

C. P. HUNTINGTON TRAIN

Service Manual

Manual Number 1020050-001

PHONE: 316-942-7411 • WWW.RIDES.COM

FAXES: ADMINISTRATION 316-942-0320 • PURCHASING 316-945-3498 • CUSTOMER SERVICE 316-942-2012

P.O. BOX 12328 WICHITA, KS 67277-2328 • SHIPPING: 4200 W. WALKER WICHITA, KS 67209

Ride Information Plaque and Serial Number Plates

The ride information plaque and serial number plates are mounted in the following locations. Record the serial numbers in the spaces provided.

Locomotive - Mounted to the left hand side of the cab under the walkboard. The plaque lists ride specifications, operating dimensions, weights, as well as model and serial number and date of manufacture.

Locomotive serial number _____

Coaches - Mounted to left hand side of each coach frame. The plaque lists model and serial number and date of manufacture.

Coach serial numbers _____

Engine - Mounted to side of the engine valve cover

Engine serial number _____

Transmission - Mounted to side of the transmission housing

Transmission serial number _____

Air compressor - Mounted to side of the air compressor cylinder block

Air compressor serial number _____

When ordering parts or requesting information from the CHANCE Customer Service Department, always specify the model and serial number of your train.

IMPORTANT: Always refer to the ride information plaque on your ride for specifications.

The terms "right hand" (RH) and "left hand" (LH) as used in this manual are determined by sitting in the operator's seat facing the front of the locomotive.

C. P. HUNTINGTON

MODEL NO. 102

SERIAL NO. [REDACTED]

DATE OF
MANUFACTURE [REDACTED]

ENGINE NO. [REDACTED]

ENGINE HORSEPOWER [REDACTED]

CRM

CHANCE RIDES MANUFACTURING, INC.

MAXIMUM COACH CAPACITY: 14 ADULTS OR 21 CHILDREN (2380 LB.)

MAXIMUM SEAT CAPACITY: 2 ADULTS OR 3 CHILDREN (340 LB.)

MINIMUM PASSENGER HEIGHT: 42 INCHES - UNACCOMPANIED BY ADULT

MAXIMUM RIDE SPEED: 12 MPH

MAXIMUM GRADE: 3%

MINIMUM TRACK CURVE RADIUS: 50 FT.

TRACK GAUGE: 24 IN.

WEIGHT EMPTY: LOCOMOTIVE 6100 LBS., COACH 2700 LBS.

Conforms with all applicable ASTM amusement
ride standards in effect on date of manufacture.

MANUFACTURED IN THE U.S.A. BY
CHANCE RIDES MANUFACTURING, INC. WICHITA, KANSAS

1020589-001



CHANCE RIDES MANUFACTURING, INC.

C. P. HUNTINGTON TRAIN

Installation of Components and Track Preparation Guide

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Installation of Components and Track Preparation

Introduction - Planning the Overall Layout

This manual is provided as a service by Chance Rides Manufacturing, Inc. to assist in planning your track installation. It is for informational purposes only. We recommend that you consult with Chance Rides Manufacturing, Inc. before beginning construction to review your proposed track layout.

When planning the overall layout and track routing, several important factors must be considered. One of the most important factors is to provide high visibility to heavy traffic areas whenever possible, which will encourage ridership. Another important factor is to provide patrons with a pleasant ride through an attractive setting. Route the train past scenic features in the area. Lakes, streams, waterfalls, ravines and wooded areas are ideal if conditions permit. Bridges, trestles and tunnels also provide a very realistic feeling for the overall train ride. In addition, tunnels may also be used for overnight and off-season storage of the train.

Chance Rides Manufacturing, Inc. does not recommend running the train through or near pedestrian areas without some type of safety barrier. If the track is located near a pedestrian area, always use fencing, landscaping, water or other barriers to control pedestrian access to the track. At crossings, use gates and signals whenever possible to control pedestrian and vehicle traffic across the track. A listing of train whistle signals is included in this guide. Operators and employees must be trained in their use.

If the train runs near ravines or along high elevations where no guardrail is present, consider the installation of closeout panels or chains on the coaches. Closeout panels and chains are recommended for passenger safety. Consult Chance Rides Manufacturing, Inc. to discuss specific requirements.

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(Issued March, 2003)

CHANCE RIDES MANUFACTURING , INC.

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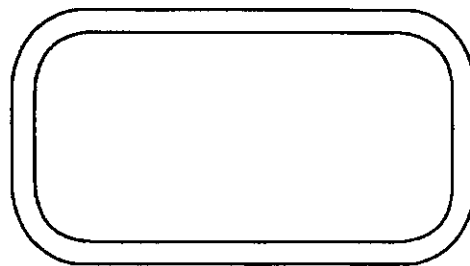
2 Chance Rides Manufacturing, Inc.

A siding must be provided so that one or more coaches can be uncoupled during slack times. Sidings also allow the removal of equipment for routine maintenance, and should be located whenever possible in a screened, sheltered or secluded area.

There are three track configurations typically used for C.P. Huntington installations. They are the loop, double loop (or "dog-bone"), and the figure eight, as shown in the following illustration.

Typical Track Configurations

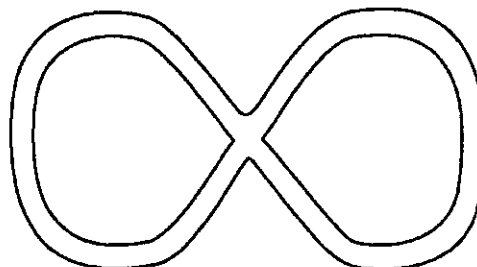
Continuous Loop



*Double Loop
(or "Dog Bone")*



Figure Eight

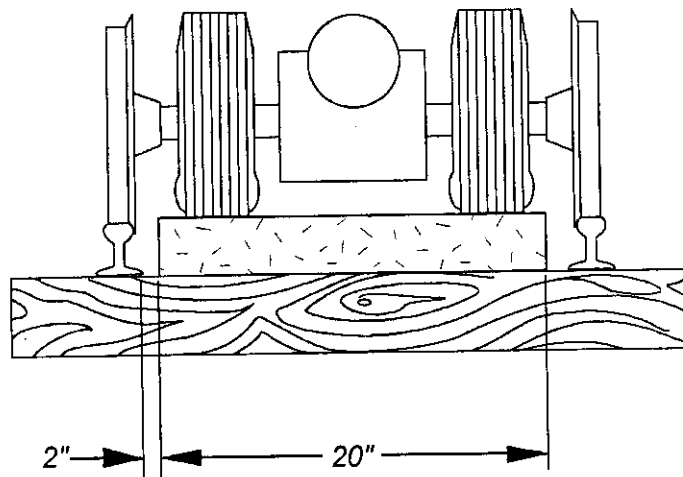


Because each location is different, one or more of these configurations might be appropriate for a specific installation. For special needs or assistance designing a specific installation, consult with Chance Rides Manufacturing, Inc. before finalizing the track layout.

Another important consideration is the station location. The station should be located in a highly visible, high-traffic area which is easily accessible to the public. The recommended length of approaches into curves, stations or grades of 2% or more is equal to the length of the train in operation (refer to "Train Length Chart" elsewhere in this manual. The approach should be level before entering the curve or station. If the train is required to enter the curve or station from both directions, equal lengths of level grade approach on tangent track are recommended at both entrances to the curve or station.

After the preliminary plans have been made, an actual track layout survey must be performed. This will determine the exact amount of grading necessary. All trains have definite limitation as to the amount of grade they can negotiate. Generally, 2 to 3 percent is considered the recommended grade for successful operation, particularly over an great distance. In most cases, grades over three percent can be negotiated for short distances, but only on tangent (straight) track. Refer to the "Grade Chart" in this manual for requirements. If grades are in excess of three to five percent, an auxiliary rubber tire drive may be required.

Rubber Tire Drive Installation



For additional information on the rubber tire drive, or to determine whether a specific installation requires it, consult Chance Rides Manufacturing, Inc.

Track Bed Preparation

Preparation of Sub-Grade

Proper preparation of the sub-grade is one of the most important steps in laying the track. Many times, too little effort is expended in the preparation of the sub-grade. The idea that ballasting will take care of any discrepancies in the grading is far from true. If the track is installed on improperly drained areas of in poor, sandy soil conditions, the track will eventually pump up and down, creating conditions which can potentially cause derailment. It is more economical to properly prepare the sub-grade than to pay for it later in additional labor and material costs.



WARNING: Improperly installed track can cause derailment and serious personal injury. When installing track in unstable, damp or sandy soil conditions, follow the installation instructions described under "Special Soil Conditions" in this manual to avoid excessive moisture and prevent wash-outs.

A properly designed and well engineered track bed is important. Whenever possible, low-lying areas must receive sufficient fill to elevate the track bed, allowing for proper drainage. In areas where potential run-off problems exist, the area must be stabilized or run-off diverted to eliminate track wash-outs. On level or sloping terrain, it may be necessary to install drain pipes or ditches on one or both sides of the track to control excessive run-off. Always maintain sufficient grade in ditches (2:1 to 3:1) to allow for proper drainage.

When adding fill, it is important to maintain the proper compaction at all times. Fill should be added in 6- to 10-inch layers, and each layer should be compacted to 95 percent prior to application of the next layer. When complete, the entire fill area should again be compacted before 3 to 4 inches of base ballast (1-1/2" to dust) is added. Then the track bed should be compacted once again to 95 percent.

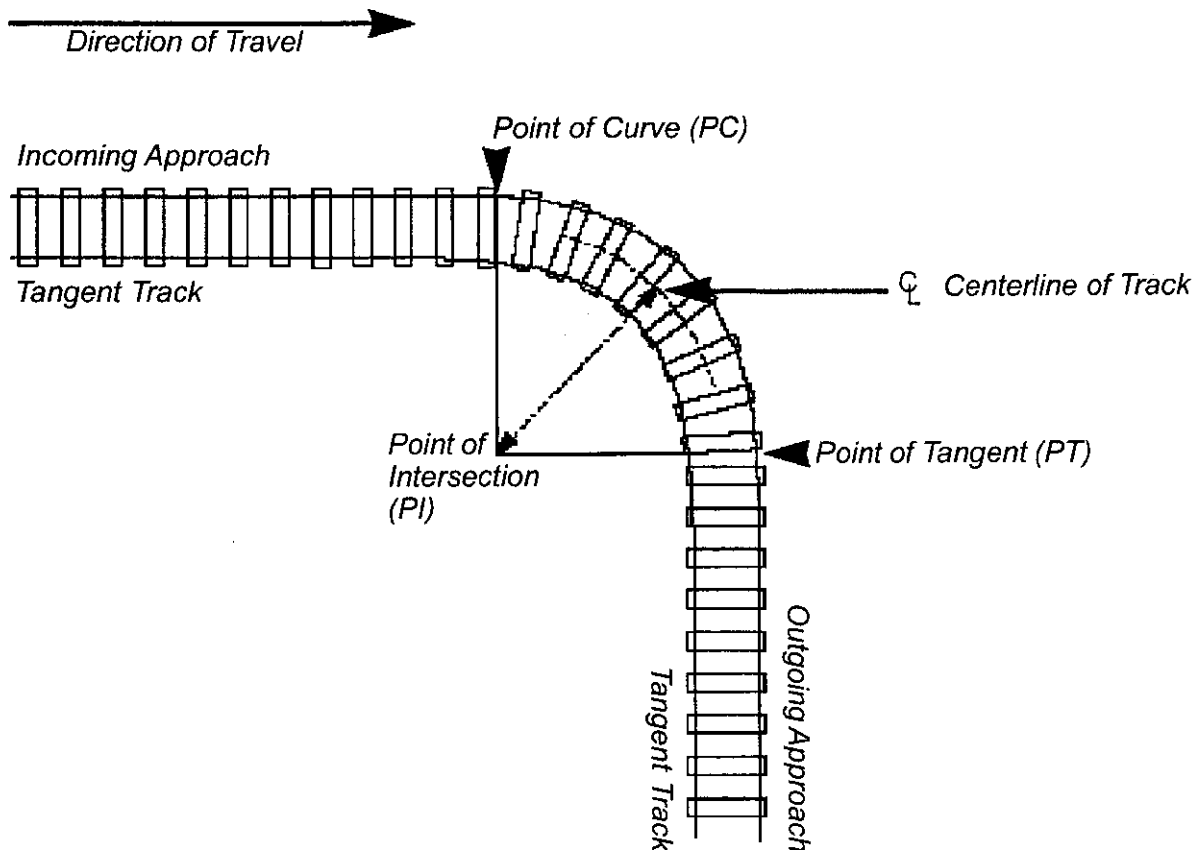
When preparing the track bed, it is important to create a right of way of approximately 10 feet (excluding ditches), allowing five feet of clearance on each side from the centerline of the track, as well as overhead clearance of at least 8 to 10 feet. The track bed itself should be at least 10 feet wide and compacted to 95 percent before proceeding with track installation.

When preparing the track bed, keep it level across the grade, or in a constant bank for curves. Perfect track laying is prohibitive in cost and impossible to maintain, so tolerances are permitted. The change of "super elevation" of one rail above the other must not exceed 1/4-inch rise per 16 lineal feet of track; approximately 1/8-inch rise per 20 lineal feet of track is recommended. This means that the sub-grad must be as level as possible, preferably within the 1/4 inch rise in 16 feet of track limitations. This limit holds for tangent (straight) sections, approaches to curves and changes in banks of curves. On curves and super elevated areas, the operator must use discretion and good judgement in operating the train at a safe speed.

Curves

The recommended radius for curves is at least 75 feet (see "Determining Curve Radius" illustration). A radius of at least 75 feet will help eliminate squealing wheel noise. It is not always possible to maintain such a large radius on curves; however, the use of 75 feet or larger curve radii for main line operation is strongly recommended. If curves with a radius of less than 75 feet are used, the flanges on the wheels can wear down prematurely and cause excessive noise. Curves between 50 and 60 feet may require increasing the gauge on the curve by approximately 1/8 inch, while curves less than 50 feet may require increasing the gauge by up to 1/4 inch. For track installations which require curves with less than 50-foot radius, contact Chance Rides Manufacturing, Inc. for consultation prior to finalizing the track layout.

Determining Curve Radius





WARNING: "S"-curves without the recommended distance of tangent track between the curves can cause derailment. When two curves are in close proximity to each other, the distance between the point of tangent of the first curve and the point of curve of the second curve should be a section of tangent (straight) track no less than the length of the train, especially in reverse curve situations.

All radii for preparing sub-grade for curves must be measured to the center of the track bed or sub-grade.

Approaches to curves must be prepared in such a manner that the track will be in the proper degree of bank at the point of the curve before it starts its arc. Refer to the following "Curve Radius / Bank" chart to determine the proper degree of bank.

Curve Radius / Bank Chart		
Radius of Curves	*Degree of Bank	Equivalent Height of Super Elevation
50 ft. to 70 ft.	1-1/2 Degrees	5/8 inch
75 ft. to 95 ft.	1 Degree	7/16 inch
100 ft. to 125 ft.	1/2 Degree	1/4 inch

* Recommended approach to the Point of Curve should be approximately 1/4 inch rise of the line (outside) rail per 200 feet of approach.

EXAMPLE: (75-foot radius curve)

Recommended degree of bank 1 Degree

Equivalent height 7/16 inch

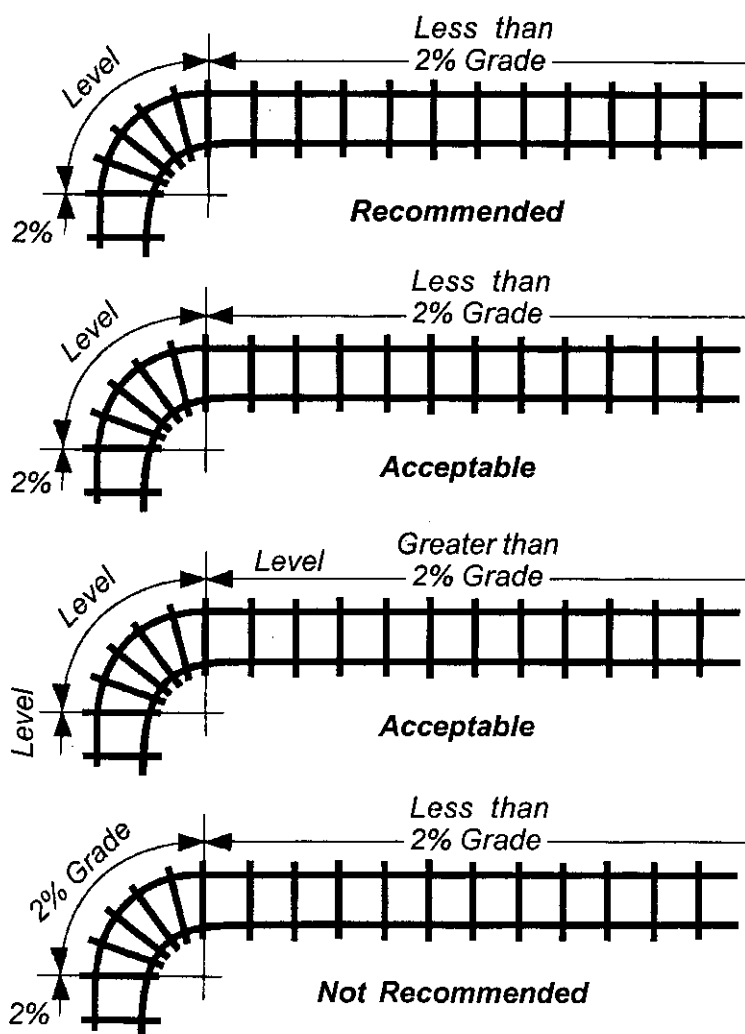
Equivalent height (7/16")
1/8" = $3\text{-}1/2 \times 20 \text{ ft.} = 70 \text{ ft.}$

Recommended length of approach is 70 ft.

Approaches

The recommended length of approaches into curves, stations or grades of 2% or more is equal to the length of the train in operation (refer to "Train Length Chart" elsewhere in this manual. The approach should be level before entering the curve or station. If the train is required to enter the curve or station from both directions, equal lengths of level grade approach on tangent track are recommended at both entrances to the curve or station.

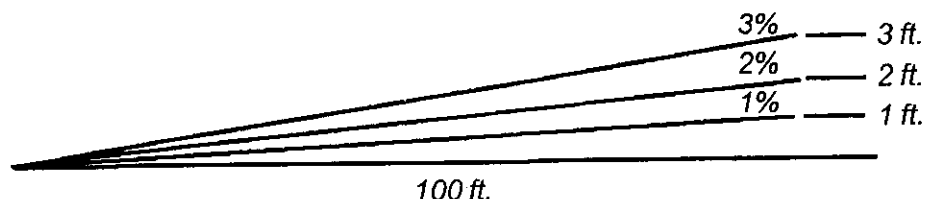
Curve Recommendations



Grades

Prepare uphill grades using cuts or fills as necessary so the grade does not exceed three percent. This three percent figure means three feet of rise per 100 linear feet of track, and must be constant grade spread over the entire 100-foot length.

Grade Calculation



A two percent grade is more desirable and should be used if possible. It is possible to negotiate grades over three percent, but only for very short distances and on tangent (straight) track. If track design includes grades of three percent or more, consult Chance Rides Manufacturing, Inc. for approval of the installation. The "Grades Chart" may be used as a guide for the amount of grade that can be negotiated with a given number of coaches. For downhill grades, use the same guidelines.



WARNING: Derailment of the train can cause serious personal injury. Excessive speed can cause derailment, as well as excessive wear on brakes. Always operate the train at a speed that is reasonable and prudent for existing conditions - especially when traveling downhill.

Avoid grades in curved sections of track. If necessary, hold grades to a maximum of two percent.

Grades Chart

Use the following chart as a guide only. It should not be used to determine the exact grades to be utilized in a specific installation. **Contact Chance Rides Manufacturing, Inc. for any questions or other assistance.**

Grades Chart			
Percent Grade or Rise per 100 ft.	Angle Degrees & Min.	Number of Coaches With 14 Passengers Each	
		Normal Rails .15	Sanded Rails .25
1	0°-34'	10	10
2	0°-9'	8	10
3	1°-43'	5	9
4	2°-17'	3	6
5	2°-52'	2	5
6	3°-26'	1	4
7	4°-0'	1	3
8	4°-34'	1	2
9	5°-9'	-	2
10	5°-43'	-	1
11	6°-17'	-	1
12	6°-51'	-	1
13	7°-24'	-	1
14	7°-58'	-	-
15	8°-32'	-	-
Maximum Draw Bar Pull		915 lbs.	1525 lbs.

Materials for Laying Track

Ballast

Ballast materials can usually be obtained locally, and most railroad offices can advise as to the suitability of the materials available. Preferred material is a crushed material such as slag, limestone, cracked gravel or trap rock. When ordering ballast, it is recommended that 1/2" clean to a maximum of 3/4" clean material be used. Smooth surface materials such as pebbles or crushed shell are not recommended for use as ballast materials.

Gauge Rods

Gauge Rods can extend the life of ties and can be added to older, existing installations to help prolong life. They are usually not necessary on a new track installation, provided the track is built properly.

Various types of gauge rods exist. A simple metal strap may be welded under the rails prior to adding fill ballast. Adjustable gauge rods and threaded gauge rods may also be obtained or manufactured locally. When it is necessary to use gauge rods, Chance Rides Manufacturing, Inc. recommends that they be placed every 6 to 8 feet.

Ties

There are numerous types of ties; check locally for hardwood and softwood tie availability. Treated wood, steel laminate and steel ties may also be available through rail suppliers for standard installation. Chance Rides Manufacturing, Inc. recommends using 4" x 6" x 42" or 6" x 6" x 42" .40 CCA Green-treated softwood ties in Ponderosa Pine, Jack Pine, Southern Yellow Pine, #2 Douglas Fir, or an equivalent.

Another alternative is a 60/40 creosote-treated hardwood or softwood tie. This tie offers the longest life of all wood ties, but may present potential liability to the extent that it is exposed to the public.



CAUTION: The chemical compound Creosote is a carcinogen, and is very dangerous if rubbed into the eyes. It can also sterilize soil, and can be tracked onto surrounding grounds, increasing the hazard of exposure. For a complete understanding of the properties and characteristics of Creosote, consult a Material Safety Data Sheet (MSDS), available from the supplier.

Hardwood ties will not accept the .40 CCA Green-treatment as readily as the Creosote treatment due to the level of penetration used in the treatment process.

IMPORTANT: *When using wood ties, it is important to remember that use in damp or high moisture conditions can shorten the life of wood ties.*

Steel ties for 20-, 16-, and 12-lb. rail are available by special order. **Consult Chance Rides Manufacturing, Inc. for information on availability.** Steel ties can offer longer service life and greatly reduced maintenance. These ties have a cam-locking device and eliminate the need for spikes. Steel ties, however, are more expensive, and may be alternated with wood ties to help maintain the gauge. Steel ties may also be available laminated to CCA Green-treated or Creosote-treated hardwood, which helps maintain the authentic appearance of the track. These ties also add stability and offer a longer service life, as well as greatly reduced maintenance costs.

Pre-formed concrete ties with studs and treated with a water sealant may be available or manufactured locally for damp climates and low-lying wetlands.

When using 20-lb. rail, it is recommended that 6" x 6" ties or 6" x 8" ties be used for average soil conditions, with a length of 42 to 48 inches. Smaller 4" x 6" ties are also acceptable, but will require more maintenance. If 12-lb. or 16-lb. rail is used, 4" x 4" and 4" x 6" ties are acceptable, but 6" x 6" ties are recommended because they will accept a larger spike. Larger spikes allow for a more stable installation requiring less maintenance. For sandy or soft soil, it is advisable to use 6" or 8" wide ties, as these will provide more load-bearing surface.

NOTE: *If wood for ties is purchased in 10-foot lengths, 40" ties are acceptable, allowing three ties per length. Use caution in spiking ties, however, as the spikes located close to the end of each tie have a tendency to split the wood. It may be advisable to drill pilot holes to help prevent splitting the wood (see "Tie Installation" in this manual).*

Always obtain information on soil conditions and weather variables for the area to determine which type of tie is best suited to a specific installation.

Rails

Railroad rails are classified by the weight of the rail per yard of length. Rail in standard 30-foot lengths is recommended.

The C.P. Huntington will operate on 12-, 16- or 20-lb. rail. **However, it is recommended that 20-lb. rail be used whenever possible.** Due to lack of availability in some areas, as well as generally higher maintenance, 12- and 16-lb. are being used less frequently.

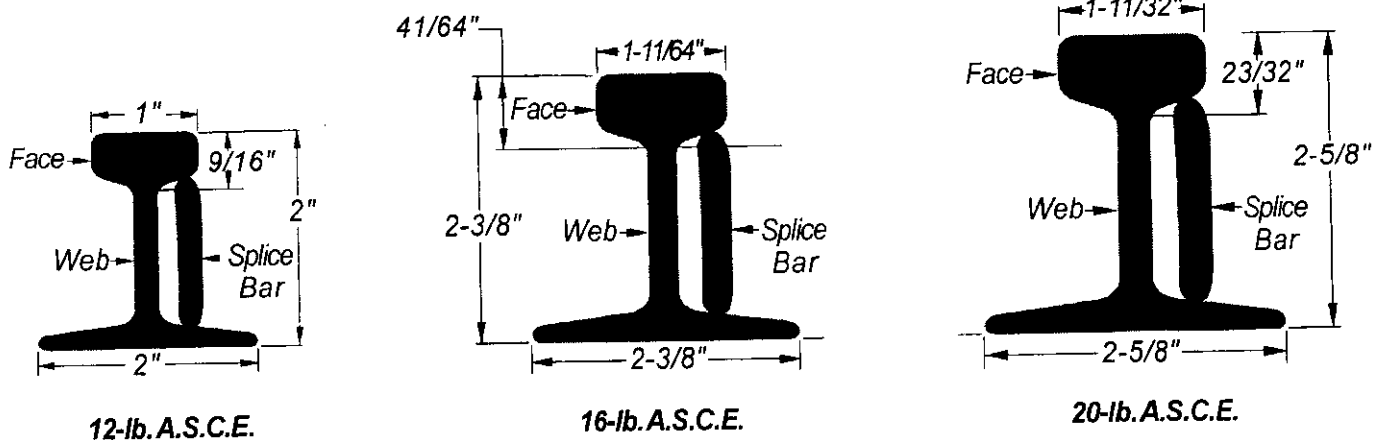
In some instances, due to the unavailability of 12- to 20-lb. rail, 25- and 30-lb. rail has been used for C.P. Huntington installations. If used, ties must be 6" x 6" or 6" x 8" on a maximum 24" spacing.

IMPORTANT: Use of 25- and 30-lb. rail may cause abnormal wheel wear and reduce traction.

Splice bar	12-lb.	16-lb.	20-lb.
Lbs./ft. (nominal)	1.5	2.0	1.83
Pairs:			
Net ton	16.7	12.5	10.0
Mile of track	352.0	352.0	352.0

Rail (30 ft.)	12-lb.	16-lb.	20-lb.
Lbs./yd.. (nominal)	12.0	16.0	20.0
Track feet/net ton	250.0	187.5	150.0
Net tons/track mile	21.1	28.2	35.2

Rail Dimensions



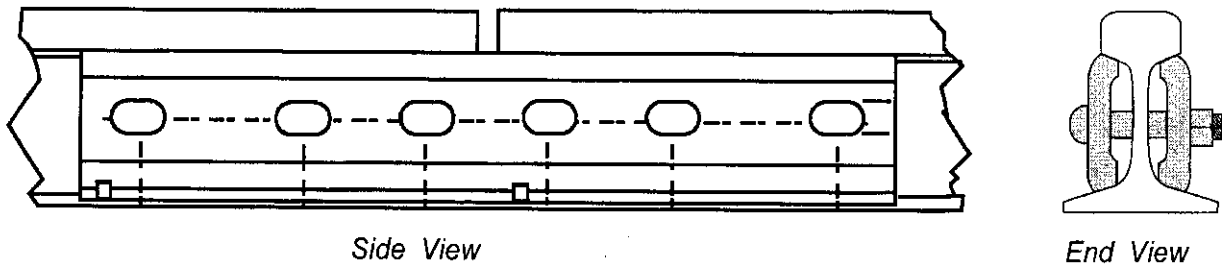
Used Rail

Often, used rail from old mines or industrial tracks may be available locally through a railroad supplier. Due to its composition, use rail often hardens in position, thus having a tendency to break if bent or straightened. Always test used rail before purchasing by bending with a manual or rolling rail bender. Also, inspect the ball (crown/head) and face of the ball for excessive wear. If signs of excessive wear are visible on both faces of the ball, the rail must not be used. If only one face is worn excessively, the rail can be reversed and can likely provide several years of service. Bear in mind, however, that some older rail may not have been properly heat treated, which may cause the ball and face of the rail to wear prematurely.

Splice Bars

Splice bars must be ordered complete with bolts and nuts for the weight and quantity of rail ordered. Always make sure they are of the proper size for the rail being used. Figure one pair of splice bars, four bolts and four nuts for each piece of rails ordered.

Splice Bars



For example, if 30-foot lengths of rail are ordered, order a pair of splice bars and four each of the bolts and nuts for every 30 feet of rail - or for every 15 feet of track. Optional lock washers may be added under the splice bar nuts to help prevent bolts and nuts from loosening.

Standard track bolts are button-head, oval-neck design, fitted with square nuts. Bolt head and neck are forged steel with U.S. Standard coarse threads. Nominal diameter, specified as bolt size, is the overall thread diameter. Length is measured from under the head to the end of the bolt. Track bolt nuts should be manufactured to the American Standard heavy unfinished square design. Carbon steel lock washers should be oil tempered and tested, and should be properly sized to the bolts being used. Lock washers are normally ordered by the piece; however, keg quantities are available from rail suppliers.

Spikes

Cut track spikes consist of a square body with a flat hook head, reinforced throat and chisel point at the bottom end. They are manufactured in accordance with American Railway Engineering Association standards

Track spikes are measured from under the head to the cut end. When ordering, check to be sure that the size of the spike conforms to the weight of the rail and the thickness of ties being used. Refer the following "Recommended Tie/ Spike Chart."

Recommended Tie/Spike Chart		
Rail Size	Approved Ties	Recommended Spikes
12-lb.	4" x 4"	3/8" x 3"
12-lb.	4" x 6"	3/8" x 3-1/2"
12-lb.	6" x 6"	3/8" x 3-1/2" - 4-1/2"
12-lb.	6" x 8" *	3/8" x 5" or 9/16" x 5-1/2"
16-lb.	4" x 6"	3/8" x 3-1/2"
16-lb.	6" x 6"	3/8" x 3-1/2" - 4-1/2"
16-lb.	6" x 8" *	3/8" x 5" or 9/16" x 5-1/2"
20-lb.	6" x 6"	3/8" x 3-1/2" - 4-1/2"
20-lb.	6" x 8" *	3/8" x 5" or 9/16" x 5-1/2"

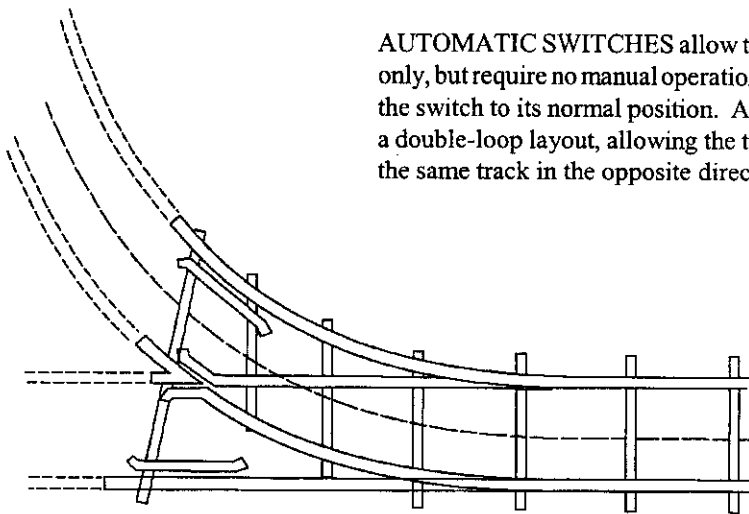
* Railroad Industrial Standard

Turnout Switches

Turnout switches are available from Chance Rides Manufacturing, Inc. in left hand, right hand and "Y" configurations. They are available for 12- or 20-lb. rails, and are built with a 50-foot radius turnout. Intersection configurations, which require a steel base plate or reinforced concrete pad, may be fabricated on-site. This type of intersection may require a signal for safety. Consult Chance Rides Manufacturing, Inc. for the requirements of any specific application.

MANUAL SWITCHES allow the train to pass through in either direction. Switches must be actuated manually at each use. Manual switches are normally used for sidings, etc.

AUTOMATIC SWITCHES allow the train to pass through in one direction only, but require no manual operation. After the train passes, a spring returns the switch to its normal position. Automatic switches are normally used in a double-loop layout, allowing the train to turn around and come back over the same track in the opposite direction.



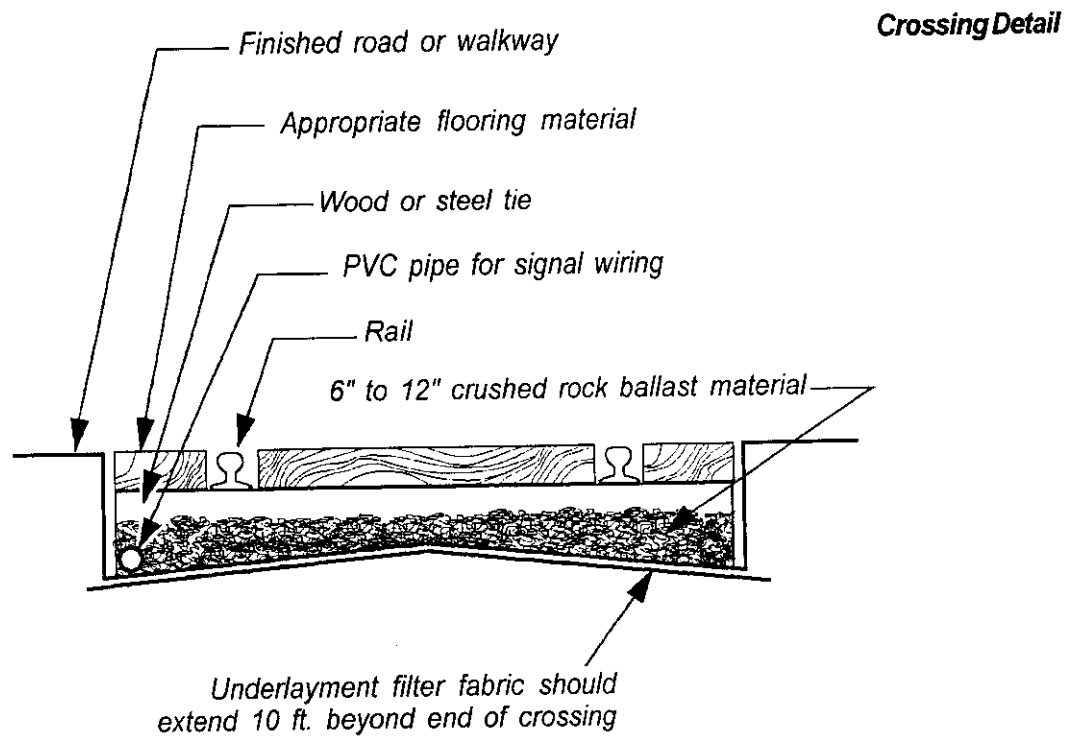
Right Hand Turnout Switch
(Left Hand Turnout Switch Opposite)

Turnout Switch Part Numbers			
Rail Weight	Type	Configuration	Part Number
12-lb.	Manual	Right Hand	1027504-001
12-lb.	Manual	Left Hand	1027504-002
12-lb.	Automatic	Right Hand	1027515-001
12-lb.	Automatic	Left Hand	1027515-002
20-lb.	Manual	Right Hand	1027503-001
20-lb.	Manual	Left Hand	1027503-002
20-lb.	Automatic	Right Hand	1027514-001
20-lb.	Automatic	Left Hand	1027514-002

Crossings

Pedestrian and automobile crossings must be floored with wood, asphalt, reinforced concrete or a rubberized matting material to create a smooth surface for pedestrian or vehicle passage.

The crossing floor must be the same height as the rails, yet maintain a gap on each side as shown. Keep the gap clear of debris at all times.



Barriers are also recommended at crossings to prevent pedestrians from wandering onto the track or other restricted areas. The barriers should be located on both sides of the crossing to promote safe crowd management.

Track Installation

Recommended Material Guidelines for Standard Installation

- 20-lb. Rail, 30 ft. lengths
- CCA Green-Treated 6" x 6" x 42" Softwood Ties
- 1/2" x 4-1/2" Spikes
- 1/2" to 3/4" Approved Clean Crushed Ballast of Acceptable Material

There are two approved methods of track installation. **For installations in sandy areas or low-lying, poor drainage areas where moisture is a problem, refer the instructions under "Special Soil Conditions" in this manual.** If the ground is wet, it is recommended that it be allowed to dry before installation begins to ensure proper compaction.

Installation Method #1

Base Ballast Installation

Base ballast should be placed in an even layer over the prepared track bed at a minimum depth of 3 to 4 inches and a width of 4 to 6 feet to level the track and provide proper bank for curves. Base ballast prevents the ties from resting directly on the ground. If ties are placed directly on the ground, they will be subject to decay, rot and infestation by borers, which will result in early replacement of ties and track pumping.

Tie Installation

Once a proper base of ballast is in place, the ties should be laid on the base ballast per the following chart.

NOTE: *Spacing of ties will vary according to local soil conditions and the weight of rail used. When deciding on tie spacing, it is important to remember that the closer the ties are spaced, the less maintenance will be required to keep the rails in level and in proper gauge.*

Tie Spacing Chart			
Tie Size	Rail	Tie Spacing	
		Curves	Tangent
4" x 4"	12-lb.	18"	20"
4" x 6"	12-lb.	18"	20"
4" x 6"	16-lb.	18"	20"
6" x 6"	12-lb.	18"	20"
6" x 6"	16-lb.	18"	20"
6" x 6"	20-lb.	20"	20"
6" x 8"	20-lb.	20"	20" to 24"

In some instances, it is recommended that the pilot holes for spikes be drilled at a 90 degree angle into the ties before attempting to drive spikes. This is especially true for ties made of hardwood, as it will help prevent splitting and ensure that the spikes are driven in at a 90 degree angle. Pre-drill hardwood ties to the following specifications:

- 3/8" Spike – 1/4" drill bit
- 1/2" Spike – 3/8" drill bit
- 9/16" Spike (railroad industry standard) – 7/16" drill bit

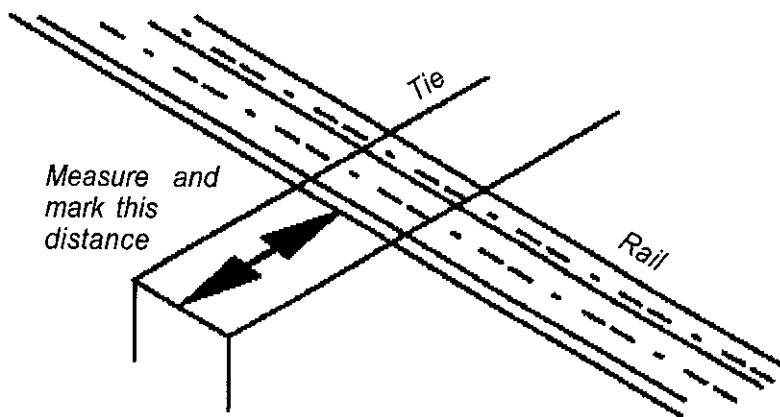
Rail Installation

The following terms will be important to remember in reviewing the track-laying procedure:

- **Line Rail** – Outside rail
- **Gauge Rail** – Inside rail
- **Gauge Side Face of the Ball** – Inside face of the rail / ball
- **Field Side Face of the Ball** – Outside face of the rail / ball
- **Base** – Flanged base of the rail which rests on the ties

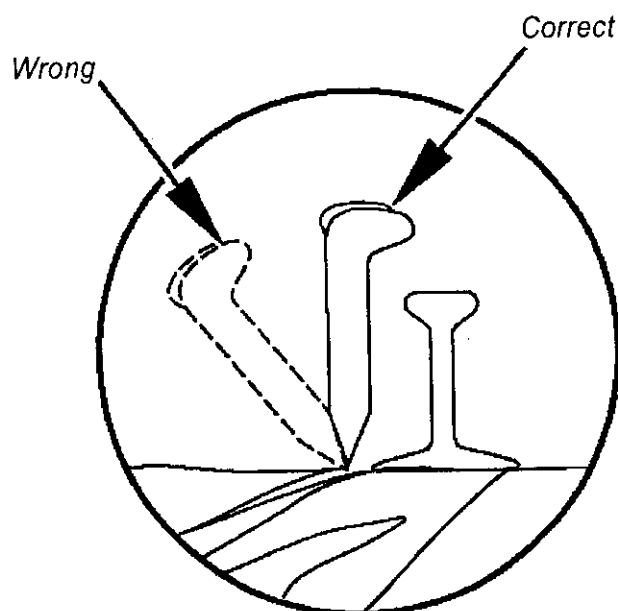
The line (or outside) rail is attached to the ties using the following procedure: First, determine the center line. Then determine the correct position of the line (outside) rail.

Select a tie of average length, and measure the distance from the end of the tie to the field side of the line rail base. Mark this position on the tie. This gives the proper distance to mark and maintain on the rest of the ties. Use this measurement to mark all additional ties for proper positioning of the line rail.



Position the line rail using the marks provided. Spike the line rail in place on every tie using one spike for every tie. **As you spike, make sure that there is a tie under every joint.**

Drive spikes straight down and tight up against the rails as shown. Do not drive spikes in at an angle, as the track will move in hot weather or when the train passes over, and may cause the spikes to work loose.



Spike Installation

Place the gauge rail in its proper position and spike every tie. For proper gauging of the rails, use a triangular track gauge (Chance part number 32963000). The correct distance between the rails is exactly 24 inches for 24 gauge trains in tangent (straight) sections. Improperly gauged track can cause abnormal and excessive wheel wear and possible derailment.

When laying the gauge rail on 30-foot rail lengths, it is recommended that the gauge rail joint be offset 15 feet from the line rail joint for staggered track installation. Make sure all rail joints fall on the center line of a tie. Always avoid line rail and gauge rail joints falling on the same tie, except for switch installations.

During rail installation, use a removable metal or wood ship of the proper thickness to leave a gap between rail joints for expansion. Proper gapping between rail joints will help prevent rail buckling, loss of gauge and plowing of ballast away from ties at curves. It is better to allow too much gap than too little; gaps may vary as much as 50 percent from the gap measurements shown in the following "Gap Between Rail Joints" chart. After splice bars have been properly positioned and tightened, remove the shims.

Temperature (In Degrees Fahrenheit)	Expansion (Gap) (In Inches)
-10°	5/16"
-10° to 14°	1/4"
15° to 34°	3/16"
35° to 59°	1/8"
60° to 85°	1/16"
Over 85°	None

IMPORTANT: *Keep in mind that, as temperatures change during the installation, gaps in rail joints must be adjusted accordingly.*

According to the American Railway Engineering Association manual, temperature measurements should be taken on the shady side of a rail with a rail thermometer, available from most railroad suppliers. Recommended gaps in rail joints (all rail sizes) are shown in the following chart.

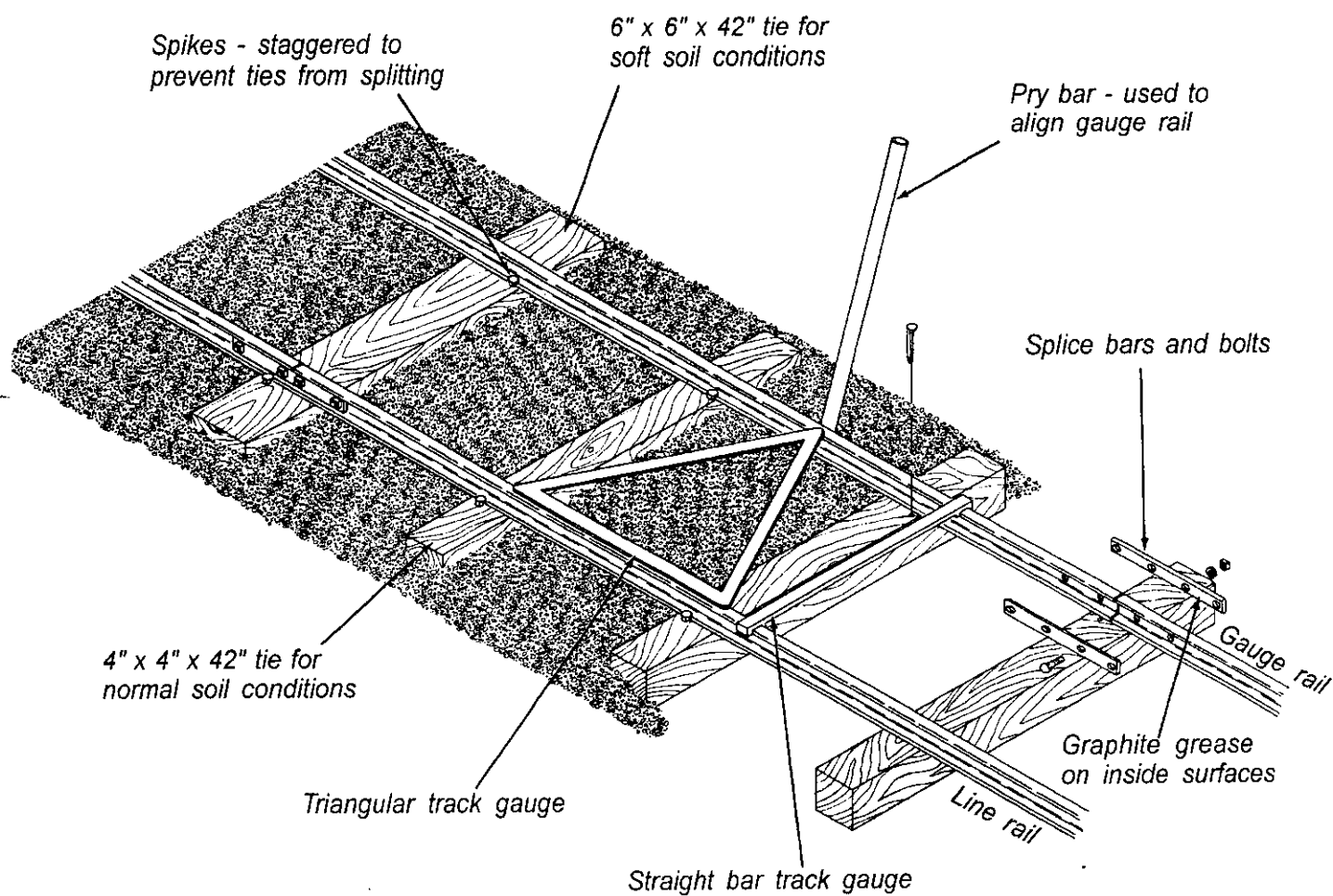
When track alignment and gauge are accurately secured, the balance of spikes can be driven.

Splice Bar Installation

Before installing the splice bars, lubricate the inside of the bar with a grease containing graphite. For 12-, 16- and 20-lb. rail, bolts should be installed from the inside, pointing out. If it is necessary to use 25-lb. or larger rail, bolts should be installed alternating between inside-pointing-out to outside-pointing-in. Place the nut on the bolt and tighten it until the splice bar becomes snug. **Do not over-tighten.** If lock washers are used, place the lock washer and nut on the bolt and tighten just enough to flatten the lock washer.

IMPORTANT: *Excess tightening of bolts will cause binding and buckling when the rails expand, and may push the rail outward on curves. If ballast is pushed away from the outside line rail – especially on curves – excess tightening of splice bars or improper gapping of rail joints is indicated.*

Track Laying Detail

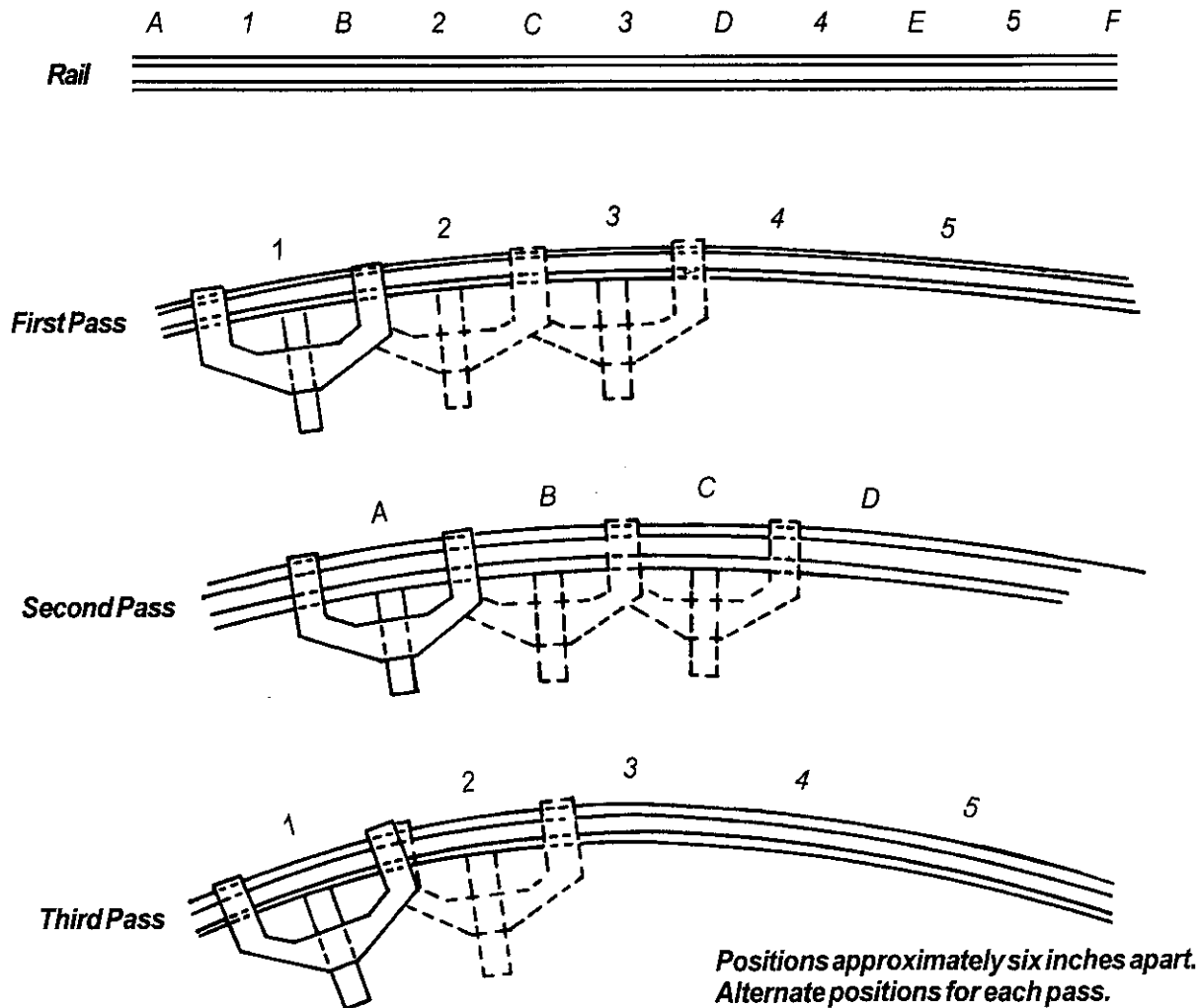


Forming Curved Rail Sections

Curves are produced by bending the line rail to a scribed arc by using a screw-type bender (Chance part number 25787700). If a contractor is hired for track installation, determine whether they will be using a rolling-type rail bender. This equipment will provide a smoother curve and usually result in a better quality installation than those made with a screw-type rail bender.

Scribe an arc with chalk on a level section of concrete to make the correct radius. If using a screw-type rail bender, make several passes until the rail matches the arc, as shown in the following illustration.

Rail Bending Diagram



Do not attempt to bend to the proper arc in one or two passes, as this will result in sharp bends or kinking. Once the line rail is formed, spike it to the ties in the same manner as straight sections, as described under "Track Installation," earlier in this section. Form the gauge rail in the same manner and spike it into position.

Under no circumstances should one attempt to bend rail by spiking down one end of the rail and pulling the other end into position to be spiked. The rail must be bent to the appropriate track curve radius using a screw-type rail bender (or rolling rail bender, if available) to avoid sharp bends and kinking which can cause derailment.



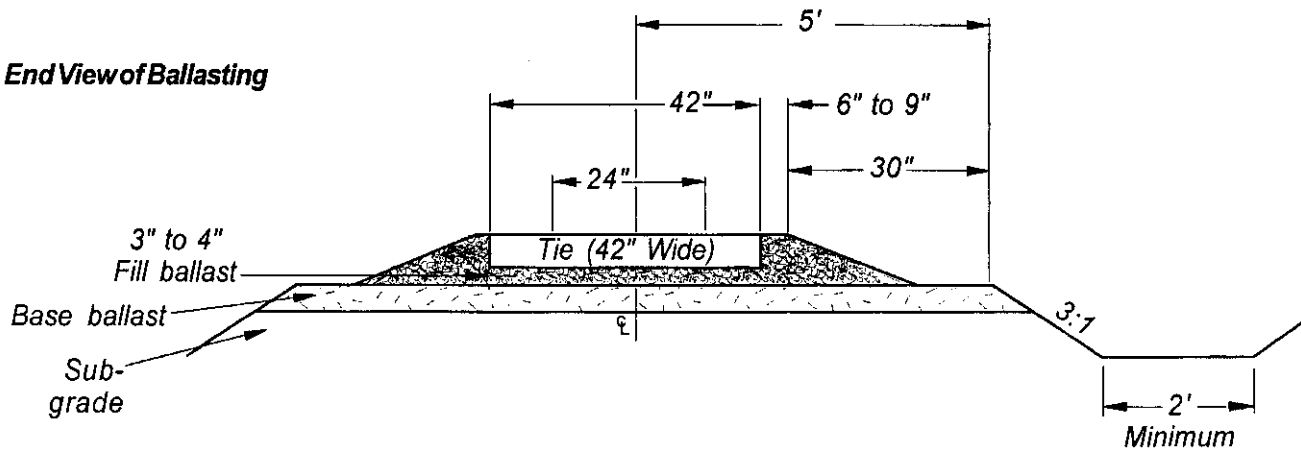
WARNING: Improperly installed track can cause derailment and serious personal injury. Rail must be properly bent and laid in the relaxed position. It is impossible to lay track to required specifications without following the recommended bending procedure. Any other method will result in an unsatisfactory and unsafe installation.

Fill Ballast

After the rails are laid and secured to the ties, fill ballast is placed between the ties. Spread the ballast by straddling the track with a dump truck with a tailgate opening the same width as the ties, or by rigging a ballast car that can be moved by the locomotive. Once the fill ballast is spread, tamp and pack the ballast under the ties until they are solid, tight and reflect the proper grade height. Tamp the ballast under the ties to the point of refusal to ensure that they are solidly secured. Any excess fill ballast material between the rails must be removed so that the fill ballast is level with the top of the ties. Fill ballast should be level with the tie 6 to 9 inches beyond the end and taper to grade at a ratio of 3:1.

Considerable time and care must be taken on the ballasting operation to provide a good track and a safe operation.

End View of Ballasting



Track Leveling

On tangent track, level each tie individually. Care must be taken to see that there are no bumps or valleys in the track. On curved sections, the outer rail must provide the proper degree of bank (see "Curve Radius / Bank Chart" elsewhere in this manual). Also, make sure that the inclination of the line rail tapers gradually into the tangent sections on both incoming and outgoing approaches (refer to "Grade Calculation" illustration).

IMPORTANT: When grade is important, it is recommended that grade stakes marked with the proper grade be driven into the ground on both sides of the track approximately 4 to 5 feet from the center line of the track. The height of these stakes should be the same as the top (ball) of the rail, plus $\frac{3}{8}$ " to allow for settling. Lay a board and level on the grade stakes, crossing the rails. When both rails are level with the board, the proper grade should be reflected.

Installation Method #2

Once the track bed is properly prepared and compacted, lay the ties on the track bed using the proper tie spacing for the type of tie and rail being used (See "Tie Spacing Chart" elsewhere in this section). Rail should be laid following the installation method described in "Installation Method #1."

When the track is constructed, cover the entire installation with 1/2" to 3/4" clean top ballast, then physically pull the track up through the ballast. If grade stakes are used, lay a board and level on the grade stakes, crossing the rails. Tamp and pack ballast under the ties until they are solid, tight and both rails are level with the board, at which point the proper grade should be reflected. Bear in mind that an allowance has been made for 3/8" for settling, follow the leveling instructions previously outlined under "Track Leveling," then remove any excess ballast material from the top of the ties.

Special Soil Conditions

In low-lying areas where poor drainage exists, it is important to observe the following installation procedures to avoid excessive moisture and wash-outs.

With the track bed in place and compacted to 95 percent, apply a layer of 6-ounce underlayment filter fabric that will completely cover the track bed area. The fabric can be obtained from any rail supplier, and is provided in 14-foot wide strips for easy installation.

Once the underlayment filter fabric is in place, apply a four to six-inch layer of road stone (1-1/2" to dust) as a sub-base, tapering both ends in line with the track to provide a smooth transition of track in and out of the low-lying areas. Compact the surface to 95 percent, then add three to four inches of clean 1/2" to 3/4" base ballast, and build the track following the installation methods previously outlined.

Track Maintenance

Track Inspection

A regular program of track inspection must be implemented.

Daily Inspection

Walk or drive the train over the entire route at the beginning of each day of operation. Carefully watch the track for obstructions and other obstacles close to the track. Observe the condition of the track throughout its entire route.

Detailed Inspection

During the first two months of operation, the following detailed inspection must be made daily, then once a week thereafter.

During inspections, visually check the conditions of the ties and ballast, looking for pushed out areas. Check for loose spikes, splice bar nuts and bolts, and debris. Also look for evidence of vandalism to both track and switches.

Periodically check the surface and inside face of the rail ball. Make sure it has not been worn so much that it will not match the profile of the wheel. Make sure there are no grooves in the top of the rail ball or excessive wear and noise can result as the wheel attempts to locate its gauge in these grooves.

In addition, also check the inside face of the line rail ball on curves, looking for chatter marks (marks caused by the flange on the wheel) and unlubricated areas.

Carry a piece of white chalk or soapstone when making inspections to mark ties, track or splice bars which require attention. In order to identify track sections, metal identification numbers can be added to ties approximately every 100 feet.

Take notes during the track inspection as to the problems needing attention (e.g., "Section 5, 10th tie - track bolt loose"). These notes can be especially helpful on longer installations or when the person making the repairs is not the same person who makes inspections.

Track Lubrication

The inside face of the line rail on curved sections of track with a radius of less than 100 feet should be kept lubricated. This is necessary to keep the flanges on the wheels from wearing out prematurely and to help eliminate excessive noise.

Lubricate the outside or line rail on the inside face of the ball only (where the wheel flanges contact the inside face). Never lubricate the top surface of the rail ball. Apply a graphite-based grease or stick grease (Cut-Ease®, Chance part number 24219500) in small amounts approximately every six to ten feet throughout the entire curve. Grease will be spread as the wheel flanges contact the inside face of the rail ball.

IMPORTANT: *Do not apply excessive amounts of grease to the inside face of the line (outside) rail. Also, check rails to make sure that the ball remains clear and free of grease. Excessive grease or dirt on the top of the ball can cause a loss of traction, as well as inconvenience customers who might get grease or dirt on their clothing or shoes.*

Rail / Ballast Movement

If the rail is being pushed out on curves, ballast will appear to have been pushed outward from the ends of the ties. This indicates one of two conditions:

- A. Improper gapping of the rails
- B. Excessive tightening of the splice bar bolts and nuts

NOTE: *Some movement of the rail is normal due to expansion and contraction of the rail with changes in temperature.*

To remedy these conditions:

- A. Inspect the joints where the rails butt together. If all joints are tightly compressed during the warmest part of the day, the rails are not properly gapped and require re-gapping.
- B. If excessive tightening of the splice bar bolts and nuts is identified, go back approximately 10 joints from the curve in both directions and loosen all bolts and re-tighten by hand. **Do not over-tighten.** If the problem persists, go back another 10 joints and repeat the procedure.

If re-gapping is required, go back 10 joints from the curve and dismantle the track. Properly gap the joints, then re-install the track and replace ballast along the outside ends of the ties. It may be necessary to trim the rail sections to achieve the proper gap.

NOTE: *Using a saw, hammer and steel wedges, it may be possible to gap the rails without taking the track apart.*

In some cases, operators have staked steel rods or steel fence posts at the ends of the ties on curves to prevent rail movement. These posts should be placed on the outside of the curve only. On tangent sections of track where rail movement is evident, use the same procedure for repairs.

Once repairs are completed, always check the gauge to make certain it is within operating parameters. Re-check the gauge periodically to avoid future problems.

To some degree, there will be a small amount of movement in all railroad ties. If tie movement is noticeable, however (especially in an up-and-down pumping action, as described in detail in the following topic), add ballast under the ties and tamp to the point of refusal. If the track is in wet or low-lying areas, poor sub-grade may be responsible. In these instances, follow the procedures outlined under "Special Soil Conditions" in this section.

Tie Pumping Action

Water or mud being forced out from the end of ties is usually evidence of the ties pumping up and down as trains pass over them. This is usually the result of fouled ballast, which occurs when water deposits mud and silt onto the ballast, causing deterioration of the sub-grade beneath.

NOTE: *Fouled ballast usually occurs in wet or low-lying areas where drainage is a problem.*

To remedy this situation in its initial stage, remove the fouled ballast under the ties and wash or clean it before placing 3 to 4 inches of ballast back on the track bed.

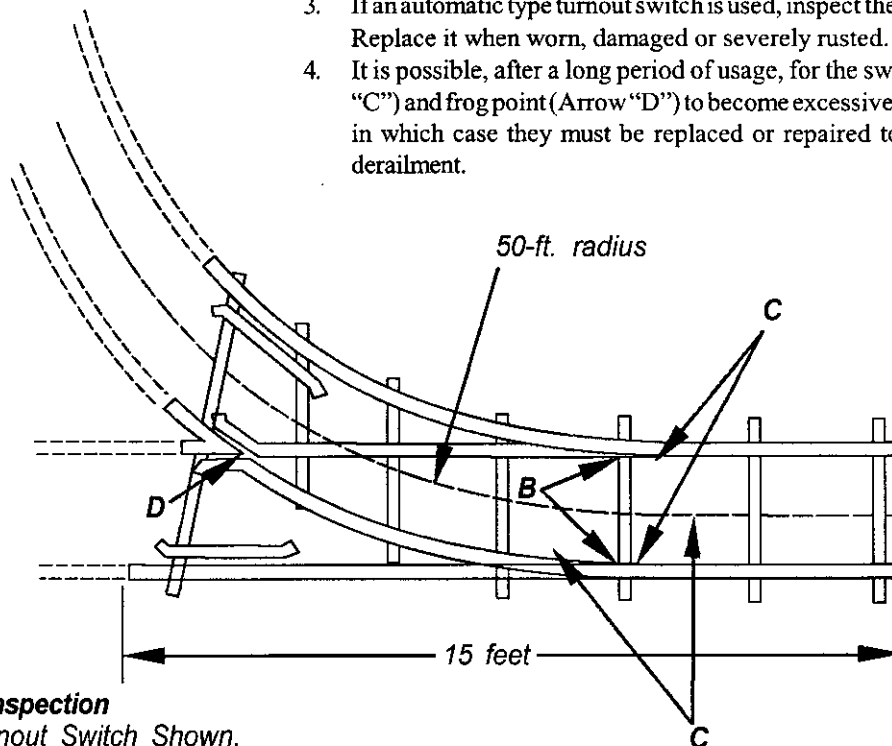
In more severe cases of pumping action where the sub-grade is in poor condition, go back two or three joints from the problem area and remove the splice bars and track, as well as all ballast in the area down to the track bed. If the track bed is soft or muddy, replace with dry fill and compact to 95 percent.

Cover the track bed with an underlayment filter fabric (see "Special Soil Conditions" in this section). If the area is low, apply a 4 to 6 inch sub-base of road stone (1-1/2" to dust) and compact to 95 percent. Taper the edges to allow for a smooth transition of track. Then add 3 to 4 inches of base ballast and re-install the section of track.

Turnout Switch Maintenance

Minimal maintenance is required for either the manual or automatic turnout switches.

1. Ballast in the area immediately below the switch (see Arrow "A" in the following illustration) must be kept lower than normal. This lessens the chance of a rock becoming lodged in between the track and switch points, which would prevent the switch from operating.
2. The steel support tubes (Arrow "B") must be kept greased where the switch pints slide back and forth on them. This use a graphite-based grease is recommended, as it will not wash off as easily during rain. All other moving parts must also be kept lubricated.
3. If an automatic type turnout switch is used, inspect the spring frequently. Replace it when worn, damaged or severely rusted.
4. It is possible, after a long period of usage, for the switch points (Arrow "C") and frog point (Arrow "D") to become excessively worn or blunted, in which case they must be replaced or repaired to prevent possible derailment.



Turnout Switch Inspection
(Right Hand Turnout Switch Shown,
Left Hand Turnout Switch Opposite)

Turnout Switch Replacement Parts

<u>Description</u>	<u>Part Number</u>
SPRING	27215700
SWITCH POINT - Inside	1027515-007
SWITCH POINT - Outside	1027515-009
CONNECTING LINK ASSEMBLY (manual switch only)	1027504-005
LINKAGE ROD	1027515-026

Avoiding Derailment

There are a number of factors which can lead to derailment under the right circumstances. These factors include, but are not limited to, those listed below. If a problem is experienced with derailment, use the following list as a resource to check the entire installation for problem areas.



WARNING: Derailment can cause serious personal injury. If any of the conditions listed below are discovered on your installation, the problem must be corrected before allowing a train to operate on that area of track.

Derailment can be caused by:

1. Expansion and/or contraction of the rail.
2. Improper track gauge.
3. Improperly gapped or uneven splice joints.
4. Transition points incorporating different rail weights.
5. Worn or damaged rail.
6. Bowed or buckled rail due to expansion or poor sub-grade.
7. Loose spikes or splice bars.
8. Improper installation of splice bar bolts.
9. Improper installation of track.
10. Incorrect splice bar bolts.
11. Bad ties.
12. Improper spacing of ties.
13. Debris on track or in crossing grooves.
14. Areas where ties are unstable or where ties show evidence of pumping action.
15. Curves where passing trains force ballast outward from track, which may cause loose spikes and/or improper gauge.

Derailment at a switch can be caused by:

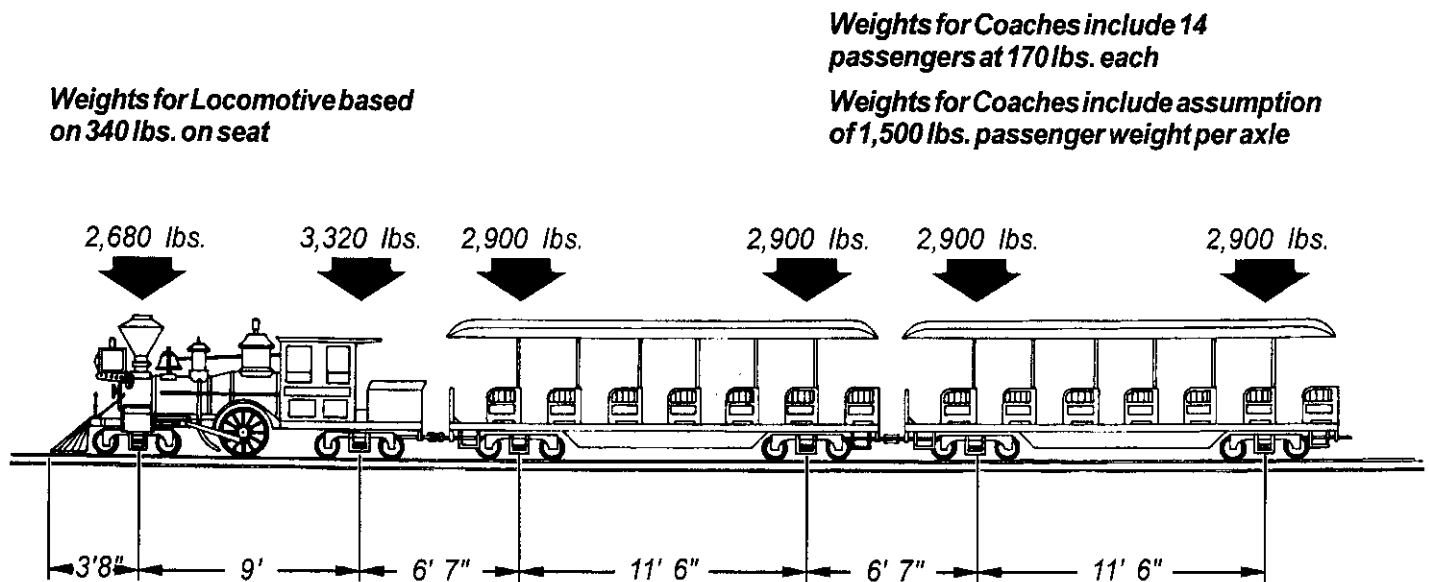
1. Improperly gapped or worn switches.
2. Switch points that are too blunt.
3. Weak or broken switch springs.
4. Improperly gapped or uneven splice joints.
5. Debris on rail or in switch points.
6. Improper ballasting (too high)

Trestles, Tunnels, Stations and Maintenance Facilities

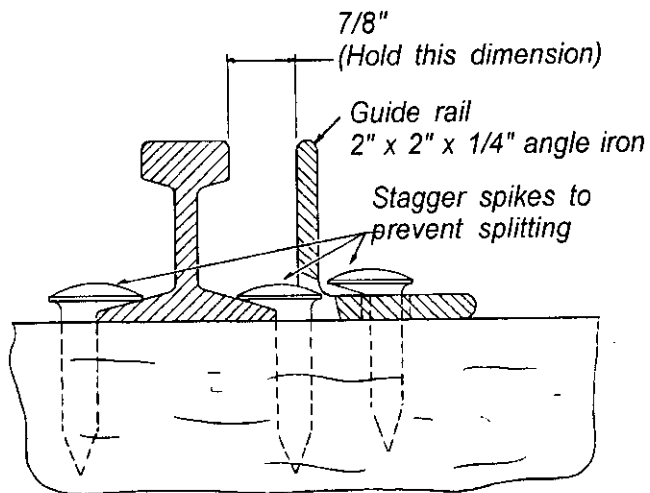
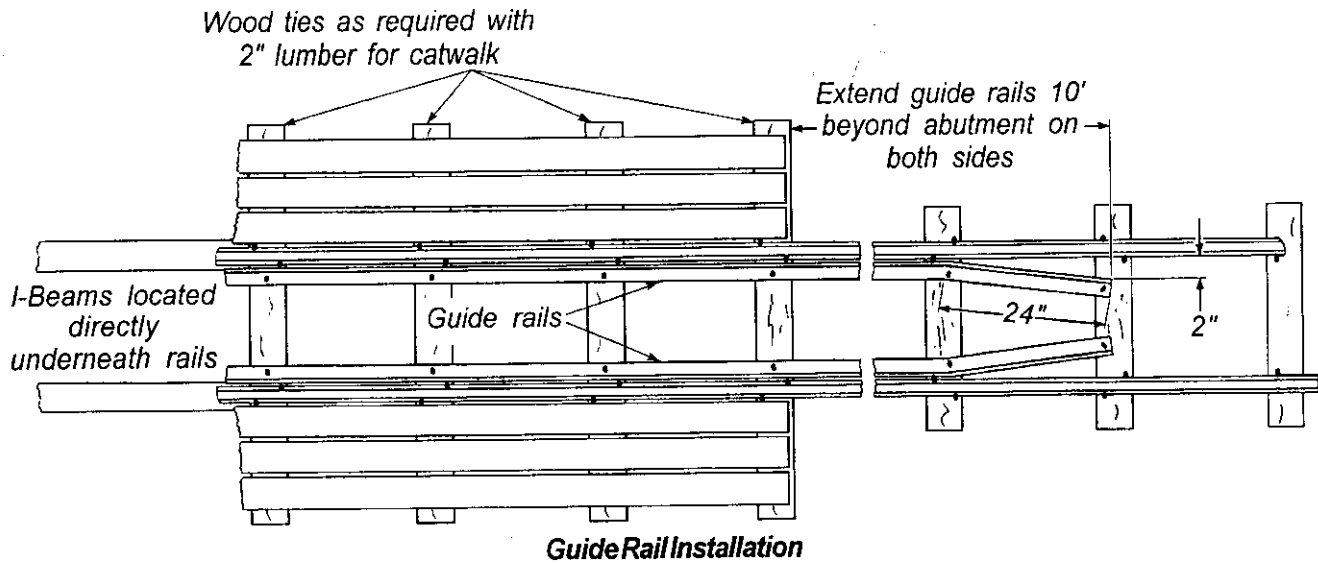
Trestles

Chance Rides Manufacturing, Inc. does not offer information in regard to the method of construction to be used in the building of trestles, tunnels or bridges. The information provided concerns the loads imposed by the locomotive and coach trucks, and the construction of guide rails that must be used on trestles or bridges.

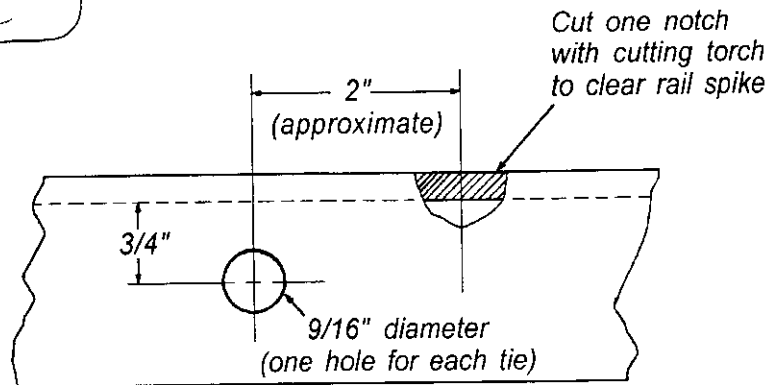
With this basic information, a local architect or civil engineer can propose a number of different designs that will meet the needs of a specific installation.



Weights for Locomotive and Coaches; Lift Points



IMPORTANT: Keep inside edge of guide rail thoroughly greased with graphite-based grease.



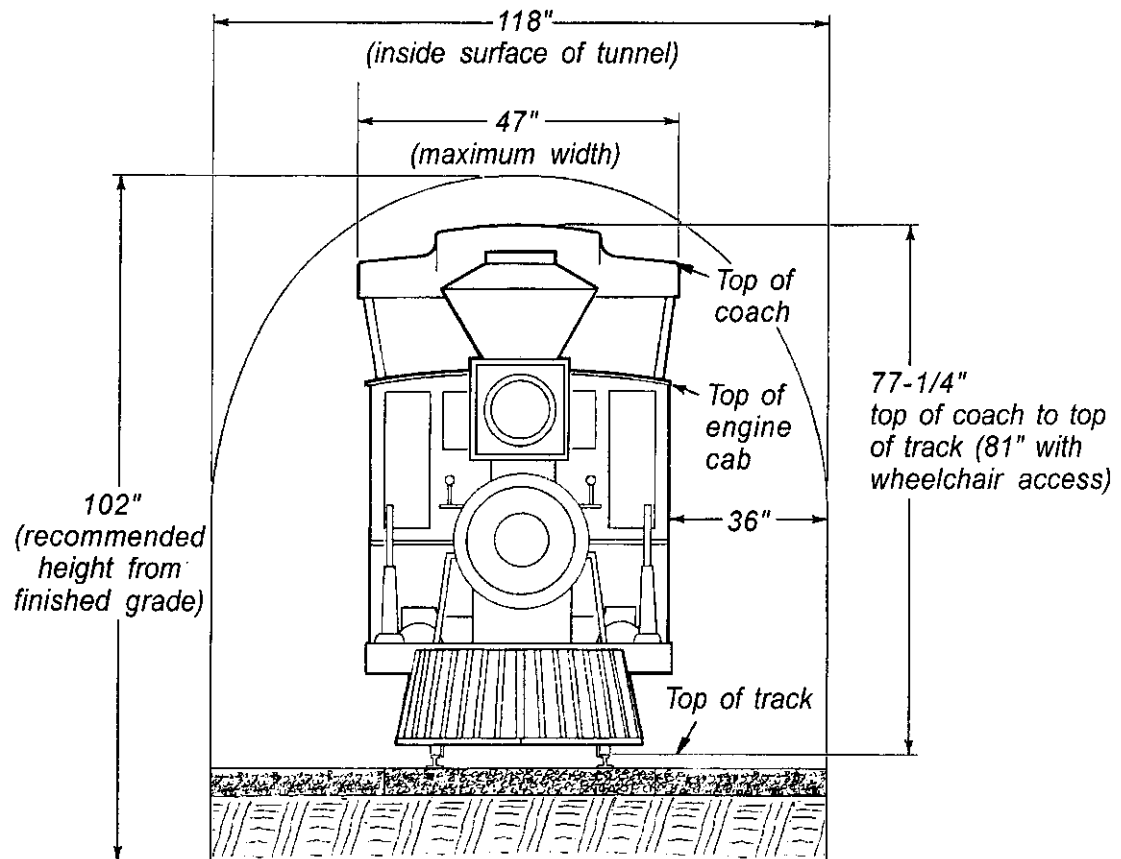
Tunnels

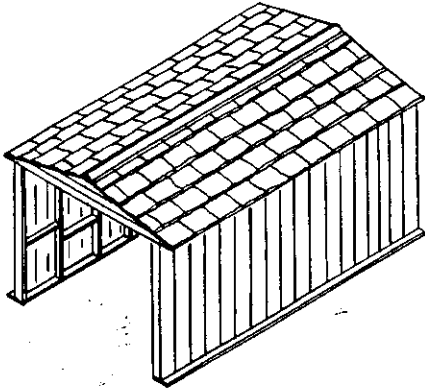
There are a variety of different materials which can be used in the construction of tunnels. Some of these materials, along with typical designs, are illustrated on the next page.

The following drawing gives the basic minimum inside dimensions that must be considered when planning a tunnel on tangent track. If the minimum dimensions are used, the inside surfaces of the tunnel must be free of any sharp obstructions.

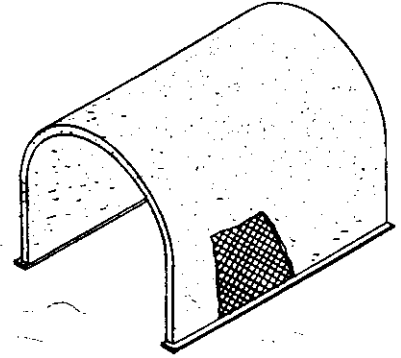
When planning a tunnel, doors are often included in the tunnel design, allowing the train to be stored in the tunnel. This eliminates the need for an additional storage building.

Minimum Inside Tunnel Dimensions

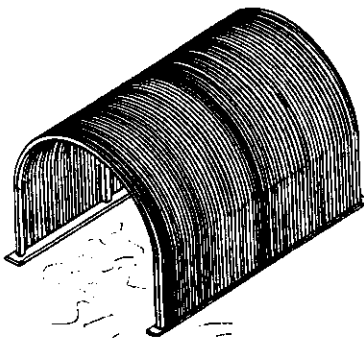




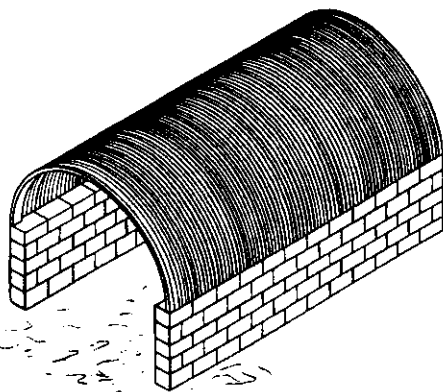
Wood



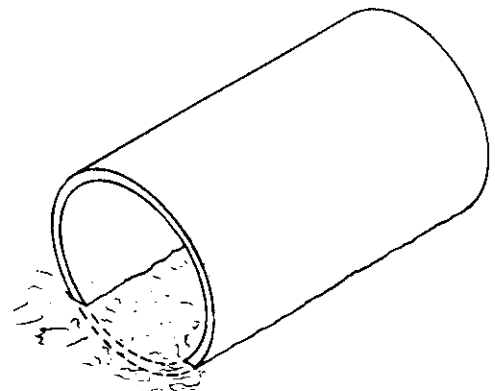
Stucco on wire mesh



Corrugated steel



Concrete blocks with steel top



Culvert

Tunnel Configurations

Stations

As mentioned in the beginning of this guide, the location of the station is vital to a successful operation of the C.P. Huntington. It should be constructed in a highly visible, heavy-traffic area where the train can arrive and depart on stretches of level, tangent track equal to the length of the train in operation. The side should also be large enough to accommodate and manage anticipated passenger capacities and queue lines with restraining systems.

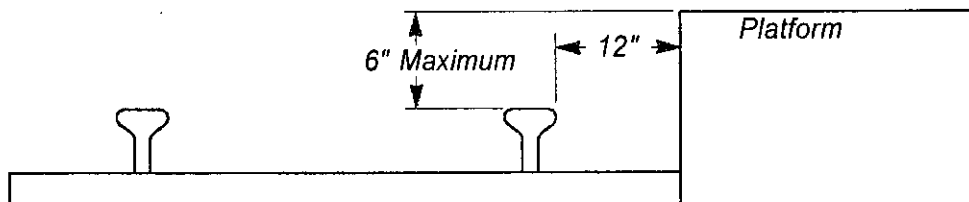
A loading platform should be constructed next to the tracks for passenger loading/unloading. While sufficient clearance must be maintained for safe passage of the train, the distance between the platform and train should be minimal for safe passenger loading/unloading.



WARNING: Excessive platform height can create a pinch point between the train and station structures. This condition can result in serious personal injury. Always follow the recommended platform design specifications.

Chance Rides Manufacturing, Inc. recommends that the platform be located no more than 12 inches from the outside face of the rail ball nearest the loading platform for safe loading/unloading. The loading surface of the platform should be elevated six inches above the top of the rail, and should be longer than the length of the train to facilitate visual inspections by the operator (Refer to "Train Length" chart elsewhere in this section).

Platform Detail



The platform may be constructed from a variety of materials, although reinforced concrete and wood are two common materials used. If the train is wheelchair accessible, the design of the platform should accommodate the length and angle of the ramp and provide sufficient landing area at the end of the ramp. Always allow at least 9 feet of depth on the platform to accommodate the wheelchair ramp extension and create a sufficient landing area.

The station building itself may also be constructed from a variety of materials, depending on theme and budget. The structure must meet all local codes and standards, and have an electrical lighting system for passenger loading/unloading if operating during evening hours. An office, rest rooms and an accessible storage area for strollers and other carry-on items is often incorporated into station designs. Many installations also include ticket sales areas, retail gift shops and food service areas due to the increased traffic a station attracts.

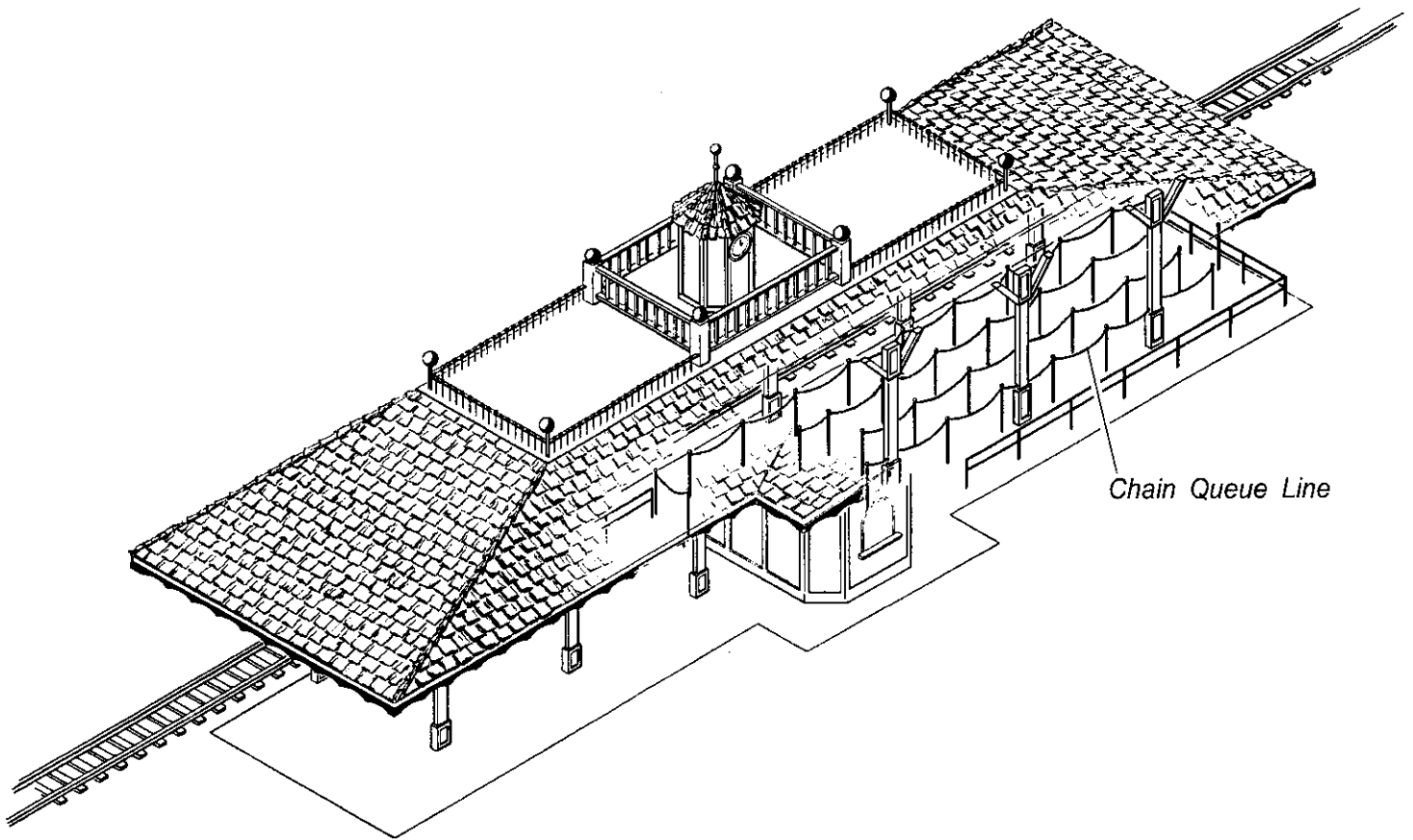
In some cases, the operator may prefer to construct a totally enclosed station that may be used to store the train and related equipment during the off-season. If this type of station is used, it must have adequate ventilation and be of sufficient height to accommodate the train. It is not recommended, however, to use the station area for maintenance purposes.

Fuel Station

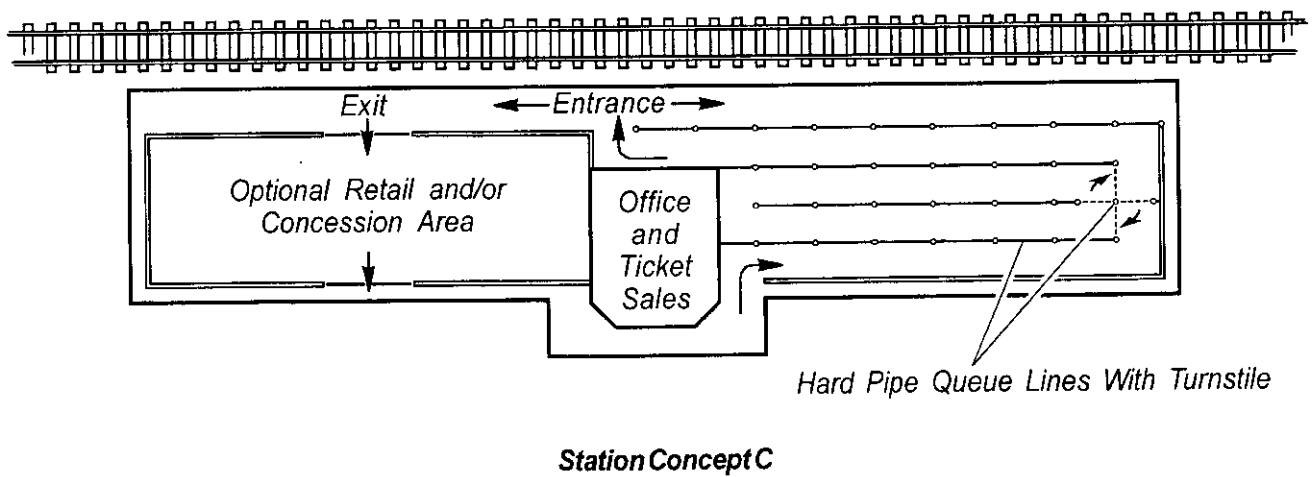
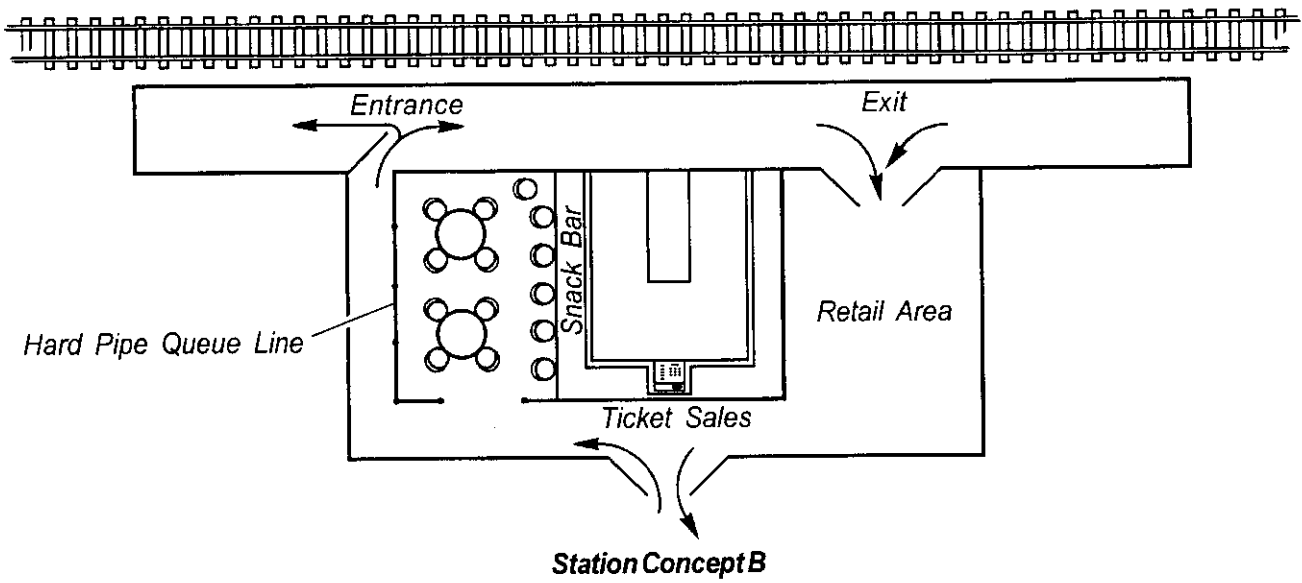
If fuel is being provided on-site, it may be wise to locate the fueling facility near the maintenance facility for convenience and safety. The fuel station should not be accessible to the public, but should include off-street access for fuel trucks, etc. If the fuel truck must cross the tracks to reach the fuel station, always construct a heavy-duty crossing to avoid damage to the track.

Station Concepts

The following illustrations provide examples of train stations, incorporating various features. The actual station design for a specific installation will depend upon many factors, as described in this section.



Station Concept A



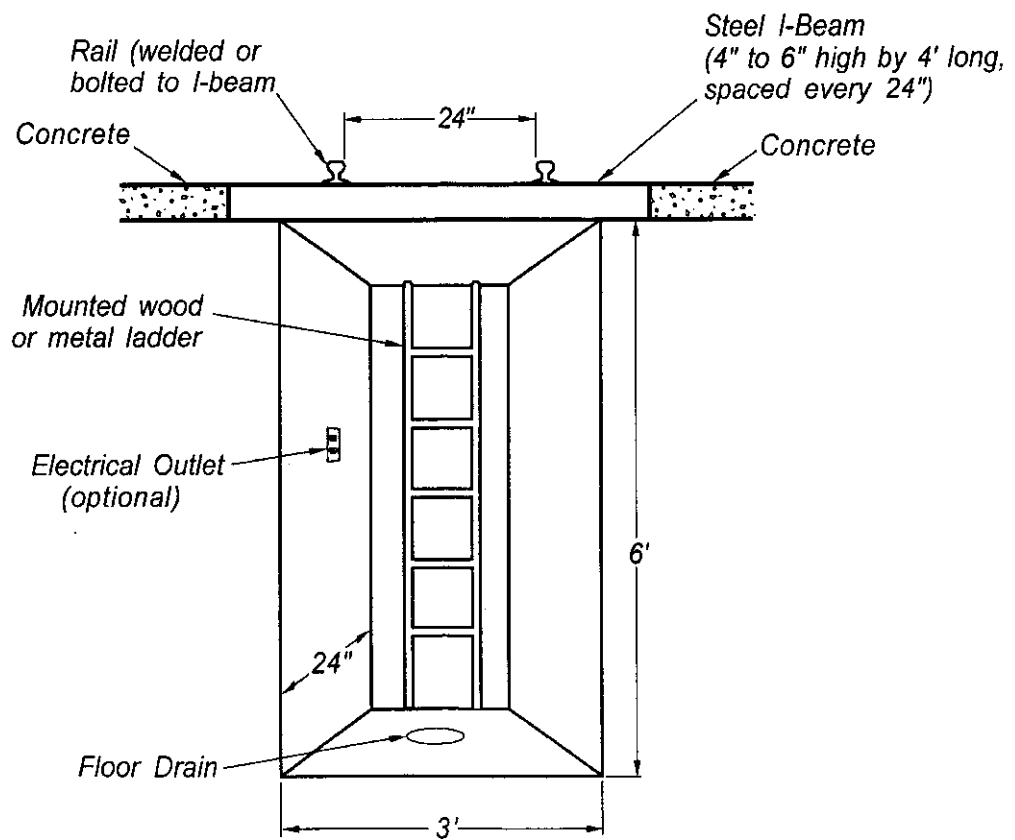
Maintenance Facilities

A maintenance area should be provided on a siding in an area not visible to the general public. It can be as simple as a fenced or screened area, an extension to an existing building, or a separate building. In areas prone to inclement weather, an enclosed facility is recommended.

A maintenance service pit with a floor drain is recommended for general maintenance (changing oil, lubrication, repairs, checking gearboxes, brake maintenance, etc.), as is water service for regular washing of equipment. The facility should also include power for use of a drop light in the service pit, a storage area and a room for a workbench and indoor spare parts storage. Chance Rides Manufacturing, Inc. recommends placement of safety fencing on each side of the service pit.

Other options for your maintenance facility include an office with sufficient space for records storage, a telephone, rest rooms, a compressed air supply, 220-volt outlets for welders and other equipment, a solvent tank for parts cleaning, hand tools and a heat source (in cold weather climates).

Service Pit Detail



C.P. Huntington Train Accessories

Wheelchair Access Kit

A high quality, easy-to-use wheelchair access kit system makes the C.P. Huntington accessible to everyone. One to two wheelchair positions can be installed easily on a single coach (one wheelchair per position), and kits are available to retrofit any existing C.P. Huntington train. The coach will lose two seats for each wheelchair position installed. Station loading platform heights may vary between trains equipped with the wheelchair kit and those that are not.

Kit A: Single wheelchair position kit includes a retractable ramp, drop-in aluminum flooring and two quick-release adjustable wheelchair lock-downs.

Kit B: Second wheelchair position kit includes drop-in aluminum flooring and a partition gate with two quick-release adjustable wheelchair lock-downs.

Wheelchair positions will load from either the left hand or right hand side, facing forward. The appropriate wheelchair access kit for your installation can be determined based on the direction the train will travel and the station loading configuration.

NOTE: *Wheelchair access kits are installed by Chance Ride Manufacturing, Inc. in the first coach, directly behind the locomotive. For ordering information, or for installations requiring special positioning of the wheelchair access kit, consult Chance Rides Manufacturing, Inc.*

For each wheelchair position in use subtract two passenger seats from total coach capacity.

Crossing Gates

Crossing gates add realism to the railroad, while helping to control traffic at pedestrian and automobile crossings. The gate lowers automatically, activating red lights and a bell to guard the crossing as a train approaches. All-weather, steel frame construction and complete automatic controls ensure smooth, dependable operation.

Crossing Signals

A selection of crossing signals helps attract attention to your C.P. Huntington train, while controlling pedestrian and automobile traffic. The 7-1/2-foot tall signals add a sense of realism to the overall train layout and are available in a variety of electric and non-electric configurations. The signal type used may be selected on the basis of individual need. However, at least one type should be selected for use at each crossing to ensure pedestrian/passenger/vehicular safety.

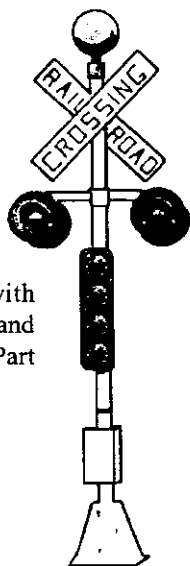
All electric signals operate on a 110-volt circuit and use a solenoid actuated by a magnet to turn them on or off as a train passes. Depending on the speed your train will be running, placement of actuating magnets should be carefully calculated. Never place a relay near the station or any other scheduled stops.

Crossing Signal Approach/Shut-Off Chart			
Locomotive plus number of coaches being pulled	APPROACHES; DIMENSION "A"		SHUT-OFFS; DIMENSION "B"
	Vehicular Traffic (Minimum in Feet)	Pedestrian Traffic (Minimum in Feet)	Locomotive plus number of coaches being pulled
1	200	100	36'
2	200	100	53'
3	200	100	72'
4	200	100	90'
5	200	104	107'
6	200	122	125'
7	200	140	143'
8	200	158	161'
9	200	176	179'
10	200	194	197'

NOTE: Approach Dimension "A" is arbitrary depending upon the location of the crossing in relation to the speed of the train and to the type of traffic on the roadway. 100 feet is the suggested minimum for pedestrian traffic and 200 feet for vehicular traffic. Dimension "B" is given as a minimum dimension and allows approximately 2 feet of clearance between the last coach and the roadway before the signal shuts off.

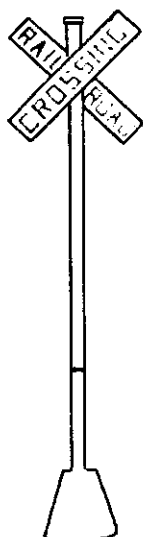
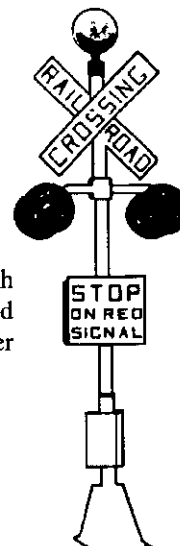
Deluxe Crossing Signal

Signal comes complete with flashing lights, signal bell and vertical stop lights. Chance Part Number 32118400.



Standard Crossing Signal

Signal comes complete with flashing lights, signal bell and stop sign. Chance Part Number 32118300.



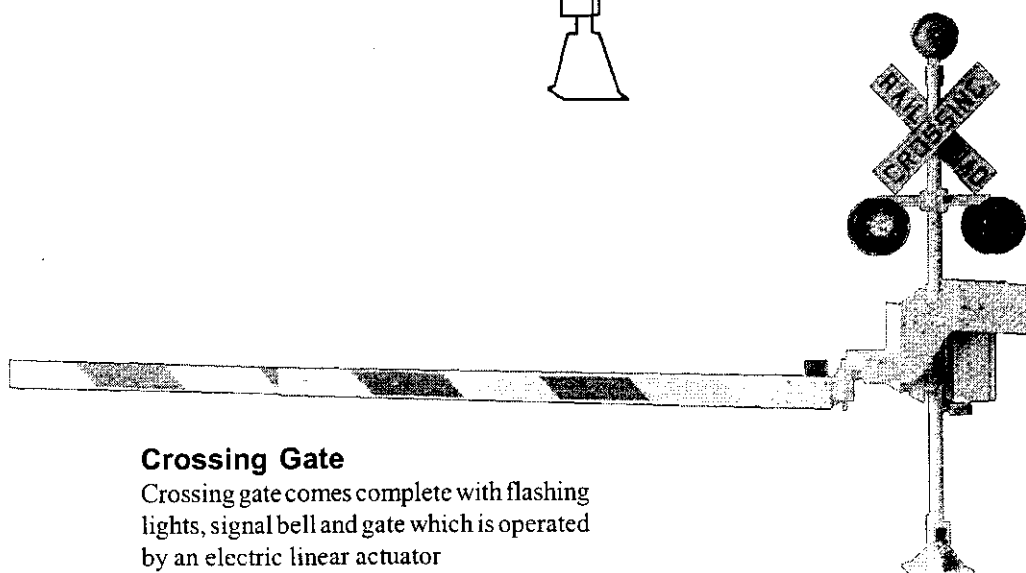
Non-Electric Crossing Signal

Consists of pole and arms only. Chance Part Number 32118200.



Block Signal

Contains red and green signals to warn if other trains are on the track. Chance Part Number 36780000.



Crossing Gate

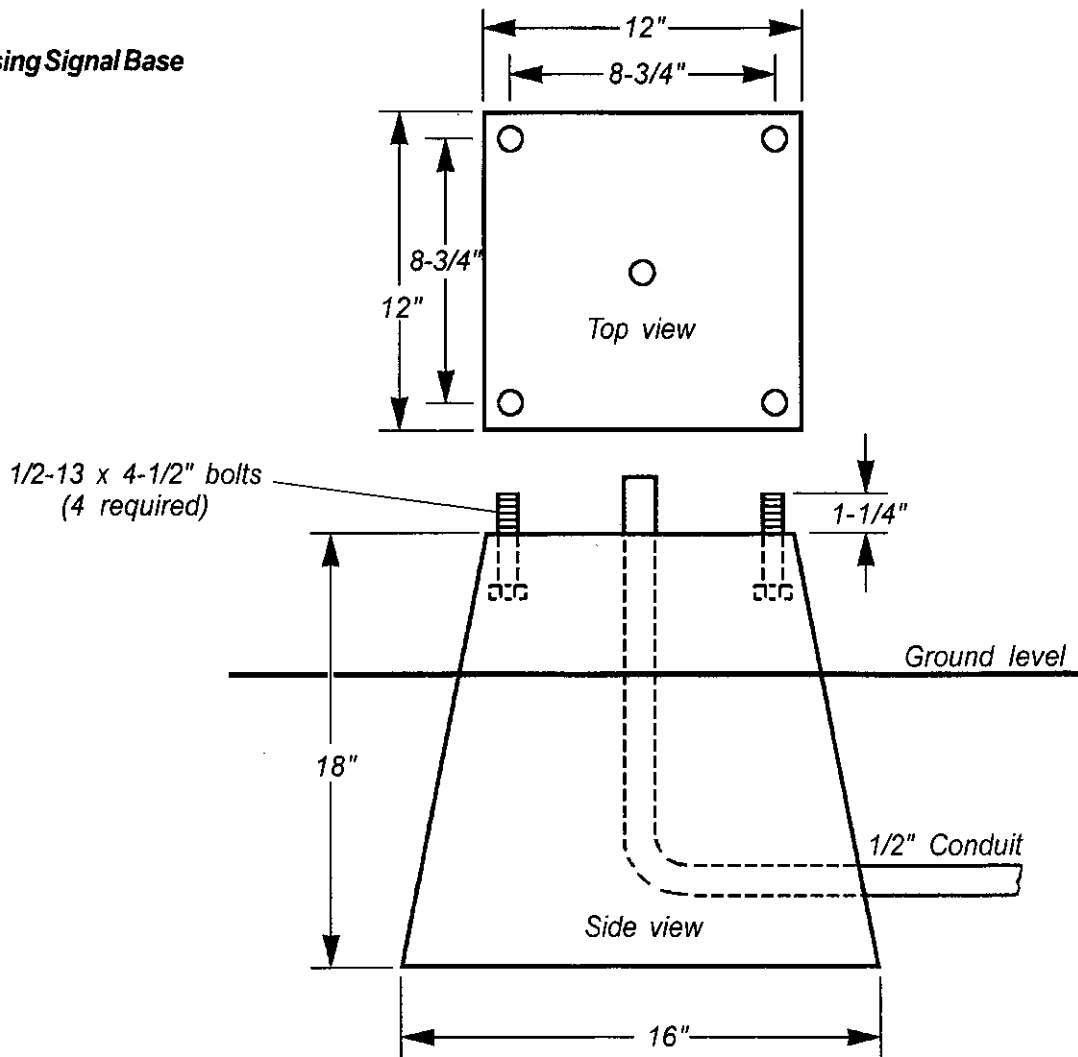
Crossing gate comes complete with flashing lights, signal bell and gate which is operated by an electric linear actuator

Crossing Signal Installation

Chance Rides Manufacturing, Inc. offers three different types of crossing signals and one type of block signal. Two of the crossing signals contain lights which flash when the train passes over certain sections of track. The block signal operates on the same principle. The sections of the track are electrified with only six volts, so they pose no shock hazard. A non-electric crossing signal is also available for areas where electricity is unavailable, or where an automatic signal is unnecessary due to low traffic.

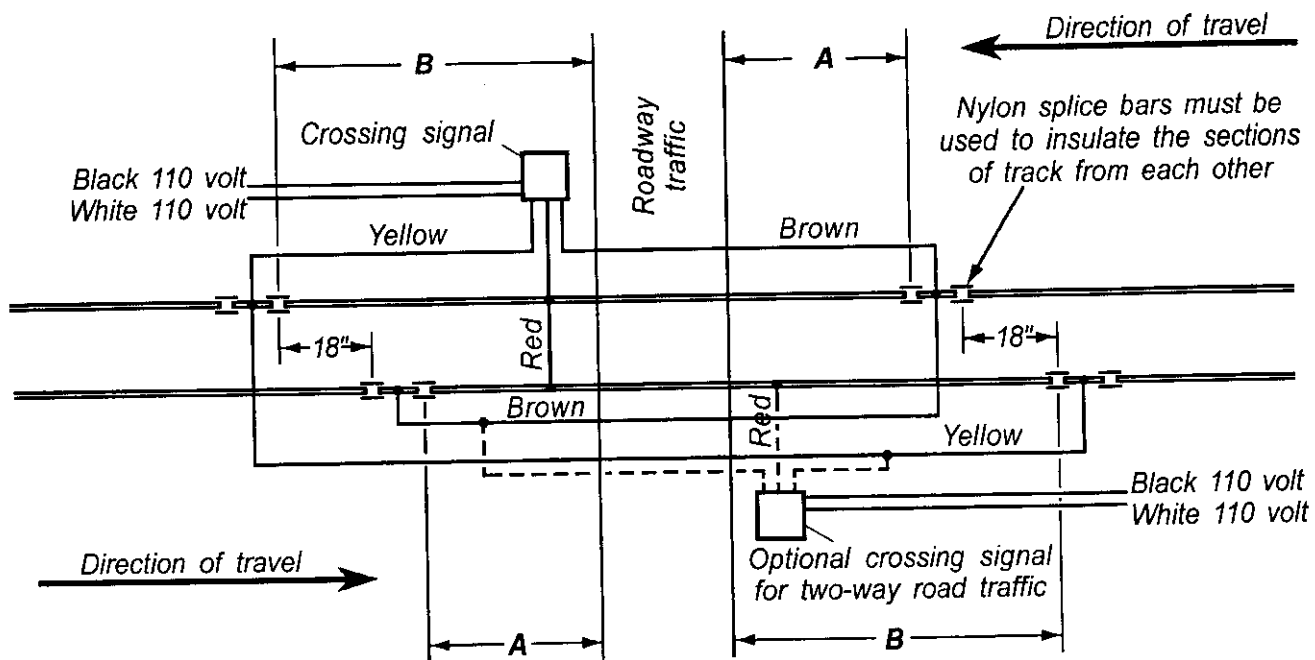
Mount the signals on a concrete base so there is no risk of them being knocked over. A suggested design for the base is shown below. These dimensions do not have to be exact, except for the mounting bolt pattern.

Crossing Signal Base



Refer to the crossing signal wiring diagrams on the following pages for installation of crossing signals.

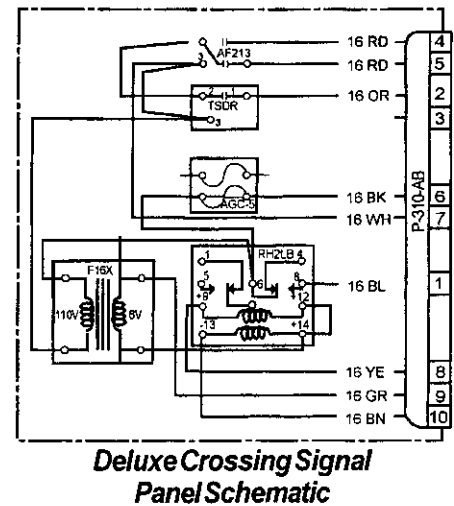
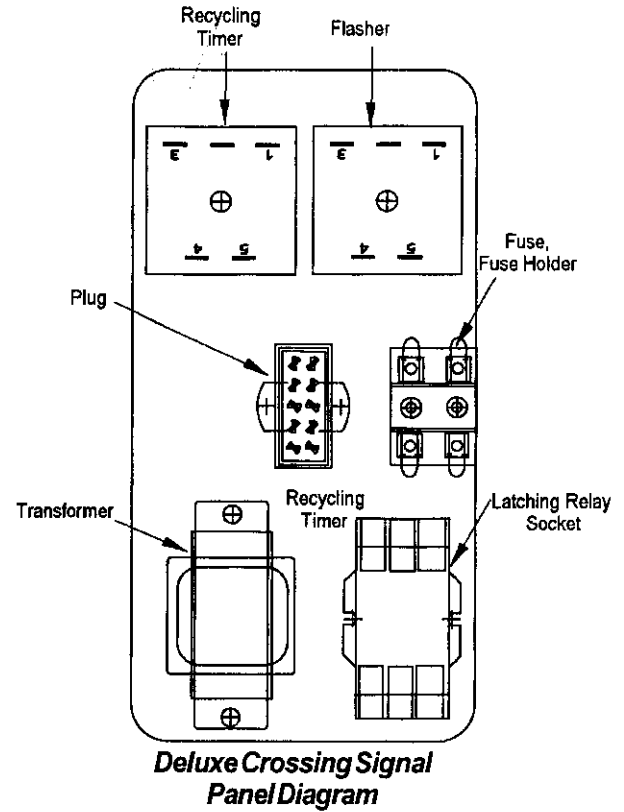
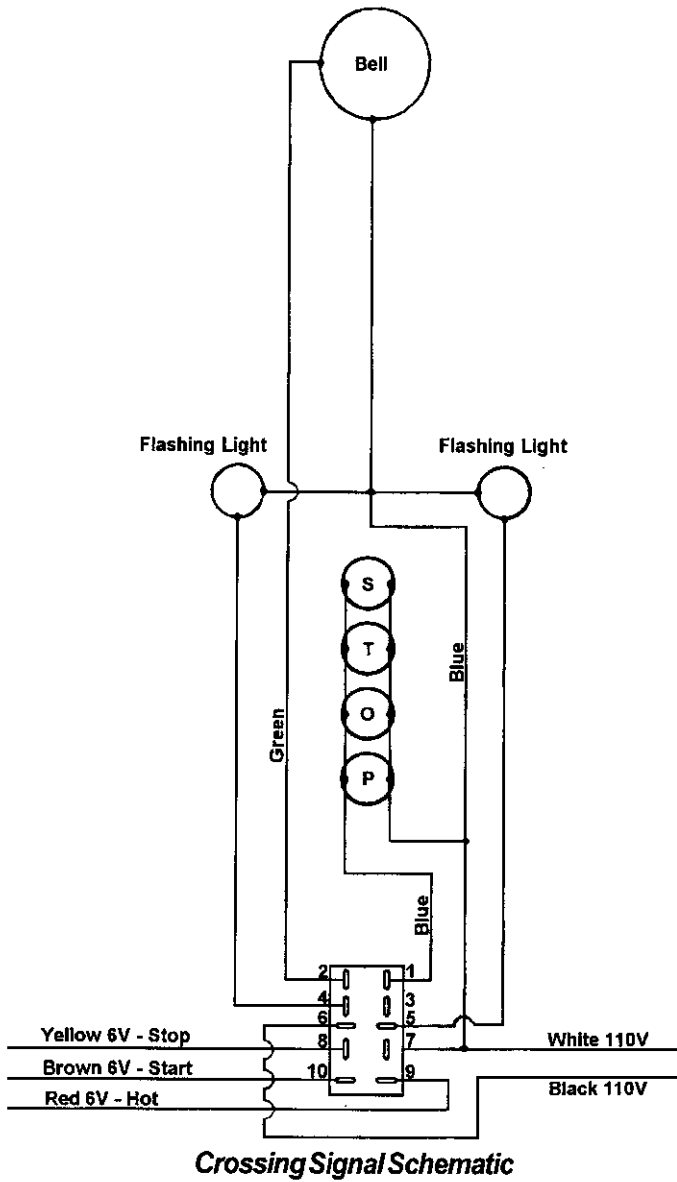
The diagram below shows two signals wired to operate with a train running in both directions. For an installation where the train runs only one direction, make connections the same way, but only wire one rail.



Crossing Signal Wiring Diagram

NOTE: All wiring shown is 6 volt, except as noted.

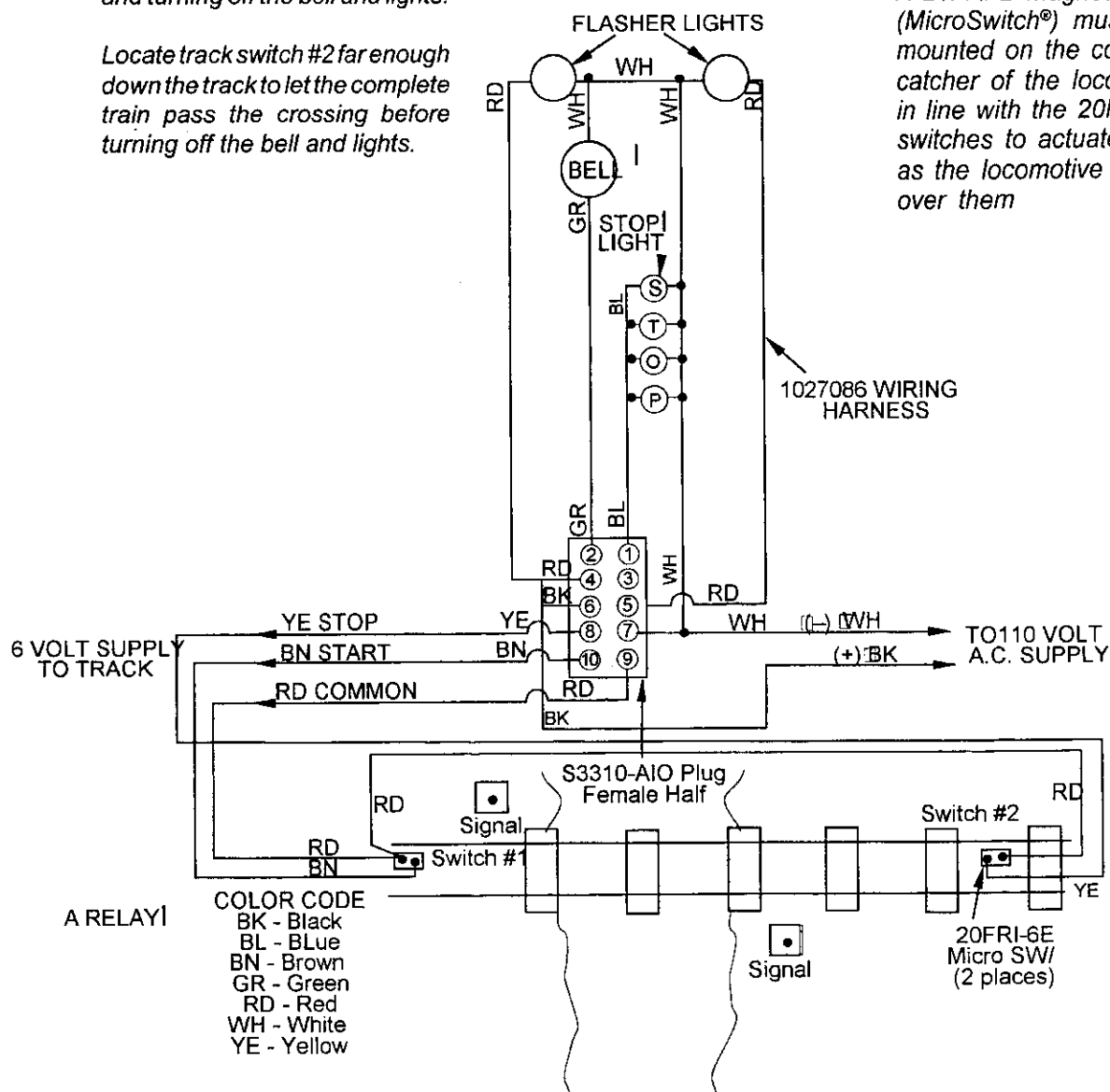
This diagram is for installations where signals are wired to function with the train running in both directions. Dimension "A" must always be three feet shorter than Dimension "B".



NOTE: When the train crosses track switch #1, it starts the bell and lights, latching a relay, so they stay on until the train crosses switch #2, un-latching the relay and turning off the bell and lights.

Locate track switch #2 far enough down the track to let the complete train pass the crossing before turning off the bell and lights.

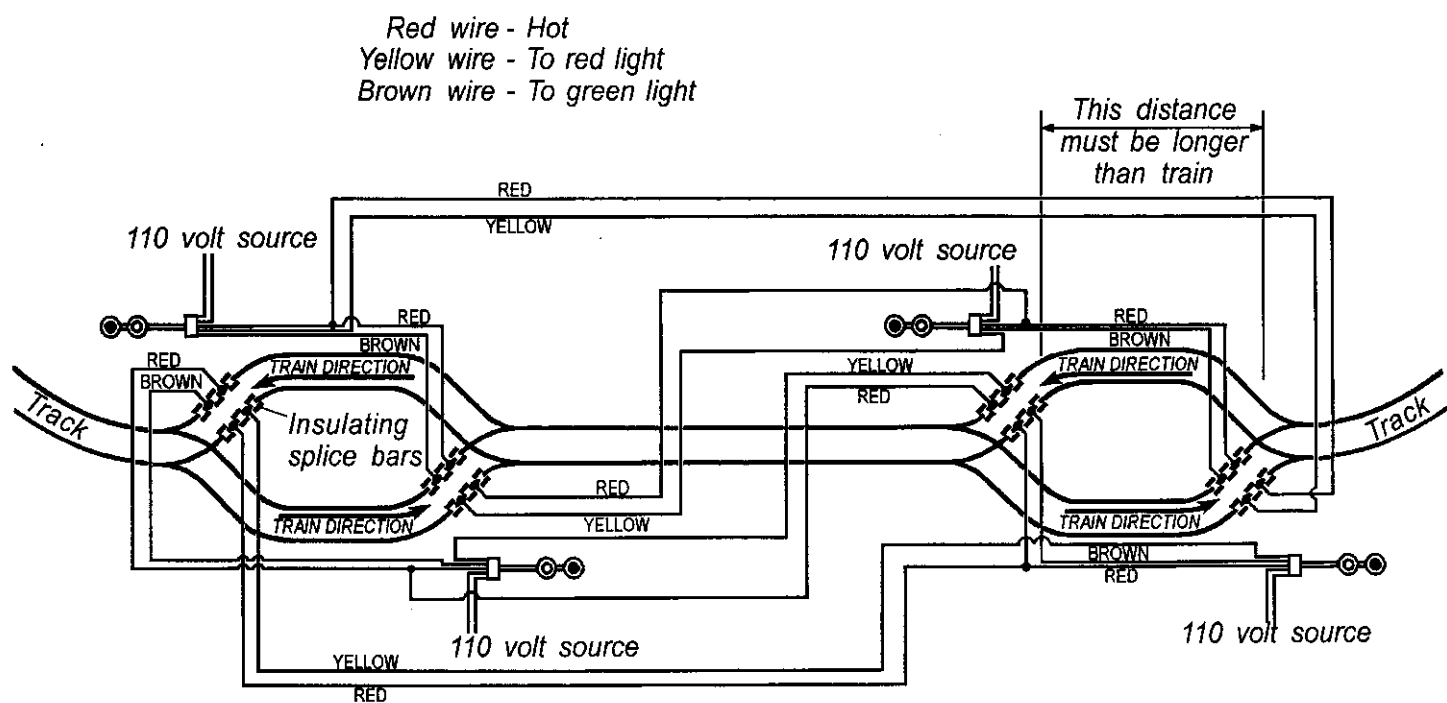
A 21FRI-B magnet (MicroSwitch®) must be mounted on the cow catcher of the locomotive, in line with the 20FRI-6B switches to actuate them as the locomotive passes over them



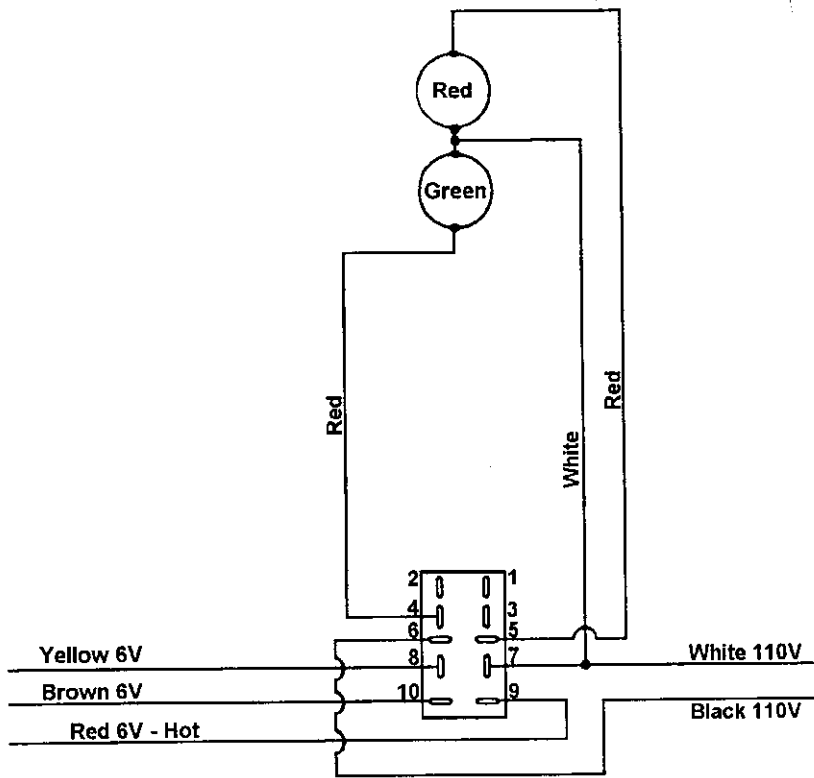
Deluxe Crossing Signal Schematic

Block Signal Installation

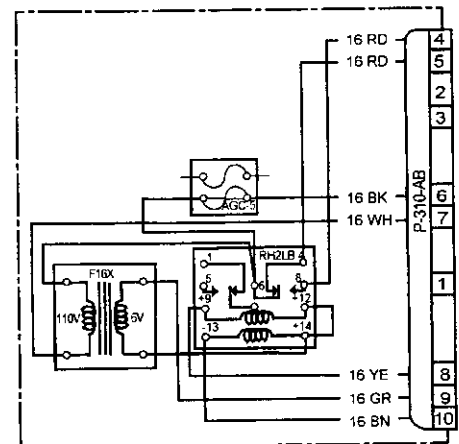
Refer to the block signal wiring diagrams to install the block signal. The diagram shows the wiring with two turnouts used. It appears that these are in the same section of tangent track, but actually they are designed to be used 180 degrees apart.



Block Signal Wiring Diagram



Block Signal Schematic



Block Signal Control Panel Wiring

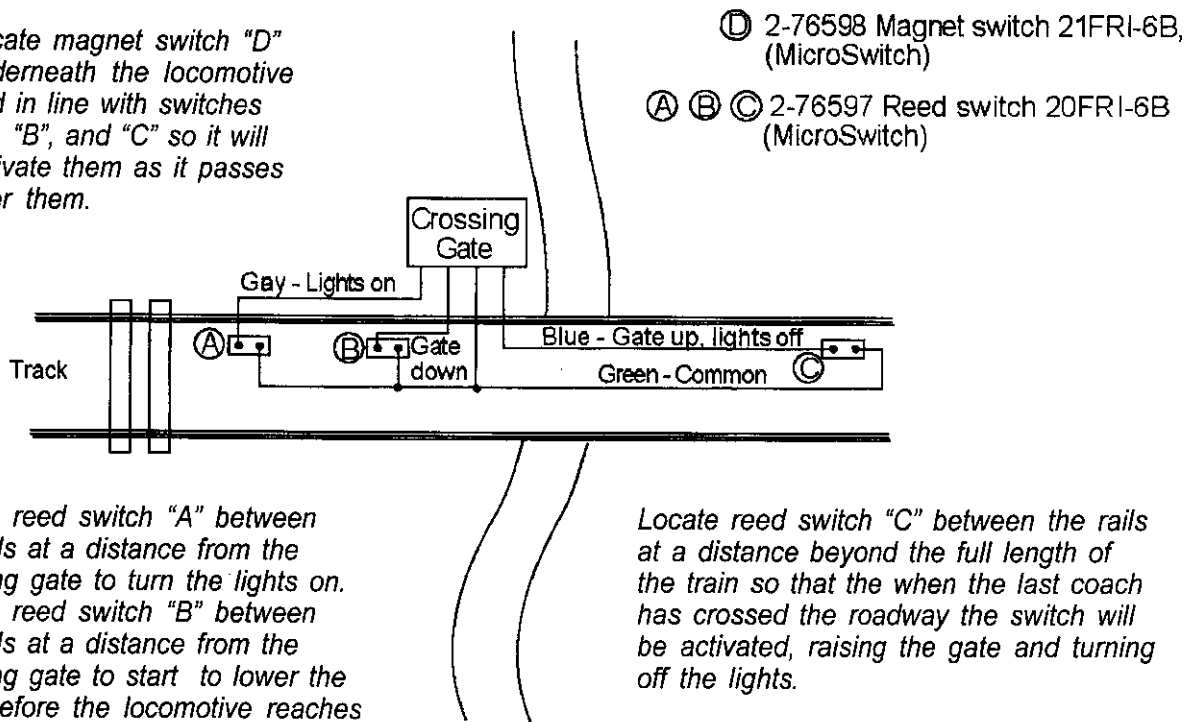
Crossing Gate Installation

Refer to the crossing gate wiring diagrams on these pages to install the crossing gate.

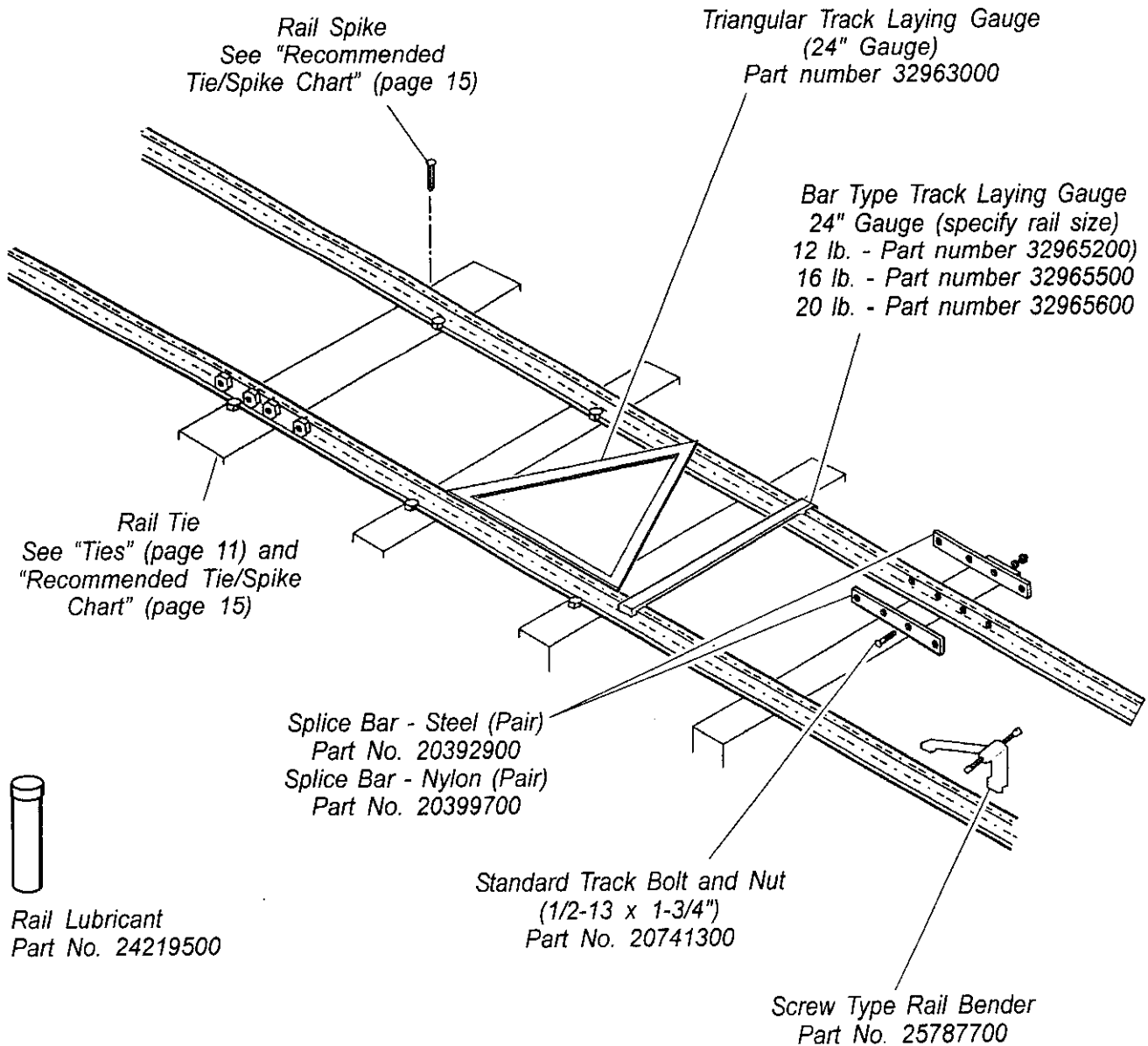
Locate the magnet switch "D" underneath the locomotive engine and in line with the reed switches "A", "B" and "C" which will be mounted on the track. The magnet must pass directly over the reed switch locations to activate them as the train passes.

Locate the reed switch "A" between the rails some distance away from the crossing gate to activate the lights. Reed switch "B" must be located between the rails at a slightly smaller distance to activate the gate, lowering it before the locomotive begins to cross the roadway. Reed switch "C" must be located on the other side of the crossing at a distance greater than the full length of the train. It will signal the gate to open after the last coach has crossed the roadway, as well as turning off the signal lights.

Locate magnet switch "D" underneath the locomotive and in line with switches "A", "B", and "C" so it will activate them as it passes over them.



Additional Track Accessories



Train Whistle Signals

The following are a few of the more common whistle signals.

—————	Station approach
•	Stop. Apply brakes
——— ———	Proceed. Release brakes
• • •	Back up after standing
——— ——— ———	Train has parted
——— • • •	Flagman protect rear of train
• • • ———	Flagman protect front of train
——— ——— • ———	Approaching crossing
• • • •	Call for signal
• •	Signal received
——— ——— •	Approaching meeting or waiting point
Repeated short blasts	Alarm for persons, animals, etc. on track

Glossary of Terms

ALIGNMENT: The horizontal location of a railroad as described by curves and tangents.

APPROACH: A section of tangent track leading to a curve.

BALL: Top portion (head / crown) of the rail.

BALLAST: A crushed material such as slag, limestone, cracked gravel or trap rock.

Base Ballast: (Refer to "Installation Method #1) Ballast that is spread over the track bed beneath the ties and rails to provide and even surface and prevent ties from resting on the ground.

Fill Ballast: (Refer to "Installation Method #1) Ballast that is spread between and around the ties to secure the track and prevent movement. Fill ballast should be even with the tops of the ties and cover the ends of the ties, tapering to the grade at a ratio of 3:1.

Sub-Ballast: (Refer to "Installation Method #2) A base of compacted road stone material (1-1/2" to dust) used to stabilize the sub-grade of the track bed prior to installing ballast and track.

Top Ballast: (Refer to "Installation Method #2) Ballast that is spread over the track and tamped beneath the ties. This rock is also used to dress the track.

BASE: The flange at the foot of the rail which rests on the ties.

CENTERLINE OF TRACK: A point located an equal distance between the inside edges of the rail.

CROSSING FLOOR: A floor of wood, asphalt, reinforced concrete or rubberized matting which covers the track bed at pedestrian and vehicle crossings to create a safe, smooth surface for passage.

CURVE, DEGREE OF: The angle subtended at the center of a simple curve by a 100-foot chord.

CURVE, SIMPLE: The continuous change in direction of alignment by means of an arc of a single radius

CUT: Removal of earth, rock, etc. to bring the track bed to grade. May be ballast or sub-base material

FIELD SIDE OF RAIL: Outside face of a rail.

FILL: Addition of earth, rock, etc. to ensure a steady grade.

FILTER FABRIC: An underlayment of 6-ounce material used over the track bed in wet or low-lying areas to prevent moisture from corrupting the sub-grade, or in sandy or poor soil areas to stabilize the track bed.

FLANGEWAY: The open way on the inside of the rail which provides a passageway for wheel flanges.

FROG: A track structure used at the intersection of two running rails to provide support for wheels and passageways for their flanges, thus permitting wheels on either rail to cross the other.

GAUGE: Exact distance from the inside face of the line rail to inside face of the gauge rail, measured at a right angle.

GAUGERAIL: Insiderail.

GAUGE RODS: Rods or metal straps welded or bolted to the bases of the gauge rail and lie rail to maintain the track gauge. Several types are used, including metal straps welded underneath the base of the rail, or threaded, adjustable rods attached to the base of the rail.

GAUGE SIDE OF RAIL: Inside face of the gauge rail.

GRADE: Gradual rise or fall of the track over a distance. *(Example: Three feet of rise per 100 feet of track is a 3% grade)*

GUARD RAIL: A rail or other structure laid parallel with the running rails of the track. Used to prevent wheels from being derailed or to hold the wheels in correct alignment to prevent their flanges from striking either the points of the turnout, the crossing frogs, or the points of the switches.

LINE RAIL: Outsiderail.

LINE SIDE OF RAIL: Outside face of line rail.

MAIN LINE: The principal line of lines of a railway.

POINT OF CURVE: When approaching a curve on tangent track, the "Point Of Curve" is the point where the arc of the curve begins.

POINT OF INTERSECTION: The "Point Of Intersection" is the centermost point of a curve, being an equal distance from both the "Point Of Curve" and the "Point Of Tangent."

POINT OF TANGENT: When leaving a curve, the "Point Of Tangent" is the point where the arc of the curve ends and the tangent track resumes.

PUMPING: Vertical up and down action of ties when stepped on or when a train crosses over them. Pumping action creates dips in the track, and can be traced to poor ties, ballast or bed conditions.

RADIUS: Distance from the "Point Of Intersection" on a curve to the "Centerline Of Track."

RAIL, TRACK: A rolled steel shape, commonly a T-section, designed to be laid end-to-end in two parallel lines on cross ties or other suitable supports to form a track for railway rolling stock.

RAIL JOINT: Where the ends of two pieces of rail come together.

SIDING: A track which is auxiliary to the main track, for meeting or passing trains or storage and maintenance of equipment.

SLEEPERS: Cross ties are sometimes referred to as "sleepers."

SPLICE BAR: A steel member embodying beam strength and stiffness in its structural shape and material. Commonly used in pairs for the purpose of joining rail ends together, and holding them accurately, evenly and firmly in place with reference to surface and gauge-side alignment.

SPUR: A stub track diverging from a main or other track.

SUB-GRADE: The base of fill and ballasting that acts as a foundation for the ties and rails.

SUPERELEVATION: The vertical distance between the outer rail and inner rail when one rail is elevated above the other.

SWITCH: A track structure used to divert rolling stock from one track to another.

SWITCH, AUTOMATIC: A switch with an automatic spring device incorporated into its operating mechanism. This device returns the switch points to their original position after the trailing wheels have passed over their flanges.

SWITCH STAND: A device for the manual operation of switches, or of movable center points.

TANGENT TRACK: Any straight portion of a track alignment.

TIES: Wood, steel, wood-and-steel, or concrete supports that act as a foundation for the rails.

TRACK: An assembly of rails, ties and fastenings over which the locomotive and coaches are moved.

TRACK BED: A foundation of fill approximately eight feet wide and compacted to 95%.

TRACK BOLTS: A bolt with a button head and oval or elliptical neck and a threaded nut designed to fasten together rails and splice bars.

TRACK LAYOUT: Overall configuration of the track installation.

TRESTLES: Bridges crossing streams, rivers, or ravines.

TURNOUT: An arrangement of a switch and frog with closure rails, by means of which rolling stock may be diverted from one track to another.

C. P. HUNTINGTON TRAIN

Operation Manual

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OPERATION

General Information

Safe operation is a combined responsibility and effort of the ride manufacturer and the owner/operator. This manual provides detailed information on the operation of the ride and provides the operator with important safety information.

All operators must be thoroughly familiar with the contents of this section before attempting to operate the ride. This information must be immediately available to all operators of the ride.

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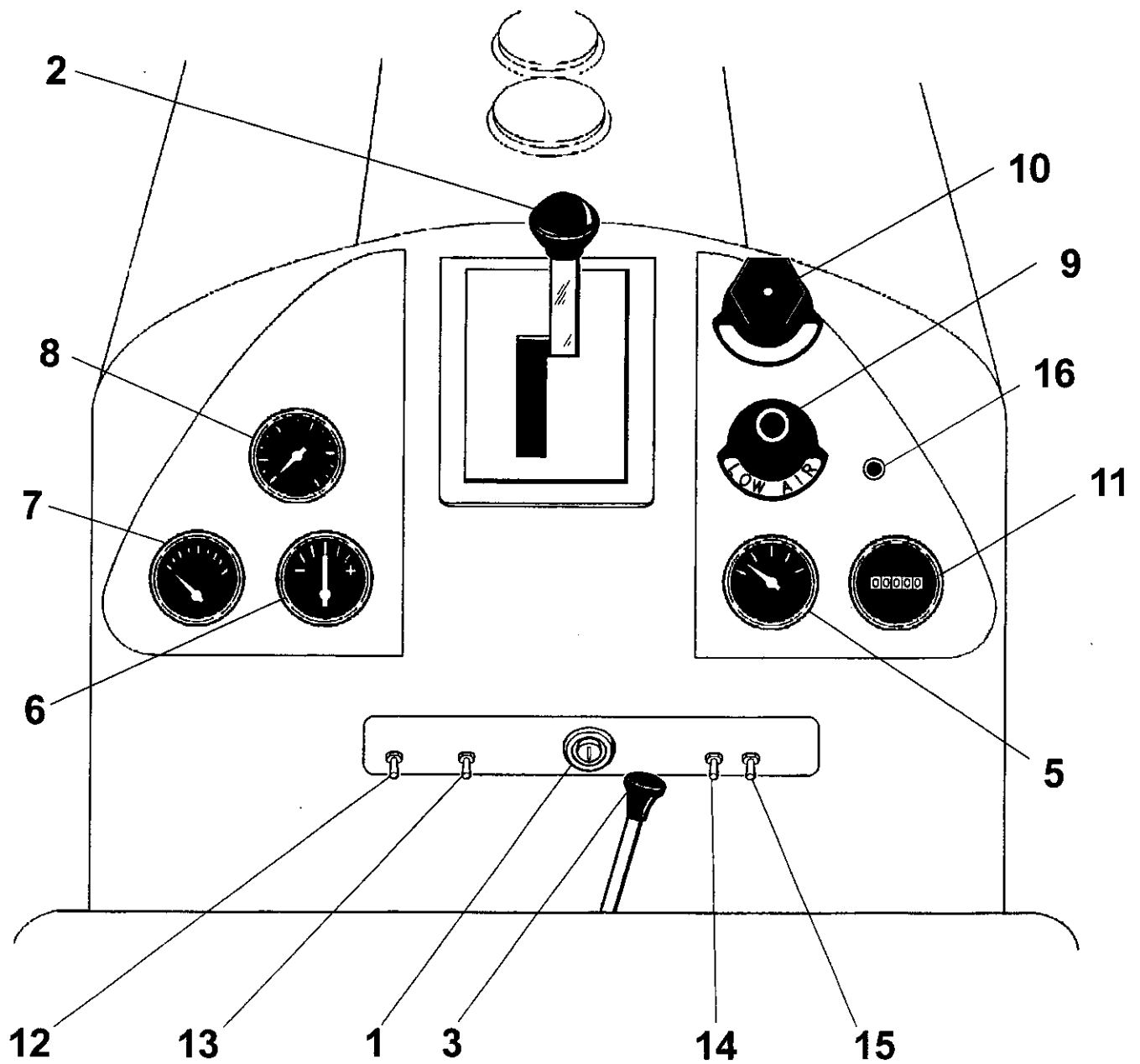
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Operator Selection and Instruction

1. Select competent, mature operators, capable of understanding the function, use and control of the train.
2. Instruct each operator fully in the proper use and function of the ride he/she is to supervise, including:
 - a. Controls and procedures for normal and emergency operation.
 - b. Manufacturer's recommended maximum speed and load.
 - c. Any foreseeable misuse of the train as determined by the manufacturer or owner, or by special conditions such as weather, location or crowds.
 - d. Each operator must have immediate availability of the manufacturer's operation manual.
3. Require the operator to inspect the train before each day of operation.
 - a. Determine that no portion of the train or track is damaged, missing or worn in such a manner that it is unsafe, or that can develop into an unsafe condition.
 - b. Report any irregularities to supervisor or owner.
 - c. If any irregularities are found, do not operate the train until such condition is corrected.
4. Instruct operators to allow no passenger to ride who is visibly ill, or under the influence of drugs or alcohol. Pregnant women and persons with physical impairments should view the ride for potential risks before riding.
5. Instruct operators to never move the train while any person is in a dangerous or unsafe position on the train or within the path of the train.
6. Instruct operators and attendants on the proper methods of seating passengers in the train. Do not allow a passenger on the train that cannot be properly seated due to passenger size. Stop the train immediately if any passenger is observed tampering with the train or behaving dangerously, such as standing up or placing hands, arms and/or feet and legs outside the vehicle.
7. Insist that each operator remain in full control of the operating controls during operation of the ride. The operator's full attention must be given to the ride and its passengers.

8. Instruct operators to allow no other person, except for another trained operator, to operate the train.
9. Instruct operators to properly secure the train when it is left unattended.
10. Advise operators that factory-installed safety devices must not be tampered with or removed and must be operating properly.
11. Instruct operator of owner's or supervisor's procedure for assisting ill or injured passengers.
12. 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.
13. Instruct operators to always test run the train before each day of operation, using the instructions in this manual. Run the ride through its route to observe the overall performance of the train in relation to past performance of the train and for proper function of all controls and indicators, as well as to observe track conditions.
14. Instruct operators in emergency procedures related to the operation of the train.

Operator's Controls



1. **Key Switch** - The key switch has four positions:

- "Acc" (Accessories) - Turn the key counter-clockwise from "OFF" to energize accessory circuits such as the P.A. system for use when the engine is not running.
- "Off" - This center position is used to stop the engine and disable all accessory circuits.
- "On/Run" - Turn the key clockwise to this position to energize the ignition system as well as all accessory circuits.
- "Start" - Turn the key further clockwise against the spring to engage the starter motor. Release the key as soon as the engine starts.

NOTE: *The DIRECTIONAL CONTROL must be in "Neutral" to operate the starter.*

2. **Directional Control** - This single lever controls forward and reverse directional travel, as well as engine speed. The center position is "Neutral". Push the control lever to the right and forward for "Forward" travel. Pull the lever to the left and back for "Reverse" travel. A spring return on the directional control will return it to the "Neutral" position if released.

As the lever is moved farther in either direction from "Neutral", the train speed will increase. As the lever is moved back toward "Neutral", the engine speed will decrease to idle, but the train speed will not decrease significantly because of the weight of the coaches coupled to the locomotive.

IMPORTANT: *Do not move the directional control lever from "Forward" to "Reverse", or from "Reverse" to "Forward", while the train is moving. Serious damage to the drive train can result.*

3. **Brake Lever** - Move the brake lever to the left to apply the air brakes to the locomotive wheels (except false drive wheels) and all coach wheels. Move the lever to the right to release the brakes. Do not use the air brakes as a parking brake when the locomotive is stopped.

IMPORTANT: *If an air supply line breaks, or there is loss of supply air pressure for any other reason, the coach brakes will be automatically applied. See "Brake Operation" in this section for detailed information on the air brakes.*

6 Chance Rides Manufacturing, Inc.

4. **Parking/Emergency Brake Lever (not shown)** - Use the parking brake lever to hold the train when parked. This brake locks the drive train on all eight drive wheels on the locomotive. To avoid wear on the brake components, do not apply the parking brake when the train is moving except in an emergency. In an emergency, the parking brake can be used to lock up the locomotive drive train. Squeeze the release handle and pull back on the lever to apply the parking brake. Squeeze the release handle and push forward to release the parking brakes.
5. **Water Temperature Gauge** - This gauge indicates the temperature of the engine coolant. Normal temperature is 178-205° F. If overheating occurs, stop the engine and investigate the cause.
6. **Volt Meter** - The volt meter indicates the rate of charge or discharge of the battery. Under normal operation the voltage will be between 12 and 14 volts. A drop in voltage while electrical accessories are in use is normal. However, if voltage drops to 9.5 volts, the engine will automatically shut down. If an extreme high or low voltage is indicated during normal operation, stop the engine and check the system.
7. **Oil pressure gauge** - This gauge indicates the pressure of the engine lubrication system. Normal operating pressures are 7 psi at idle, and 36-71 psi at full throttle. Pressures will be slightly higher when the oil is cold. Do not operate the engine at less than the recommended pressures.
8. **Air Pressure Gauge** - This gauge indicates the pressure in the main air supply tank. Normal operating brake air pressure is 90-110 psi. An alarm buzzer will sound and the LOW AIR PRESSURE INDICATOR LIGHT will come on when the air pressure is below 55-65 psi.

IMPORTANT: See "Brake Operation" in this section for detailed information on the air brakes

9. **"LOW AIR" Indicator Light** - The low air indicator light illuminates whenever the pressure in the coach air brake system falls below 55-65 psi.

NOTE: The low air light operates in conjunction with the audible low air alarm buzzer.

10. **Emergency Coach Brake Valve** - Press the emergency coach brake valve to apply the brakes on the coaches. Refer to "Emergency Procedures" in this manual for detailed instructions on use of this control.

IMPORTANT: *The EMERGENCY COACH BRAKE VALVE may have to be pulled out to allow the coach brake system to be charged with air. It may be necessary to hold the valve out while the system charges.*

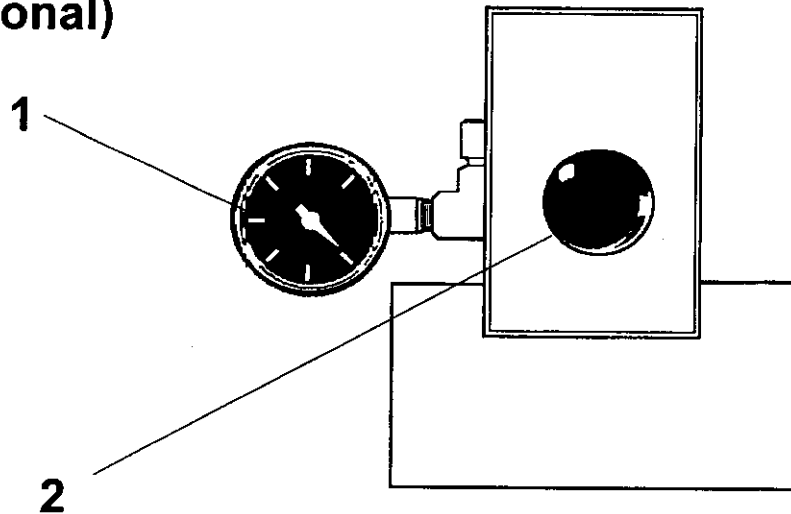
IMPORTANT: *The AIR PRESSURE GAUGE must read at least 90 psi before the train is moved.*

11. **Hour Meter** - The hour meter indicates the total time the engine has run, in hours and tenths of hours. It operates whenever the KEY SWITCH is in the "On" position.
12. **Bell Switch** - Move the switch up to ring the bell. The down position is "Off".
13. **Lights Switch** - Move the switch down to turn on the headlight or up to turn on the headlight and coach dome lights. The center position is "Off."
14. **Sander Switch** - Move the switch up to apply sand to the rails. Release the switch to stop sander operation. For detailed description of this control, see "Track Sander Operation" in this section.
15. **Public Address (P.A.) System Switch** - Move the switch up to turn on the P.A. system on. The down position is "Off".

NOTE: *With the P.A. SYSTEM SWITCH in the "On" position, push the switch on the side of the hand-held microphone only while speaking. Do not hold the microphone switch down continuously. Premature failure of the amplifier can result.*

16. **"CHECK ENGINE" Indicator Light** - If this light comes on, a fault in the engine operation is indicated. Stop operation and service the engine as soon as possible. This light is also referred to as the MIL (Malfunction Indicator Light).
17. **Transmission Temperature Gauge (not shown)** - This gauge displays the temperature of the transmission fluid. It is located under the right hand engine cover at the transmission oil filter.

Rear Coach Conductor's Controls (optional)



The optional rear coach conductor's controls include the following:

1. **Coach Air Pressure Gauge** - The rear coach air pressure gauge indicates the air pressure in the coach air brake system. Normal operating brake air pressure is 90-110 psi.
2. **Rear Coach Emergency Brake Valve** - Press the knob on the rear coach emergency brake valve to apply the brakes on the coaches. Pull out on the valve to release the brakes. Refer to "Emergency Procedures" in this manual for detailed instructions on use of this control.

IMPORTANT: The REAR COACH EMERGENCY BRAKE VALVE may have to be pulled out to allow the coach brake system to be charged with air. It may be necessary to hold the valve out while the system charges.

IMPORTANT: The COACH AIR PRESSURE GAUGE must read at least 90 psi before the train is moved.



Engine operation

Engine Run-In

The engine requires careful and close attention during the run-in period. Piston rings and cylinders can be damaged in a new engine if run-in instructions are not followed. Check the instruments frequently during engine run-in. The following are recommended:

Engine Speed and Load

Do not run the new engine at high speeds or on full load for the first 25 hours. The load and speed may be increased to a maximum over this period. After the first 50 hours of running, carry out the maintenance operations described in the "Maintenance Schedule" in this manual.

Operating Temperature

Allow the engine to reach its normal operating temperature before stopping the engine. Keep the engine coolant at the proper level.

Engine Oil

Keep the engine oil at the proper level. Drain the engine oil and remove the oil filter after the first 50 hours of operation. Install a new filter and refill the crankcase with the recommended type and weight of oil.

Cooling

Let the engine run at idle for five minutes before stopping it so the engine parts can cool evenly.

Starting Procedure



WARNING: Uncontrolled movement of the train can result in serious personal injury to the operator, passengers and/or pedestrians. Always check the following before starting the engine:

- Never operate the train from any position other than the operator's seat.
- Check that the parking/emergency brake is applied and all controls are in "NEUTRAL".
- Make certain the track is clear of bystanders and/or pedestrians in front of and behind the train.

IMPORTANT: Before operating the train upon initial installation, be sure that all service points listed under "Preventive Maintenance - Initial Installation" have been performed.

At the beginning of each day of operation, be sure that all daily and required maintenance has been performed in accordance with the recommendations in the "Maintenance" section of this manual.

After the operator has become thoroughly familiar with all the operating controls and their functions and with safety and emergency procedures, use the following starting procedure:

1. Make certain the track is clear of bystanders and/or pedestrians in front of and behind the train.
2. Check that the PARKING/EMERGENCY BRAKE is applied. All accessories must be turned off.
3. The DIRECTIONAL CONTROL must be in "Neutral." In any other position, the neutral-start switch prevents the starter motor from operating.
4. Turn the KEY SWITCH to the "On" position, then to the "Start" position to operate the starter motor. Release the key as soon as the engine starts.

NOTE: *If the engine does not start within 30 seconds, release the key and wait at least two minutes before trying again. This prevents the starter motor from overheating.*

5. If the engine fires and stops, wait for the starter motor to stop spinning before attempting to operate the starter again.
6. Check the instrument panel for proper gauge indication.

NOTE: *Be sure the BRAKE LEVER is in the released position. If the brake is applied, air will exhaust from the relief valve and the air pressure may not reach the 90-110 psi range. If equipped, the REAR COACH EMERGENCY BRAKE VALVE must be pulled out.*

IMPORTANT: *Check the AIR PRESSURE GAUGE to verify there is sufficient air pressure to operate the air brakes.*

The LOW AIR INDICATOR LIGHT will be on and the low air warning buzzer will sound until the EMERGENCY COACH BRAKE VALVE is pulled out.

7. Pull out the EMERGENCY COACH BRAKE VALVE and observe that the LOW AIR INDICATOR LIGHT and buzzer are off and the air pressure gauge shows at least 90 psi.

IMPORTANT: *It may be necessary to hold the EMERGENCY COACH BRAKE VALVE for a few moments while the coach brake lines are pressurized. The EMERGENCY COACH BRAKE VALVE will not stay out if there is insufficient air pressure to operate the brakes.*

8. Make sure the LOW AIR INDICATOR LIGHT and low air warning buzzer is off.
9. Allow the engine to warm up before applying a load. The warm-up period will prevent oil starvation, especially during cold weather starts and after oil and filter changes.

10. Test the brake operation. With the operator in the operator's seat, release the PARKING/EMERGENCY BRAKE and engage the directional control to forward position. Move train approximately 10 feet and apply BRAKE LEVER. Check for proper brake operation.



WARNING! Brake operation must be tested before the train leaves the station. Remember, a train is quite heavy and will take some time and distance to stop. Failure to adequately test the brakes could result in serious injury to passengers and/or bystanders.

Shut-Down Procedure

If the train is stopped and left unattended, the following steps must be followed.

1. Stop the train and put the DIRECTIONAL CONTROL in "Neutral". Apply the PARKING/EMERGENCY BRAKE. Do not use the air brakes as a parking brake.



WARNING: Avoid parking the train on a grade. If it is necessary to park the train on a grade, wheel chocks must be placed under the wheels to prevent rolling or slipping down the grade.

2. If the train has been operating under a load, idle the engine for five minutes to allow the engine parts to cool evenly.
3. Turn the KEY SWITCH to "Off". After the engine has stopped, REMOVE THE KEY.

NOTE: *If the engine is abnormally overheated, it may continue to run after the ignition is turned off. If this happens, turn on the ignition switch immediately and allow the engine to idle until it has cooled enough to stop. If the engine is overheated due to loss of coolant, stop the engine immediately, if necessary, by applying a load. Determine the cause of abnormal overheating and make necessary repairs before the train is put back into service.*



Operating the Train

The train operator is responsible for providing the passengers a safe, enjoyable ride. Careful control of the speed of the train, and constant observation of track conditions are necessary to avoid accidents. Almost all derailments are caused by excessive speed and/or poor track conditions.

Before pulling out of the station, make the following checks:

1. Be sure all passengers are aboard and properly seated. Passengers must remain seated at all times while the train is moving.
2. Do not move the train until the LOW AIR INDICATOR LIGHT and low air warning buzzer are off and the AIR PRESSURE GAUGE shows at least 90 psi.

NOTE: *Be sure the BRAKE LEVER is in the released position. If the brake is engaged, air will exhaust from the brake valve and the air pressure may not reach the 90-110 psi range.*

3. Check that all gauges are in the normal range.
4. Release the PARKING/EMERGENCY BRAKE.
5. Push the DIRECTIONAL CONTROL slightly forward. As the train starts to move, carefully continue to push it forward to increase the speed of the train as conditions permit (see following topic, "Speed Control").
6. When applicable, use an appropriate whistle signal to warn pedestrians (see "Train Whistle Signals" in Section 1 of this manual).

Speed Control

The maximum safe operating speed for the train will vary according to track conditions and the number of coaches being pulled. Be familiar with the distance required to stop the train at different speeds and different track conditions. Always be ready to stop the train if a problem is observed on the track ahead.



CAUTION: The operator must maintain full control of the train at all times to avoid injury to passengers and/or bystanders.

Always drive at an appropriate speed for the existing conditions. Excessive speed can cause loss of control and derailment, resulting in injury to passengers and/or bystanders.

The correct speed at which curves are negotiated depends on several factors, including the radius of the curve, the degree of bank on the curve, and visibility around the curve. As the train approaches a curve, slow down, either by pulling back on the directional control, or by pulling back on the directional control and applying the air brakes.

As the train approaches turnouts, tunnels, trestles, bridges, crossings or increased grades, reduce the speed accordingly.

Brake Operation

Air brakes are provided at all eight drive wheels on the locomotive and to all eight wheels on every coach. All brakes are applied when the brake lever is moved to the left, and released when it is moved to the right. The best braking is obtained by making the initial application, gradually increasing to the extent of braking required. Operate the brakes in conjunction with the directional control, as it is moved toward "NEUTRAL". Do not use the air brakes as a parking brake when the train is stopped.



CAUTION: Do not operate the train with the brakes continuously "dragging," or partially applied. This causes abnormally high brake temperatures, excessive brake wear, and damage to the brakes. Braking performance can be reduced, resulting in increased stopping distances, and possible injury to passengers and/or bystanders.

Normal brake operating air pressure is 90-110 psi. Check the air pressure gauge frequently. A malfunction in the brake system which results in the loss of air pressure to below 55-65 psi will cause the alarm to sound, the coach brakes to automatically apply and the "LOW AIR" warning light to come on.



WARNING: Do not drive the train until air pressure is at least 90 psi. Braking performance can be reduced, resulting in increased stopping distances, and possible injury to passengers and/or bystanders.

If a loss of air pressure is indicated, stop the train immediately. Do not operate the train until the cause of low air pressure has been corrected.

Loading



CAUTION: Do not operate the train unless all parts of the train and track are in good condition. All safety items, such as non-slip surfaces and safety placards must be in good condition.

Any broken or missing parts must be repaired or replaced immediately.



CAUTION: Do not allow any passenger on the train who cannot be properly seated because of passenger size or condition.

Never allow a passenger on the train who is visibly ill or under the influence of drugs or alcohol.

Pregnant women or persons who have physical impairments should view the ride for potential risks before riding.



WARNING: Instruct the passengers that, to avoid serious personal injury, they must keep their hands and feet inside and sit with their feet on the floor. All passengers must be properly seated in the seats or serious personal injury can result.



CAUTION: Never allow the train to become overloaded. Maximum capacity of each seat is two adults and one child, or four children, with a maximum weight of 430 pounds..



CAUTION: Never leave the train unattended while the engine is running. If necessary to leave the operator's position, always stop the engine and remove the key.

General Loading

With the train completely stopped, the DIRECTIONAL CONTROL in "Neutral" and the PARKING/EMERGENCY BRAKE applied, all seats can be loaded simultaneously.

NOTE: *If coaches are equipped with closeouts and/or chains, assist the passengers in releasing them to permit entry.*

Once all passengers are loaded, walk down the length of the train and check that every passenger is properly seated. Make sure that all loose articles (eyeglasses, purses, keys, etc.) are secured.

NOTE: *If coaches are equipped with closeouts and/or chains, make sure they are securely fastened.*

Loading Passengers with Optional Ramp for Wheelchairs or Other Mobility Aids

The following is a description of the operation of the ramp. Read and be familiar with this section before operating the ramp.

Daily Checks

Inspect the ramp each day prior to use. It must be clean, free of debris, and well maintained. Check the following:

- Check overall operation of the ramp
- Non-slip surfaces must be in good condition
- Check the general appearance of the ramp
- Make sure lubrication and other maintenance has been performed
- All fasteners must be tight

To Board Passengers

1. Make sure the train is parked on a level area, with adequate room for ramp deployment and passenger boarding. If the station has a specific area for the ramp, the train must be positioned to align the ramp correctly.

IMPORTANT: Place the *DIRECTIONAL CONTROL* in "Neutral" and apply the parking brake.

2. Release the safety chain from the ramp. Move the release lever forward and carefully lower the ramp.
3. Align the wheelchair with the ramp, facing the train. Be certain the wheels are aligned between the ramp side barriers.
4. With assistance from an attendant, move the wheelchair up the ramp.



WARNING: Never allow a wheelchair passenger to go up or down the ramp without assistance. The wheelchair can roll out of control, causing personal injury.

Always have an attendant to control and/or supervise the wheelchair when it is on the ramp. The attendant must observe the wheelchair at all times to be sure it is not unstable, out-of-balance, or in an unsafe position.

5. Secure the wheelchair inside the train. Refer to "Wheelchair Restraints" in this section.
6. Return the ramp to its stowed position. Make sure it latches and install the safety chain.



CAUTION: Never move the train when the ramp is deployed. Serious personal injury to bystanders can result. Always stow the ramp and latch it in position and install the safety chain before attempting to move the train.

Wheelchair Restraints

Once the wheelchair passenger is on board the ride, secure him/her with the wheelchair restraint system. The wheelchair restraint system consists of two wheel locks and a safety belt.



CAUTION: All wheelchair restraining devices must be properly engaged to insure the safety of ALL passengers. Do not operate the ride without first establishing that all passengers are secure.

1. Open the wheel locks by pushing the release levers down. If necessary, align the locks with both wheels by sliding the locks to the left or right on the mounting bar.
2. Roll the wheelchair back so both wheels engage the yokes of the wheel locks. Make certain the front casters are pivoted to the forward position (the wheel ahead of the pivot point).

NOTE: *The wheelchair must be positioned squarely in the restraining position.*

3. Back the wheelchair against the yokes until both locks close and latch. Roll the wheelchair forward slightly to be sure the locks are securely engaged.

IMPORTANT: *All four wheels of the wheelchair must be firmly in contact with the floor when in the secured position.*

4. Once the wheelchair has been secured, lock the brakes on the wheelchair.
5. Restrain the wheelchair passenger with the safety belt. Pull each side of the belt through the arm of the wheelchair and attach over the passenger's lap.

IMPORTANT: *Safety belts must not be twisted. Make certain both belts are straight. Pay particular attention to the placement of the lap belt. It must be as low as possible with the passenger seated well back in the wheelchair.*



WARNING: A snug fit, with the safety belt positioned low on the hips is necessary to reduce the chance of injury in an accident. This position spreads the forces applied to the body in case of an accident over a person's strong hip bone structure instead of the soft abdomen.

To help reduce the chance of injury and/or the amount of injury in an accident:

1. Do not use the same safety belt for more than one person at a time.
2. Never wear twisted safety belts.
3. Do not damage safety belts or hardware by pinching them in the seat.

Operator's and Attendant's Positions



CAUTION: The operator must remain in full control of the operating controls at all times during the operation of the train. The train and passengers must be given the full attention of the operator at all times.

Never leave the operating controls while the engine is running.

The operator at the controls is responsible for the safety of the passengers as they ride. The operator must know and fully understand all operation and emergency procedures for this ride, and must be at the controls at all times. The train and passengers must have the operator's complete attention at all times.

Attendants

When determining the required number and location of attendants, crowd size and other factors must be taken into consideration.

When the train is in motion, the attendants must not stand on any portion of the train or the loading/unloading platforms.

Attendants are responsible for the safety of the passengers as they wait in line to board the train, as well as during loading and unloading. Attendants should do the following:

1. Control access to the train through the entrance gates.
2. Make sure all passengers remain at a safe distance as they wait to board the train. Persons waiting in line must not be allowed to hang over the fences or sit on the fences.
3. Make sure the passengers are properly seated before the operator starts the train.

4. Make sure only passengers meeting all ride restrictions are allowed to ride.
5. Give safety announcements including, but not limited to:
 - Watch your step when boarding or exiting the train.
 - Remain seated at all times.
 - Keep hands and feet inside the train at all times.
 - Passengers must secure all loose articles before boarding the ride.
This includes, but is not limited to eyeglasses, purses, keys, etc.
6. Make sure passengers do not tamper with any part of the train, including, but not limited to:
 - Seats
 - Safety placards
 - Closeout chains (if equipped)

Rear Coach Conductor (Optional)

If the train is equipped with a rear coach conductor controls and is being operated with a rear coach conductor, the conductor is also responsible for the safety of the passengers as they board the train, as well as during unloading. In addition, the rear coach conductor should do the following:

1. Observe the conduct of passengers as they ride the train.
2. Make sure all passengers remain seated at all times, with arms and legs inside the coaches.
3. Make sure passengers do not tamper with any part of the train, including, but not limited to:
 - Seats
 - Safety placards
 - Closeout chains (if equipped)
 - Coach brake valve (if equipped)

NOTE: *If the train is equipped with a rear coach emergency brake valve, the rear coach conductor may also be required to:*

4. Apply the coach brakes in the event of an emergency (if train is equipped with rear coach conductor's controls).



Operation of Accessories

Track sander

The train is equipped with a track sander to improve traction on steep grades when the track is wet (e.g., from dew or rain). Also, if the track is rusty or greasy, the application of sand will help clean the tracks.

NOTE: *The sander is not intended as a solution for grades which are greater than those recommended by the manufacturer (Refer to Section 1, "Installation of Components and Track Preparation" in this manual).*

Make sure the sand tank is clean and dry before filling with sand. If necessary, open the drain plug on the bottom of the tank to drain and dry out the tank.

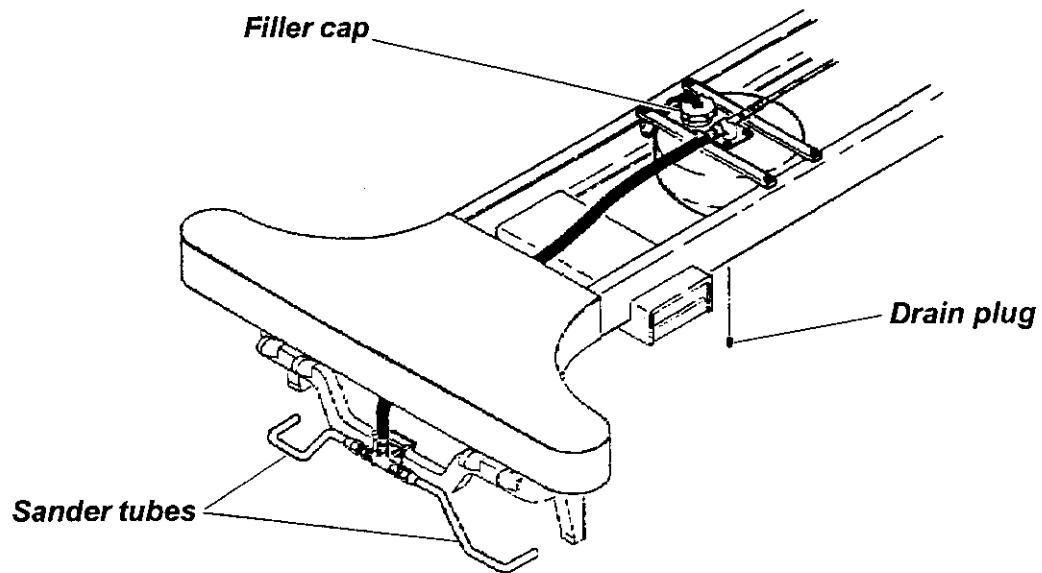
IMPORTANT: *Wet sand will not go through the jet assembly and sander tubes. Keep the sand and sand tank dry.*

Fill the sander tank with sand; tighten the cap securely to keep moisture out. Start the engine and allow air pressure to build to at least 90 psi. Move the SANDER SWITCH up to test the sander. If air comes out of the sander tubes (located in front of the forward trucks), but no sand, clean or repair the jet assembly. If there is no air at the sander tubes, check the air supply lines to the sander tank and the air valve.

Sand

The sand used in the track sander must be clean and dry, and of uniform size. Use river sand, screened through a 20 to 50 mesh screen (This is commonly referred to as "20 dry sand"). This sand is usually available in 100-pound bags, through companies which sell sandblasting supplies.

An excellent alternative sand is ground granite, screened through a 20 to 50 mesh screen. This material does not absorb moisture as quickly as river sand, but can be more expensive and harder to obtain.



Emergency Procedures

Emergency Stop During Train Operation

Use the following procedure in the event any unsafe condition requires the train to be stopped immediately:

For the Operator to Stop the Train:

1. Immediately move the brake lever to the left to apply the brakes on all locomotive drive wheels and on all coach wheels.

At the same time, move the throttle control toward the neutral position.

If the above procedure does not stop the train, perform the following procedure:

1. Press in on the emergency coach brake valve to apply the brakes on all coaches.
2. At the same time, move the directional control toward the center "NEUTRAL" position.

IMPORTANT: Use of the emergency coach brake valve to stop the train will result in the application of the brakes on the coach wheels only.

Applying the coach brakes will stop the train, but the operator must simultaneously move the directional control toward the center "Neutral" position to avoid damage to the locomotive engine and/or the air brake system.

Do not move the directional control lever into the "REVERSE" from "FORWARD," or into "FORWARD" from "REVERSE" while the train is in motion. Serious damage to the drive train can result.

NOTE: The parking/emergency brake is also available to be employed in an emergency. The parking brake locks the drive train and all drive wheels of the locomotive. Do not apply the parking brake while the train is in motion except in an emergency. Premature wear and possible damage to the drive train can result.

For the Rear Coach Conductor (if present) to Stop the Train:

On trains equipped with optional rear coach conductor controls and employing a rear coach conductor, the rear coach conductor may use the following procedure:

1. Press in on the rear coach emergency brake valve to apply the brakes on all coaches.

IMPORTANT: *Applying the coach brakes will stop the train, but the operator must simultaneously move the directional control toward the center "NEUTRAL" position to avoid damage to the locomotive engine and/or the air brake system.*

CRM

CHANCE RIDES MANUFACTURING, INC.

C. P. HUNTINGTON TRAIN

Maintenance Manual

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MAINTENANCE

General Information

Proper maintenance of the train is vital to safe operation, reduced operating costs and longer equipment life.

This manual provides detailed information on scheduled maintenance and lubrication of the ride. It also includes troubleshooting information.

IMPORTANT: In addition to the procedures listed in this section, certain components require scheduled maintenance. Refer to the "Vendor Literature" section of this manual for maintenance schedules for specific components.

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Preventive Maintenance

Preventive maintenance is the easiest and most economical means of assuring many satisfactory, productive hours of operation. Properly scheduled maintenance is the key to lower operating costs and longer service life.

Hourly intervals have been established for servicing the ride. Intervals are based on the number of hours the engine has run. The hour meter indicates the accumulated hours of operation.

The items listed in this section are separated into maximum hourly intervals. These intervals are based on "average" operating conditions. Actual conditions under which your train is operated are the determining factors when setting up a maintenance schedule. When operating under "severe" conditions, such as excessive heat, cold, dust, mud or water, more frequent servicing is necessary.

Preventive Maintenance - Initial Installation

The locomotive and all coaches were completely serviced and tested before leaving the factory. The following service must be performed upon initial installation of the train, in addition to regular scheduled maintenance.

1. During shipment of the locomotive and coaches, it is possible to develop leaks in the air system because of vibrations encountered during transit. Upon receiving the train and setting it up for operation, thoroughly check the air system for leakage. Start the engine and allow air pressure to build up to 90 psi. Apply the brakes and, with the brakes still applied, stop the engine. Observe the air pressure gauge frequently for an hour. If air pressure drops more than 5 psi, check all connections for leaks using a solution of liquid soap and water, looking for bubbles.
2. Add oil to the oil cups and grease the slide bars.
3. Connect the locomotive and coaches with the hitch splice plates, electrical connections and air line connections.

The train is now ready for normal operation (see "Operation" and "Maintenance Schedule" in this manual).

During the first week of operation, be especially observant and watch for loose parts, leaks, etc. In addition to scheduled maintenance, check the following:

- Check the torque of all functional load-carrying capscrews after the first week of operation. This allows for initial seating of components. Check the torque at monthly intervals thereafter.
- Check for lubricant leaks from the engine, transmission, and all gearboxes.
- Check for coolant leaks from the engine and radiator.
- Check for any evidence of fuel leakage.

Fluids and Lubricants

Timely lubrication and the use of high quality lubricants is necessary to obtain the maximum life of the train and its components. Use only the fluids and lubricants specified in the following chart.

Fluids and Lubricants Chart		
Component	Capacity	Specification
Fuel tank - Gasoline	13.5 gallons	See "Fuel Selection" in this section
Engine crankcase Gasoline or propane	4.5 quarts with filter	Engine oil meeting all requirements of: - ILSAC Minimum Performance Standard for Passenger Car Engine Oils GF-2* - and - - ACEA European Oil Sequences A1-96 and B1-96* *Or engine oil meeting API Service Classification SH Above 0°F (-18°C) - SAE 10W/30 All temperatures - SAE 5W/30
Transmission	Approximately 15 quarts (including torque converter and transmission cooler)	Automatic Transmission Fluid (ATF), Dexron® or Allison Type C-3
Drop-down gearbox	As required at level plug (approximately 1 quart)	Engine oil meeting A.P.I. Service Classification SB, SC, SE or CC - SAE 20W
Worm gearbox	As required	Multi-purpose gear oil - MIL-L-205B, SAE 90-140
All zerk fittings	As required	NLGI No. 2 lithium base grease
Oil cups	As required	Same as engine oil
Engine cooling system	16 quarts (approximate)	50/50 mixture of water and monoethylene glycol antifreeze (Example: Motorcraft® Super Plus 2000 coolant or equivalent antifreeze meeting Ford specification WSS-M97B44-D or Ford Specification ESE-M97B44-A)

Fuel Selection

The selection of a high quality fuel for the specific engine type will help maintain the power, fuel economy and emissions performance of the engine. A properly formulated gasoline will be comprised of well refined hydrocarbons, and chemical additives and will perform the following functions:

- Minimize varnish, lacquer, and other induction system deposits.
- Prevent gum formation or other deterioration during storage.
- Protect the fuel tank and other fuel system components from corrosion and other degradation.
- Provide the correct seasonally and geographically adjusted volatility. This will provide easy starting in the winter and avoid vapor lock in the summer.
- Avoid fuel system clogging.

Use only the fuels specified in this manual. The gasoline engine is designed to operate on regular grade unleaded gasoline with an minimum Anti-Knock Index (AKI) of 87.

NOTE: The AKI is the average of the Research Octane Number (RON) and Motor Octane Number (MON), or:

$$\frac{RON + MON}{2}$$

This fuel provides full power and economy together with long engine life and low maintenance cost.

Maintenance Schedule

DAILY or every 8 hours of operation, whichever occurs first

- ☐ **Engine oil dipstick**
Check oil level; fill if required
- ☐ **Transmission fluid dipstick**
Check fluid level; fill if required
- ☐ **Air tanks (one on locomotive, two on each coach)**
Drain water by opening drain cock on each tank. Tighten drain cock
- ☐ **Fuel tank**
Fill at the end of each day of operation
- ☐ **Radiator**
Check coolant level at overflow tank; fill as required.
- ☐ **False drive wheel slide bars (2 places)**
Lubricate
- ☐ **False drive radius rod slip joint (left hand side)**
Lubricate at zerk fitting
- ☐ **Oil cups (2 places)**
Fill with oil
- ☐ **Hitch splice bars**
Check capscrews for tightness
- ☐ **Air system and brakes**
Inspect entire system for leaks and damaged lines; test brake operation
- ☐ **Electrical connections**
Inspect entire system for worn, loose or damaged wires and connectors
- ☐ **General**
Visually inspect for coolant, fuel, engine or transmission leaks. Repair as required.

WEEKLY or every 50 hours of operation, whichever occurs first

- ☐ **Battery**
Check water level; fill if required (not necessary on maintenance-free batteries)
- ☐ **Drop-down gearbox**
Check oil level; fill if required
- ☐ **Worm gearboxes (4 places)**
Check oil level; fill if required
- ☐ **Truck swivels (2 places per locomotive or coach)**
Lubricate at zerk fitting
- ☐ **Brake air cylinders (4 places per truck)**
Check for leakage

EVERY TWO WEEKS or every 100 hours of operation, whichever occurs first

- ☐ **Engine air cleaner**
Inspect. Clean or replace as required.
- ☐ **False drive wheel swivel pins (2 places)**
Lubricate at zerk fitting

MONTHLY or every 200 hours of operation, whichever occurs first

- ☐ **Engine oil and filter**
Drain crankcase, discard filter. Replace filter (Ford part number 6731 or equivalent), fill with new oil *
- ☐ **Drive shaft u-joints (8 places) and slip joints (4 places)**
Lubricate at zerk fittings
- ☐ **Truck journal box bearings (8 places per locomotive or coach)**
Lubricate at zerk fitting
- ☐ **Coach free wheels (4 places per coach)**
Lubricate at zerk fitting
- ☐ **Serpentine drive belt**
Check tension and condition; replace if required
- ☐ **Inline Fuel filter**
Replace fuel filter at outlet of fuel tank (Ford part number 9A011 or equivalent)
- ☐ **Fuel pressure regulator/filter**
Check and replace if required*** (Ford part number #9P917 or equivalent)
- ☐ **Radiator**
Inspect for build-up of dirt and debris in cooling fins. Clean as required.
- ☐ **Transmission oil coolers**
Inspect for build up of dirt and debris in cooling fins. Clean as required.

EVERY 2 MONTHS or every 400 hours of operation, whichever occurs first

- ☐ **Spark plugs**
Clean or replace

ANNUALLY or every 1000 hours of operation, whichever occurs first

- ☐ **Radiator**
Drain, flush and refill with new coolant. Check radiator cap and replace if required.
- ☐ **Transmission fluid and filter**
Drain fluid discard filter. Replace filter and fill with new oil **
- ☐ **Drop-down gearbox**
Drain and refill with new oil
- ☐ **Worm gearboxes (4 places)**
Drain and refill with new oil
- ☐ **Serpentine drive belt**
Replace with a new belt
- ☐ **Air dryer**
Check and service as required
- ☐ **Air compressor unloader**
Check and service as required
- ☐ **Air governor**
Check and service as required
- ☐ **Coach emergency brake valve**
Pressure test and service as required
- ☐ **PCV (Positive Crankcase Ventilation) System**
Replace PCV valve. Check and clean all PCV hoses, tubes and fittings.

* Change the engine oil and filter initially after 50 hours of operation, and at bi-weekly (100 hour) intervals thereafter.

** Change the transmission fluid and filter initially after 20 hours of operation, and at yearly (500 hour) intervals thereafter.

*** It is recommended this service be performed by an authorized Ford dealer. Depending upon the quality of the fuel used, more frequent service may be necessary.



Safety

The following is a list of general rules which should be observed by everyone.

Remember, the key to safe and successful operation is to have well trained and well supervised employees.

General Safety Guidelines

1. All work must be performed by competent, qualified mechanics, capable of understanding the function of the parts and their proper installation.
2. Inspect the train and track before each day of operation to determine that no portion of the train or track is damaged, missing, or worn in such a manner that unsafe conditions can develop.
3. Perform the manufacturer's recommended maintenance procedures at the intervals specified and in the manner described in this manual.
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. Use only OSHA approved safety items. Ladders must be clean and unpainted.
6. Use the proper tool or equipment for each job. Ground all hand electric power tools before use.
7. Wear close-fitting, comfortable clothing when working on or close to moving parts or live electrical circuits. Avoid finger rings, jewelry or other articles which can be caught in moving parts or come in contact with electrical circuits.
8. Protect your eyes by wearing approved safety glasses or goggles.

9. Wear a hard hat at all times. When working in elevated areas, always use a safety belt.
10. Where work to be performed is hazardous, at least two persons shall work together.
11. If guards must be removed from equipment, make sure they are replaced before leaving the job. Check that all safety decals, signs and placards are properly installed and legible.
12. Clean up after each job, and properly dispose of surplus materials.
13. Keep a record of parts replaced and the date of replacement. Inform the manufacturer of any replacement requirements that are frequent or cause unsafe conditions.
14. Make modifications and additions as outlined in manufacturer's service and safety bulletins.



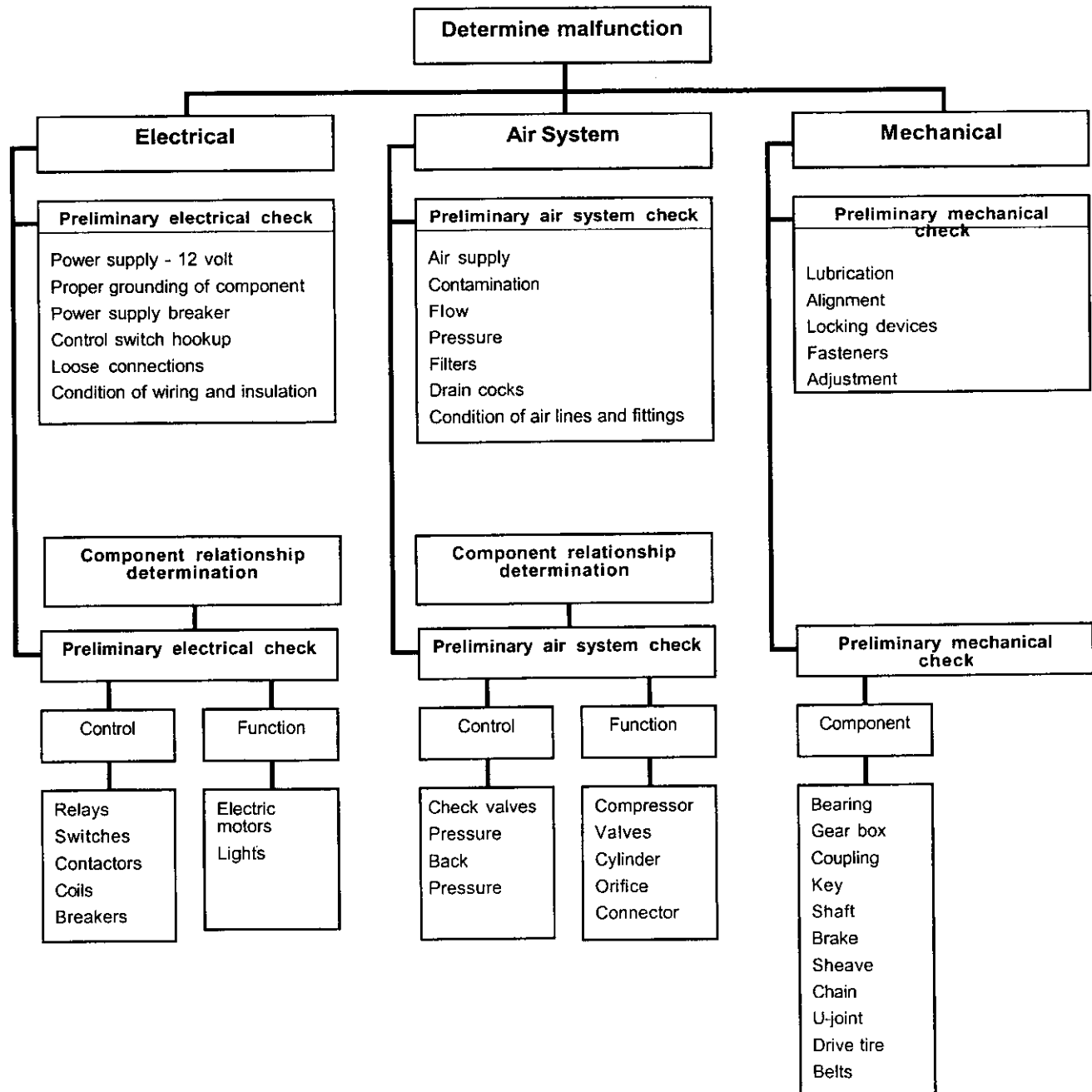
Troubleshooting Procedures

Before calling the Customer Service Department at CHANCE RIDES MANUFACTURING, Inc. for help, be prepared with the following information:

1. Have the locomotive and/or coach serial numbers available.
2. Have the service manual ready to use as a reference.
3. If train was previously owned, by whom? (Chance records often show changes made to a train by its previous owner).
4. Have the same person make all calls. Be sure to get the name of the person to whom he/she is speaking at the factory. All calls should then be made to that person.
5. Provide a phone number, fax number and/or e-mail address at which you can be reached.
6. Have shipping instructions ready (how, when, and where to ship parts).
7. Have a list of any alterations, modifications or kits that have been added to the train.
8. The person calling the factory must be familiar with the problem and be able to describe symptoms of the ride problem (such as: was the problem gradual, or did it suddenly quit; are any sounds occurring that are not normal; does the problem occur continuously or is it intermittent; does it run in one direction only; does the train run but have no braking, etc.).
9. Many times the problem that completely stops a machine from working is one of many simple things that are forgotten or overlooked. Listed on the following chart are many of the items that can cause this, as well as all items that must be checked before any calls are made to the factory. Use this chart to try to determine the cause. It can save several expensive phone calls or a more expensive visit by a factory representative, as well as valuable time.

NOTE: For engine troubleshooting, refer to the Ford 2.5L EFI Engine Diagnostic Manual and the Ford 2.5L Engine Service Manual.

Troubleshooting Chart



Fasteners

Capscrews

Capscrews used by CHANCE RIDES MANUFACTURING, INC. are classified as functional load-carrying capscrews if:

- They are used as tension members in the erection or operation of the ride

and/or

- They are required to resist shear through friction-type connections in the erection or operation of a ride.

Capscrews are selected with consideration to grade, size and quantity, using joint capacities based on tightness torques of 60% rated yield and group joint efficiencies of 62.5%

Torque Requirements

Capscrews must be tightened to the torque values listed in the torque chart, unless otherwise specified. These values were selected to produce a tightening torque range of 60% to 70% of proof load, when tightened with a hardened washer under the nut or capscrew head (whichever is accessible for tightening). When the capscrew is tightened from the head end, apply anti-seize lubricant to the shank end of the capscrew. When the threads are lubricated, use 10% less torque to tighten the capscrew.

DONOT TIGHTEN CAPSCREWS OVER THE RECOMMENDED TORQUE. This can damage the capscrew, due to variances in coefficients of friction and torque wrench accuracy. Always use a torque wrench. It is impossible to accurately measure the tightness of a capscrew by other methods. Torque wrenches must be checked for accuracy twice each operating season.

Capscrew Grades

CHANCE RIDES MANUFACTURING, INC. uses only grade 5 or better capscrews and grade 8 locknuts, with A325 hardened washers for functional loads. The *Grade markings chart* shows the capscrew markings to be found on CHANCE products. The manufacturer's identification symbols must be present on all functional load carrying capscrews.

Size Diameter - Threads/inch	Foot pound torque range (see notes 1 and 2) with locknut and hardened washer	
	SAE J429 Grade 5 ASTM A325	SAE J429 Grade 8 ASTM A490
1/4 - 20	5-6	7-8
1/4 - 28	6-7	8-10
5/16 - 18	11-13	15-18
5/16 - 24	12-15	17-21
3/8 - 16	19-24	27-33
3/8 - 24	22-27	31-38
7/16 - 14	30-35	45-55
7/16 - 20	35-40	50-60
1/2 - 13	50-60	65-80
1/2 - 20	55-65	75-90
5/8 - 11	95-115	130-160
5/8 - 18	105-130	150-180
3/4 - 10	165-200	235-285
3/4 - 16	185-225	260-320
7/8 - 9	270-325	380-460
7/8 - 14	295-360	415-505
1 - 8	400-490	565-690
1 - 12	440-535	620-755
1 1/8 - 7	495-600	800-975
1 1/8 - 12	555-675	900-1095
1 1/4 - 7	700-850	1135-1380
1 1/4 - 12	775-940	1255-1525
1 1/2 - 6	1215-1480	1975-2395
1 1/2 - 12	1370-1660	2220-2700

Torque chart

Torques for functional load carrying cold finished hex head capscrews with dry rolled threads, used with locknuts (see note 3), and tightened with an ASTM A325 hardened washer under the capscrew head or locknut (whichever is accessible for tightening).

This torque range will develop 60% to 70% of proof load.

Refer to **Replacement of capscrews and locknuts** for conditions requiring replacement









NOTES

1. Use anti-seize lubricant on capscrew shank when tightened from head end.
2. Use 10% less torque when anti-seize or other lubricant is used on threads.
3. Use same torque range for holes tapped in steel.

CHANCERIDES MANUFACTURING, INC. requires the use of cold-formed hex head capscrews with rolled threads. Hex bolts and hot formed hex head capscrews are not recommended because they may have machined threads and can have die seams along the shank.

NEVER REPLACE CAPSCREWS OR NUTS WITH PARTS OF A LESSER GRADE, OR DIFFERENT LENGTHS THAN THOSE SHOWN IN THE CHANCE PARTS CATALOG.

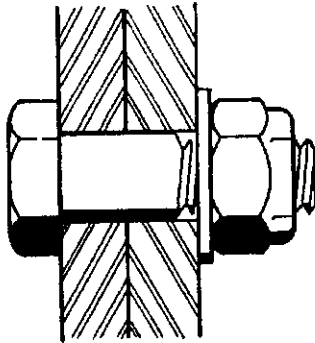
Grade markings for functional load carrying capscrews
 Manufacturer's identification symbols must be present on all capscrews

Correct markings	Examples of unacceptable markings
SAE J429 Grade 5 Medium carbon 81,000 yield 	 Grade 5.1 Low carbon  Grade 5.2 Low carbon martensitic
ASTM A325 Type 1 Medium carbon Longer shank and shorter thread length than Grade 5 81,000 yield 	
ASTM A325 Type 1 Medium carbon Longer shank and shorter thread length than Grade 5 81,000 yield 	ASTM A325 Type 2 Low carbon martensitic
SAE J429 Grade 8 Medium carbon 130,000 yield 	
ASTM A490 Alloy steel Longer shank and shorter thread length than Grade 8 130,000 yield 	

ASTM A325



ASTM A490

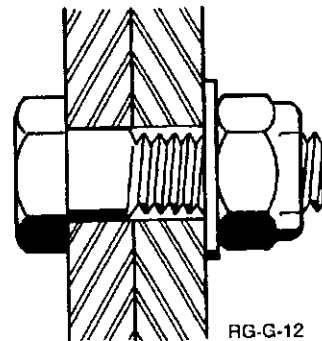
**Capscrew comparison**

ASTM A325 or ASTM A490
Capscrew - Longer shank shorter
threads

Grade 5



Grade 8



Grade 5 or Grade 8 cap screw -
Shorter shank longer threads

RG-G-12

Replacement of Capscrews and Locknuts

When permanently installed capscrews and locknuts are disassembled for repair or adjustment, they must be replaced if they have been in service over five (5) years, or corrosion, or other damage requires over-torquing for removal. If a torque wrench is not used to measure excessive removal torques, the capscrews and locknuts must be replaced.

Capscrews and locknuts which are frequently disassembled for portability must be replaced each operating season. If the capscrews and locknuts become damaged, corroded or require excessive torque for removal, they must be replaced. If a torque wrench is not used to measure excessive removal torques, the capscrews and locknuts must be replaced.

Inspection

Daily Pre-Operational Inspection

Prior to daily operation, certain inspection procedures must be followed. These inspection points include, but are not limited to the following items.

NOTE: Checklists for various inspection and maintenance intervals are provided in the back of this section. These pages can be copied and filled out as a permanent record of each inspection.

1. Passenger seating and floors - These areas must be clean and dry. All components must be properly installed.
2. Drive train - Visually check engine, transmission and all gearboxes for signs of leakage.
3. Hitch bars - Inspect each hitch bar for visible signs of wear or damage, such as contact with the locomotive or coach frames. Visually inspect each hitch bar for proper installation of fasteners and hitch splice plates. The capscrews for the hitch splice bars are Grade 5 and must be tightened to 95-115 ft-lbs.
4. Wheels - Inspect the wheels on the locomotive and all coaches for visible signs of wear or damage. Check that wheel flanges are not excessively worn.
5. General - Visually inspect the locomotive and all coaches for broken, damaged or missing parts.
6. Safety signs and decals - All safety signs and decals must be properly installed and legible.
7. On coaches equipped with a wheelchair ramp, check the operation of the ramp and wheelchair restraints. Inspect all components for broken, damaged or missing parts.
8. On coaches equipped with a closure bars or chains, check overall condition.
9. Ensure that all scheduled and required maintenance has been performed.

IMPORTANT: *The following steps require starting and operating the train. Refer to and follow all precautions and instructions provided in the "Operation" section of this manual.*

10. Check for proper operation of the air brakes at all wheels. Move the train a short distance and apply the brakes. Listen for any unusual noises.
11. Check the parking brake operation.
12. Run the train at least once over the entire course to observe the overall performance of the train in relation to past performance of the train and for proper function of all controls and indicators on the operator's control panel.
13. Carefully watch the track for obstructions and other obstacles close to the track. Observe the condition of the track throughout its entire route.

Engine

Remote Engine Switch

A remote engine switch is provided to start and stop the engine for maintenance procedures. It is located under the top engine cover and can be accessed by opening the right hand side engine cover.



WARNING: When using the remote engine switch, know and follow all safety information in the "Operation" section of this manual for starting and operating the engine.

In addition to those precautions, stay clear of all hazards that are exposed when the engine covers are open or removed. These hazards include, but are not limited to:

- Rotating machine parts (drive belts, pulleys, etc.)
- Hot engine parts (exhaust system, cooling system, etc.)
- Electrical components and connections

IMPORTANT: The remote engine switch overrides the key switch on the dash panel. It must be in the "Off" position for normal operation of the key switch. Similarly, the key switch must be in the "Off" position to use the remote engine switch.

The instruments and other accessories do not operate with the remote engine switch. Minimize engine operation time when using the remote engine switch.

The remote engine switch has three positions:

- "Off" - Move the switch all the way to the rear. This position is used to stop the engine and disable all accessory circuits. Leave the switch in this position for normal operation of the train.
- "On/Run" - In this center position, the ignition system and all accessory systems are energized.
- "Start" - Push the switch forward against the spring to engage the starter motor. Release the switch as soon as the engine starts.

NOTE: The directional control must be in "Neutral" to operate the starter.

Engine Covers

The side and rear engine covers can be removed for service or other maintenance of the components underneath.



WARNING: The side and rear engine covers must be installed and secured properly for normal operation of the train. If engine covers are removed for service or other maintenance, replace them as soon as service work is completed to reduce the risk of serious personal injury.

Side Engine Covers

Unlatch the rubber latches at the top of each side engine panel to swing it down. If additional access is required, slide the panels back to disengage the hinges at the bottom of each panel. Replace the panel when service work is completed.

Rear Engine Cover

To remove the rear engine cover use the following procedure:

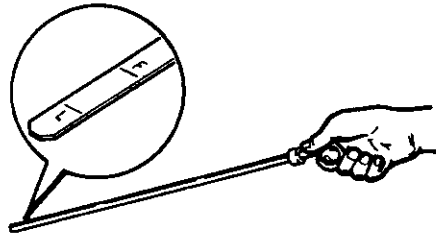
1. With the engine stopped and the parking brake engaged, remove the two side panels as described in the previous topic.
2. Loosen the seven (7) quarter-turn fasteners which secure the rear engine cover to the frame.
3. Locate and disconnect the following connections:
 - Two (2) electrical connectors on the right hand side of the engine near the transmission filter
 - One (1) electrical connector on the left hand side of the engine near the alternator
 - Two (2) quick-disconnect air fittings for the emergency coach brake valve on the dash panel
 - One (1) quick-disconnect air fitting for the air pressure gauge on the dash panel
4. With assistance from a helper, lift and remove the rear engine cover.
5. Use the reverse of this procedure to replace the rear engine cover when service is completed.

Engine Lubrication System

Engine Oil Level

Check the engine oil level after every eight hours of operation or daily, whichever occurs first. The dipstick is located on the right hand side of the engine.

Check the oil level when the engine is stopped and the locomotive is on a level section of track.



1. Clean the area around the dipstick.
2. Remove the dipstick and wipe it with a clean, lint-free cloth.
3. Insert the dipstick and remove it again to check the oil level. The oil level must be between the two marks on the dipstick. Never operate the engine if the oil level is below the bottom mark on the dipstick.
4. If additional oil is required, clean the area around the filler cap, located on the valve cover and remove the cap. Add oil until the dipstick reading shows the oil at the correct level. **DO NOT OVERFILL.**
5. Replace the dipstick, making sure it is fully inserted into its tube to maintain a sealed crankcase condition.

Oil and Filter Change

The engine oil must be changed every two weeks, or after every 100 hours of operation, whichever occurs first. If possible, drain the oil when warm. This permits the most thorough removal of contaminants.

NOTE: On a new engine, the oil and filter must be changed initially after the first 50 hours of operation.

1. Park the locomotive on a level section of track and engage the parking brake.
2. Remove the drain plug and allow at least five minutes for the oil to drain completely.
3. While the oil is draining, remove and discard the oil filter cartridge.
4. Install the drain plug and tighten to 15-25 ft-lbs (9-20 N•m).
5. Clean the sealing surface on the engine block and make sure none of the old filter gasket remains.
6. Partially pre-fill the new filter cartridge with clean, engine oil in accordance with the "Fluids and Lubricants Chart" in this section. Lubricate the gasket on the filter with clean engine oil.
7. Install the new filter on the engine and turn until its gasket contacts the sealing surface on the engine block. Tighten further 1/2 turn by hand only. **DO NOT OVER-TIGHTEN.**

NOTE: Use the correct oil filter, Ford part number 6731 or equivalent (Chance part number 22670800).

8. Select a high quality oil that meets the specifications in the "Fluids and Lubricants Chart" in this section. Clean the area around the filler cap and run over the cap. Refill the crankcase to the recommended level. **DO NOT OVERFILL.**
9. Operate the engine for a few minutes and check for normal reading on the oil pressure gauge. Check for leaks around the drain plug and oil filter.
10. Stop the engine, wait a minute for the oil to drain back into the oil pan, then check the dipstick for correct oil level. Add oil as required.

Engine Air Cleaner

The locomotive uses a dry element air cleaner. Careful attention to the air cleaner is important to long engine life and proper performance. Make the following checks frequently, especially if operating in dusty conditions.

- Check all air cleaner and hose connections for tightness. Be sure hoses and or tubes are not damaged or kinked.
- Check the air cleaner body for dents or other damage.
- Check the air cleaner for leaks. Repair or replace parts immediately to stop leaks.

Air Cleaner Service

The engine air cleaner must be serviced every two weeks or after every 100 hours of operation, whichever occurs first. Use the following procedure.

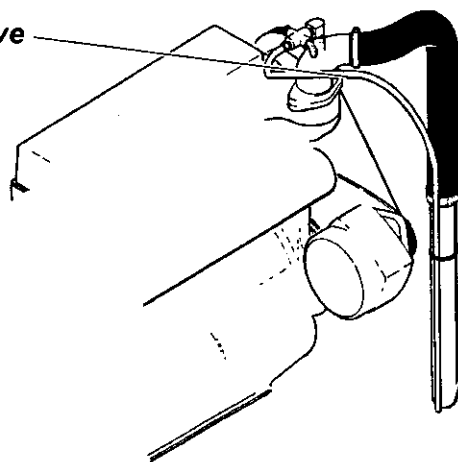
1. Loosen the clamp screw on the end of the air cleaner body and remove the dust cup.
2. To empty the dust cup, remove the rubber baffle from inside. Wipe the dust cup with a clean rag and install the rubber baffle.
3. While the dust cup is off, remove the wing nut which secures the air cleaner element. Remove the element and carefully inspect it for dirt or damage. If necessary, replace it with a new element.
4. Wipe the inside of the air cleaner body with a clean rag and replace the element.
5. Install the dust cup, with the area stamped "TOP" pointing up.
6. Tighten the clamp screw.

Engine Cooling System



WARNING: The locomotive has a pressurized cooling system. Do not open the radiator cap until all pressure is relieved from the cooling system. Serious burns can result. If the engine has been running, or if coolant is hot, open the relief valve on top of the engine to relieve pressure.

Relief valve



Checking Coolant Level

The cooling system is a closed system with a coolant overflow tank. Normal expansion of the coolant during operation is captured in the overflow tank. After the engine is shut down, this coolant is drawn back into the radiator as the engine cools.

Check the coolant level at the overflow tank daily or every 8 hours of operation, whichever occurs first. The correct coolant level is noted on the side of overflow tank. Note that different levels are marked for either hot or cold engine conditions. If the level is low, add coolant as described in the following topic "Adding Coolant."

IMPORTANT: Do not open the radiator cap to check the coolant level. Air can enter and become trapped in the cooling system, resulting in overheating and serious damage to the engine. Always check the coolant level at the overflow tank.

Adding Coolant

IMPORTANT: *If coolant must be added to the radiator, use the following procedure. Any other procedure can trap air in the cooling system, resulting in overheating and serious damage to the engine.*

If the coolant level in the recovery tank is low, a small amount of coolant can be added at the recovery tank to bring it to the correct level. However, if a significant amount of coolant has been lost, or if the recovery tank is empty, the following procedure must be followed.

1. The engine must be stopped. Open the relief valve on top of the engine.
2. Remove the radiator cap and add coolant.

IMPORTANT: *Do not add coolant to the radiator if the engine is overheated. Wait for the engine to cool to avoid damage to the engine.*

3. Start the engine and let it run until the thermostat opens, allowing coolant to flow into the engine. This will force any air in the system out the relief valve.
4. As soon as a solid stream of bubble-free coolant comes out of the relief valve tube, close the valve. Add coolant to the radiator as required, and install the radiator cap.
5. Add coolant to overflow tank to bring it to the correct level.

Radiator Inspection

Visually inspect the radiator every 200 hours of operation or monthly, whichever occurs first. Look for build-up of dirt and debris in cooling fins, paying particular attention to the side of the radiator nearest the engine. Clean as required.

Coolant Change

The cooling system must be drained, flushed and refilled with new coolant annually or every 500 hours of operation, whichever occurs first.

When the engine is cool, remove the radiator cap. Open the drain valves on the radiator and on the left hand side of the engine block, below the exhaust manifold. Flush the cooling system with clean water and drain completely.

NOTE: *Clean the exterior of the radiator fins of any dirt or other debris. Pay particular attention to the side near the engine.*

Refill the cooling system with new coolant as specified in the "Fluids and Lubricants Chart" in this section. Bleed the air from the cooling system as described previously under "Adding Coolant."

Engine Cooling fan

Air is forced through the radiator by an electric motor driven cooling fan. The fan requires little maintenance, other than periodic inspection for obvious signs of wear or damage, and removal of debris from the fan shroud.

The engine cooling fan is thermostatically controlled and will come on and go off as required to maintain the correct operating temperature of the engine.



WARNING: The fan is electrically operated and may start automatically even if the ignition switch is off.

Rotating machine parts can cause serious personal injury. Always disconnect the battery before servicing the fan.

Serpentine Drive Belt



WARNING: Keep clear of the drive belts while the engine is running. Contact with moving parts can cause serious personal injury.

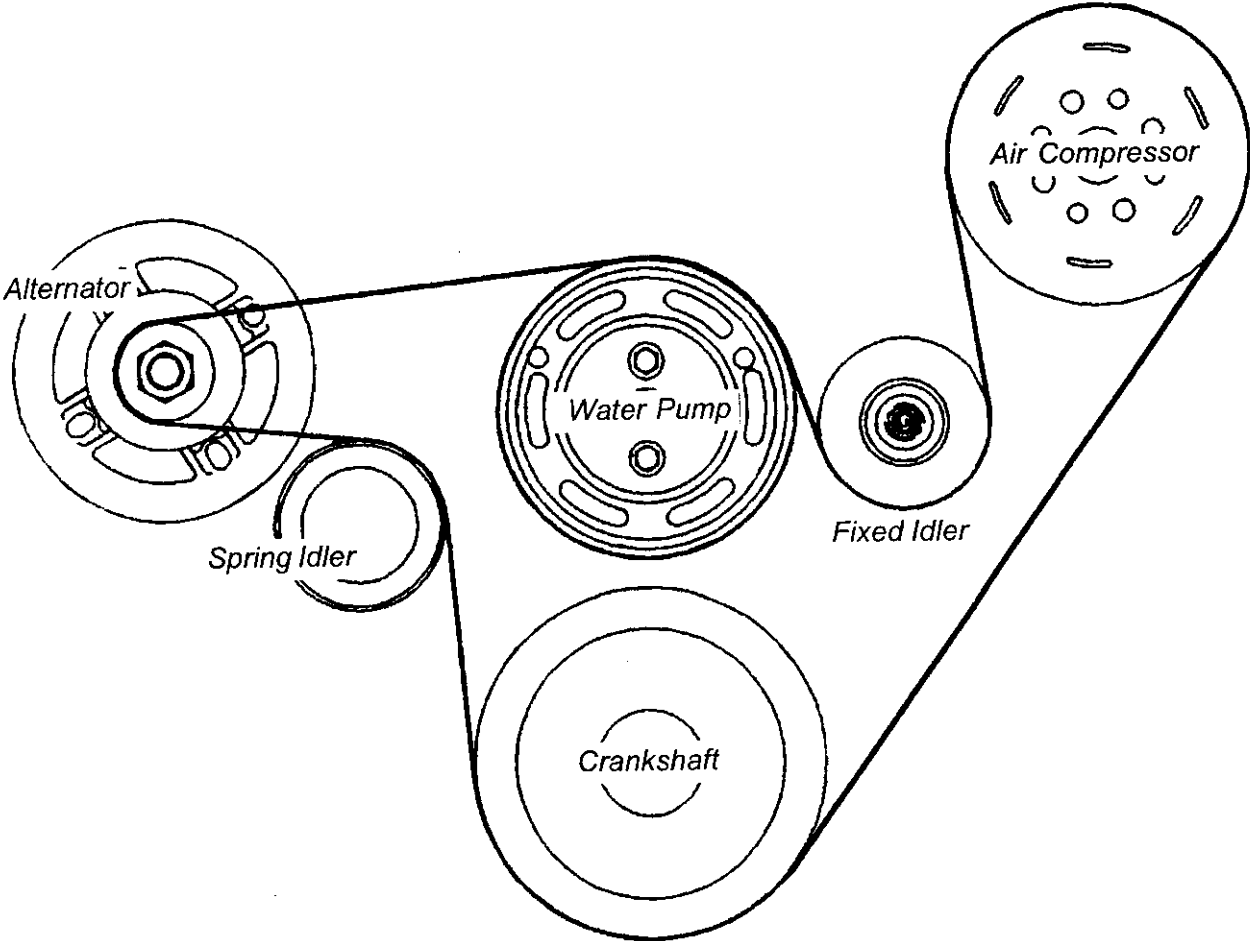
Belt tension is maintained continuously by a spring idler.

Check the condition of the serpentine drive belt monthly or at 200 hour intervals. Look for cracks, nicks or other signs of wear or damage. If necessary, replace it with a new belt as described in the following topic, "Serpentine Drive Belt Replacement."

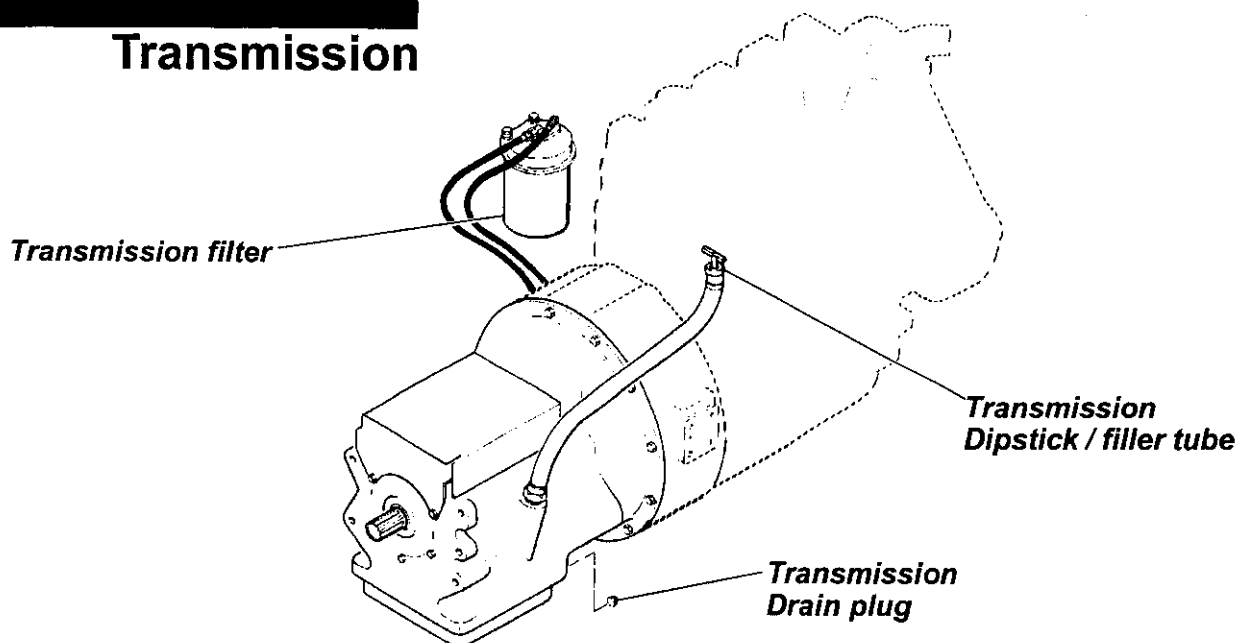
Serpentine Drive Belt Replacement

Replace the serpentine drive belt (Chance part number 20528603) after every 1000 hours of operation or annually, whichever occurs first, or any time the belt shows excessive wear or damage. Use the following procedure.

1. Remove the side and rear engine covers as described elsewhere in this section.
2. Using a 3/8" square drive breakover or ratchet in the square hole provided in the spring idler, turn the idler against the spring to provide enough slack to remove the belt.
3. Installation of the new belt is the reverse of the removal procedure. Refer to the following diagram for the correct belt routing.

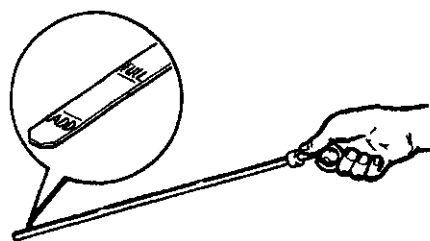


Transmission



Transmission Fluid Level

Check the fluid level in the transmission after every eight hours of operation or daily, whichever occurs first. The dipstick is located on the left hand side of the transmission. Park the locomotive on a level section of track and stop the engine immediately before checking fluid level.



Clean the area around the dipstick/filler tube. Remove the dipstick and wipe it with a clean, lint-free cloth. Insert the dipstick and remove it again to check the fluid level.

Add fluid if the level is below the "LOW" mark when cold, or the "FULL" marks when warm. Use a funnel to add fluid at the filler tube.

IMPORTANT: Add only enough fluid to bring the level to the correct mark on the dipstick. **DO NOT OVERFILL.** Low fluid level causes poor operation; high fluid level can result in foaming, clutch slippage, and leakage. Overheating and serious transmission damage can result from incorrect fluid levels.

Transmission Fluid and Filter Change

The transmission fluid and filter must be changed annually, or after every 500 hours of operation, whichever occurs first. If possible, drain the fluid when warm. This permits the most thorough removal of contaminants.

NOTE: *On a new transmission, the fluid must be changed initially after the first 20 hours of operation.*

Park the locomotive on a level section of track and engage the parking brake. Remove the drain plug and allow at least ten minutes for the fluid to drain completely. Clean the magnetic drain plug and install.

IMPORTANT: *Inspect the old fluid for signs of contamination (excessive dirt or metal particles) or high operating temperature (discoloration or a strong odor). If either condition exists, investigate the cause and correct the problem before the train is put back into service.*

Remove and discard the transmission filter. Clean the sealing surface on the filter base and make sure none of the old filter gasket remains. Lubricate the gasket on the new filter with clean transmission fluid and install. **HAND TIGHTEN ONLY.**

NOTE: *Use transmission fluid filter, Chance part number 22671600 or equivalent (AC PF-2).*

Select a high quality transmission fluid that meets the specifications in the "Fluids and Lubricants Chart" in this section. Approximately seven quarts are required to refill the transmission to the recommended level. **DO NOT OVERFILL.**

Start the engine and run at low idle with the transmission in "N" (Neutral) for one minute. Stop the engine and check for leaks around the drain plug and transmission filter. Check the fluid level at the dipstick; add fluid as required.

Transmission Oil Coolers

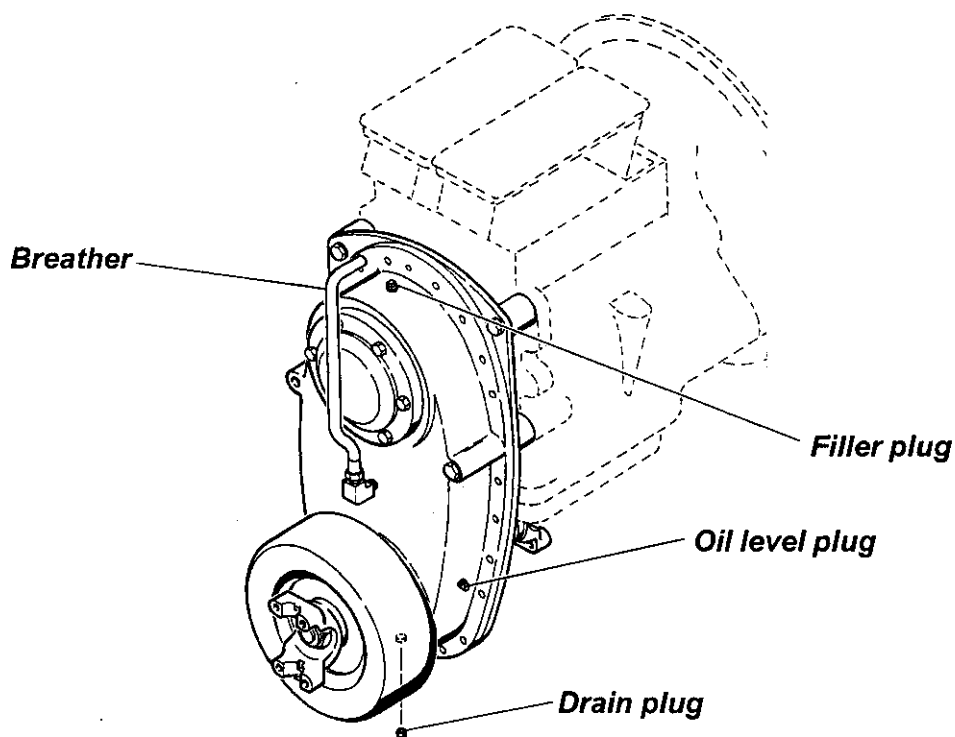
The transmission oil coolers are located under the boiler. Air is forced through the coolers by two electric cooling fans. Inspect the transmission oil coolers monthly, or after every 200 hours of operation. If necessary, carefully clean the fins of the cooler to remove dirt or debris.

The transmission oil cooler fans are thermostatically controlled and will come on and go off as required to maintain the correct operating temperature of the transmission. The fans may start or continue to operate after the ignition switch is turned to the "Off" position, especially after it has been operating under a load.

Drop-Down Gearbox

Drop-Down Gearbox Oil Level

Check the oil level in the drop-down gearbox after every 50 hours of operation or weekly, whichever occurs first. Clean the area around the oil level plug and remove the plug. The oil must be level with the bottom of the oil level plug opening. Remove the filler plug and add oil as required. Check the breather to make sure it is not plugged.



Drop-Down Gearbox Oil Change

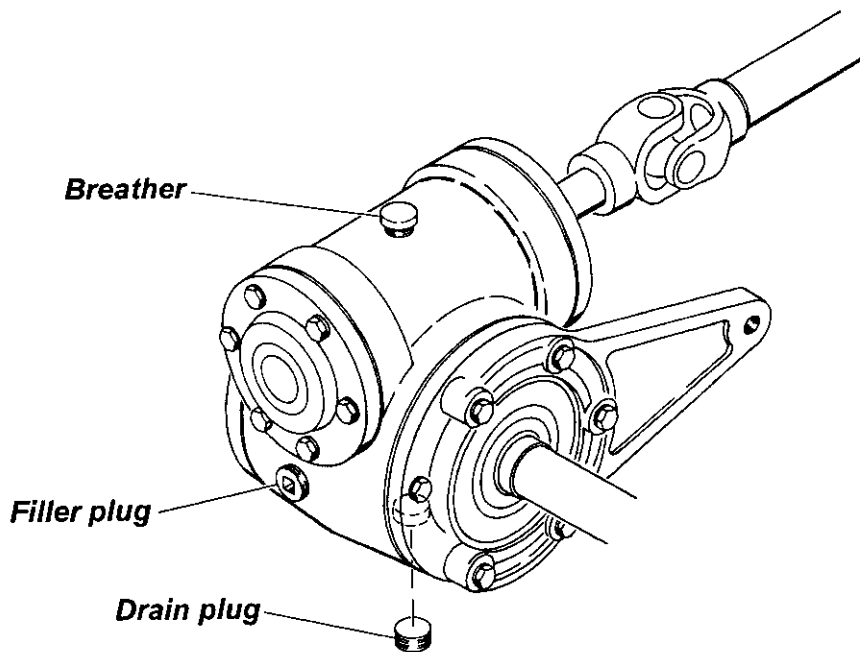
The oil in the drop-down gearbox must be changed annually, or after every 500 hours of operation, whichever occurs first.

Remove the drain plug and drain the old oil completely. Install the drain plug, remove the oil level plug and filler plug and fill with new oil.

Worm Gearboxes

Worm Gearbox Oil Level

Check the oil level in all four worm gearboxes after every 50 hours of operation or weekly, whichever occurs first. Clean the area around the filler plug and remove the plug. The oil must be level with the bottom of the filler plug opening. Add oil as required. Check the breather to make sure it is not plugged.



Worm Gearbox Oil Change

The oil in the worm gearboxes must be changed annually, or after every 500 hours of operation, whichever occurs first.

Remove the drain plug and drain the old oil completely. Install the drain plug, remove the filler plug and fill with new oil.

Air System

Air Tanks

During normal operation of the air compressor, moisture from the air will condense and accumulate in the air tanks. Drain the air tanks daily to remove all accumulated water.

The locomotive has a large air tank, located in the boiler. Each coach has two air tanks, located under the right hand side of the frame. A drain cock is provided on the bottom of each tank. Open the drain cock on each tank. Look for the presence of oil or rust in the air tank. After all water has been expelled, tighten the drain cock.

NOTE: *If moisture in the tank contains rust or other contamination, exhaust all pressure from the air system and remove the tank from the locomotive or coach. Use steam or hot water to clean the tank thoroughly from the inside. After cleaning, the tank must be allowed to dry thoroughly before installing. Replace any tank which has been weakened by rust or corrosion.*

Air Compressor Intake Hose

Check the condition of the air intake hose between the engine air cleaner and the air compressor at 200 hour intervals or monthly, whichever occurs first. Check the hose for cracks, kinks or other damage. Check the connections at each end for potential leaks.

Air Dryer

Operation

The air dryer collects and removes moisture and contaminants from the compressed air before it reaches the tank. This self-purging unit uses a replaceable desiccant cartridge and coalescing filter, and a heating element.

Operation of the air dryer can best be explained by describing the two operating cycles:

- Drying cycle
- Purge cycle

Drying Cycle

When the air compressor is in the compressing (loading) cycle, compressed air, along with oil, oil vapor, water and water vapor, enters the air dryer supply port through the air compressor discharge line. Air enters the dryer through the TurboSaver™ valve, which forces the air through the coalescing filter, where water droplets and contaminants are removed from the air.

The air then moves through the desiccant cartridge where the remaining moisture is removed. Some of the clean, dry compressed air is diverted to the purge area to dry the desiccant bed. The balance flows through a check valve in the dryer delivery port and into the air tank.

Purge Cycle

When the pre-set system pressure is reached, the governor signals the compressor to stop compressing (to begin the "unloading" cycle). Pressure from the governor's unloading port enters the dryer through the control port. This signal from the governor causes the TurboSaver™ valve to shift, closing and blocking the inlet, while simultaneously causing the purge valve to open. This sudden opening of the purge valve permits the pressurized air in the coalescing filter sump to flush moisture and contaminants from the housing. Because of this rapid decompression, it also back-flushes the desiccant bed and coalescing filter. Air trapped in the purge reservoir is metered through the purge orifice and allowed to slowly pass over the desiccant bed at slightly higher than atmospheric pressure. Since low pressure air can retain more moisture per given volume, the relatively small volume of air can easily absorb the water previously absorbed by the desiccant during the drying cycle. This cycle is audible as a large volume of air is expelled immediately, followed by a slow flow of air, lasting approximately 30 seconds.

Air Dryer Desiccant Cartridge and Coalescing Filter Service

The desiccant cartridge and coalescing filter must be replaced when they become contaminated and no longer have adequate capacity to absorb moisture. This is usually indicated by moisture in the air system when the tanks are drained.

NOTE: *If the train is operated in a wide range of ambient temperatures, a small amount of condensation is normal, and does not indicate a problem with the air dryer.*

Before replacing the desiccant cartridge and coalescing filter, check to determine that water accumulation is not related to the following items:

- An outside air source has been used to charge the system. This air did not pass through the air dryer.
- Air usage is exceptionally high and not normal for the train. This might be due to leakage or an unusual air requirement that does not allow normal loading/unloading operation of the air compressor. Check for high air system leakage.

Desiccant cartridge and coalescing filter replacement are generally recommended at 1,000 hour service intervals, or annually, whichever occurs first. However, this interval will vary depending on actual operating conditions. If experience shows that specific conditions produce either extended or shortened life of the desiccant and/or coalescing filter, a corresponding change in the service interval can be made.

If it is determined the desiccant cartridge and/or coalescing filter must be replaced, use the procedure described under "Rebuilding the Air Dryer" in this section.

NOTE: *Before servicing the desiccant cartridge and/or coalescing filter, make the following "Operational Checks."*

Operational Checks

Perform the following checks when the desiccant cartridge and/or coalescing filter are serviced, or as required.

1. Check the operation of the check valve in the outlet port, leading to the air tank. Build system pressure to normal and shut down the engine. Observe a test gauge installed in the tank. A rapid loss of pressure can indicate a failed check valve. This can be confirmed by checking for leakage at the purge valve exhaust.

NOTE: *The purge valve opens when governor cut-out pressure is reached. Wait a few minutes for the purge cycle to be completed before testing for leakage from the check valve.*

2. Check for excessive leakage at the purge valve by coating the exhaust port with a soap solution while the compressor is loading (compressing air).
3. Check the thermostatically controlled heater during cold weather operation. Check for electric power to the heater as follows. With the ignition switch on, check for 12 volts between the two terminals on the bottom of the dryer. If there is no voltage, look for an open circuit. Refer to the locomotive electrical schematic.

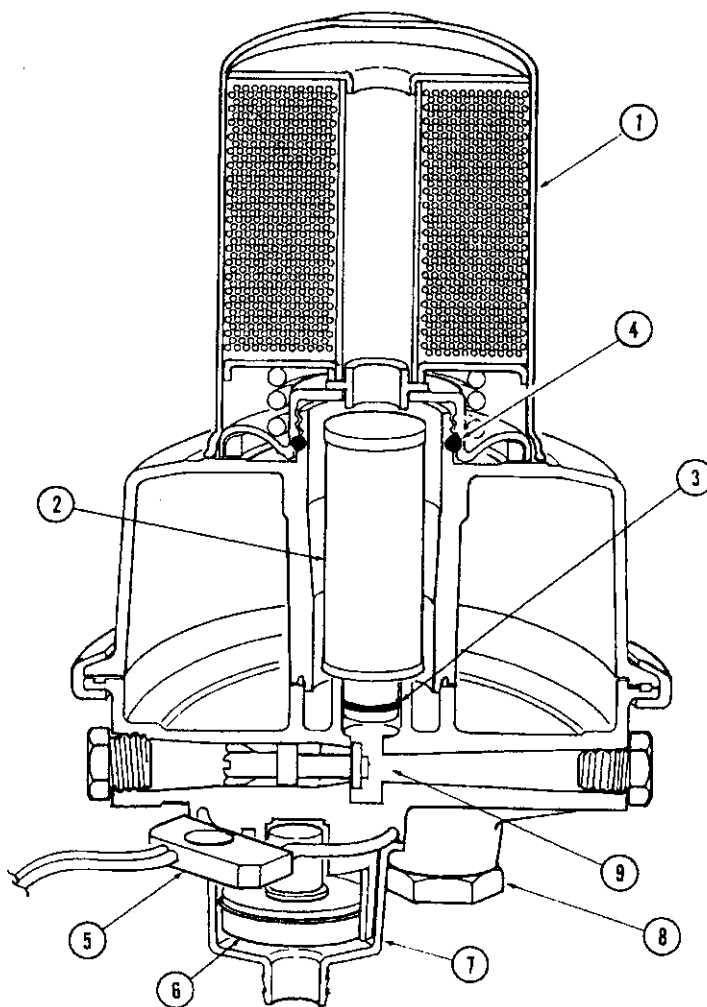
Rebuilding the Air Dryer

For ease of servicing, the dryer need not be removed from the locomotive for rebuilding.

The following describes the procedure for replacement of the desiccant cartridge and coalescing filter, which are normally serviced at the same time. (Order Chance part number 22380601 for complete Air Dryer Rebuild Kit)

Air Dryer

1. Desiccant cartridge
2. Coalescing filter
3. Small o-ring
4. O-ring (on threaded neck)
5. Heater
6. Purge valve
7. Purge valve cover
8. Outlet port check valve
9. TurboSaver™ valve



1. Drain all air from the air system.
2. Remove the desiccant cartridge. Use a strap wrench at the base of the cartridge to loosen, then spin off by hand.

NOTE: *If the old desiccant cartridge will be put back into service, be careful during removal to prevent damage.*

3. Remove the o-ring from the threaded neck and discard.
4. Remove the coalescing filter and discard.
5. Inspect the sealing surfaces of the drier. Make sure none of the seal material remains in the dryer

NOTE: *Use a suitable air system lubricant where required in following steps.*

6. Install the small o-ring in its groove on the neck of the coalescing filter. Apply a light coat of lubricant on the o-ring and insert the coalescing filter into the center bore of the air dryer. The filter must be centered in the cavity. The top of the filter must not extend above the cartridge mounting nipple.
7. Apply a light coat of anti-seize compound on the threads of the cartridge mounting nipple.
8. Apply a light coat of lubricant to the gasket on the new desiccant cartridge. Hand-tighten the cartridge 120 to 240 in-lbs, or one-half to one full turn after the gasket makes contact.

NOTE: *If the old desiccant cartridge is being put back into service, remove the gasket and install a new gasket. The 1/4-round section of the gasket is installed into the cavity on the cartridge.*

9. Proceed to "Air Dryer Operational Checks" in this section before returning the train to service.

Air Dryer Heater Replacement

The heater can be serviced while the air dryer is mounted in the vehicle.

1. Disconnect the electrical leads from the heater.
2. Remove the three screws which secure the purge valve cover to the air drier. Remove the cover.
3. Remove the old heater and discard. Install the new heater in the same location.
4. Install the purge valve cover and secure with three screws tightened to 40 to 55 in-lbs.
5. Connect the heater electrical leads.
6. Make the following "Air Dryer Operational Checks" before putting the train back into service.

Air Dryer Operational Checks

After the air dryer is serviced or replaced, make the following operational checks before the train is returned to service.

1. Start the engine and build air pressure to 100 psi, then shut off the engine.
2. Check for air leaks at the inlet and outlet ports of the dryer. Correct any leakage problem.
3. Start the engine again, and build pressure until the compressor cuts out. At cut-out pressure, make sure the dryer purge valve opens and immediately expels a large volume of air, followed by a slow flow of air lasting approximately 30 seconds.
4. Check for leakage at the following locations, to be sure the air dryer will not cycle excessively. Correct any leakage problems as soon as they are found.
 - Compressor unloader mechanism
 - Governor
 - Air tank, including drain valve
 - All connections leading to and from the tank

Air Compressor

Air Compressor Service

Unloader Service

At the beginning of each season of operation, remove the unloader and install an unloader service kit RNT-26JB (Chance part number P97158). The Unloader Service Kit includes all necessary parts and instructions.

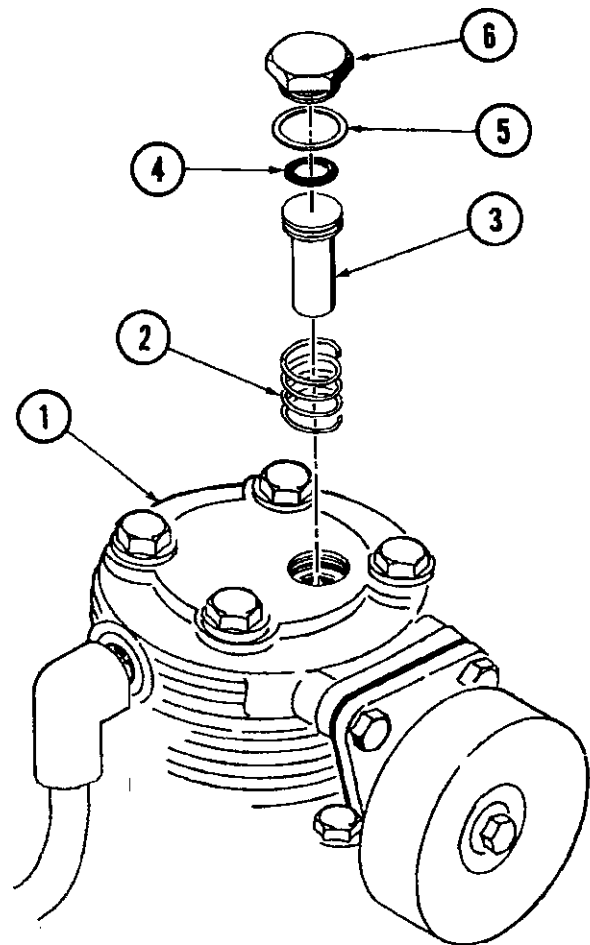
NOTE: The unloader can be serviced without removing the compressor from the engine.

1. Remove the unloader cover and the washer seal (1-1/4" hex screw), on top of the cylinder head.
2. Remove the unloader pin, o-ring and spring.
3. Discard the washer, seal and spring. Remove the o-ring from the pin and discard the o-ring.
4. Clean all machined surfaces and inspect for damage.

IMPORTANT: Be extremely careful to avoid scratching the machined surfaces.

5. Insert the new unloader spring. Assemble the new o-ring on the new unloader pin.
6. Apply Dow-Corning #33 lubricant, or equivalent, to the seal forming a 1/16" ball. Insert the unloader pin into the head. Place the unloader washer on the unloader cover. Assemble these two items to the head as a unit, compressing the unloader spring and hold down until the unloader cover thread engages in the cylinder head. Tighten the cover to 30 ft-lbs.

1. Cylinder head
2. Spring
3. Unloader pin
4. O-ring seal
5. Washer
6. Unloader cover



Air Governor Operation

The governor operates in conjunction with the compressor unloader mechanism to automatically control the air pressure in the system. Air pressure is maintained between pre-set minimum and maximum pressures.

NOTE: *The governor is set to allow charging (loading) when the pressure drops to 90 psi. The compressor cuts out (unloading) at 110 psi.*

The compressor runs continually when the engine is running, but air compression is controlled by the governor, which starts or stops compression depending on the pressure in the air tank.

Governor Service

Perform the following services annually.

Leakage Test

Check the governor for leakage using a soap solution. Check for leakage at the governor ports in both the cut-in and cut-out positions. If the governor leaks, replace it with a new part. Do not attempt to overhaul the governor.

Governor Filter Service

Examine the two filters in the governor. Clean light accumulations of foreign material with the filters installed in the governor. If damaged, use a sharp hooked tool to carefully remove the filters. Use a suitable adapter sleeve to press new filters into the ports.

NOTE: *When cleaning the governor filters, use a solvent which will not damage the metal or rubber parts of the filters.*

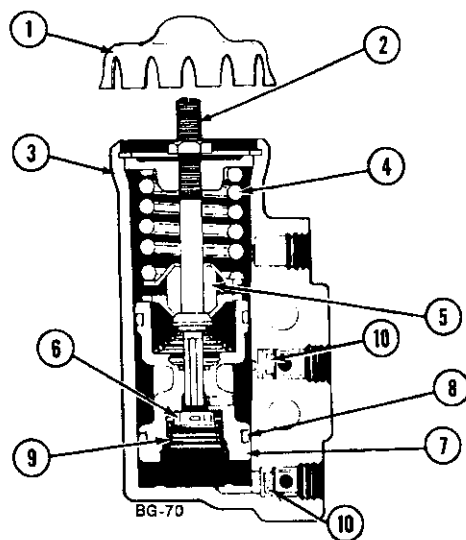
Operation Test

Start the engine and allow air pressure to build, while monitoring the system with a test gauge, or the air pressure gauge on the train's instrument panel. Check the pressure at the time the compressor cuts out. The correct cut-out pressure is 110 psi. With the engine still running, apply and release the brake several times to reduce air pressure while watching the gauge. Check the pressure at the time the compressor cuts in. The correct cut-in pressure is 90 psi.

If cut-in or cut-out pressures are not as specified, adjust the governor as described in the following procedure.

Governor Adjustment

IMPORTANT: Never attempt to adjust the governor settings without using an accurate pressure gauge. If the governor fails to operate properly, replace it with a new part. Do not attempt to overhaul the governor.



Air governor

1. Cover
2. Adjusting screw
3. Body
4. Pressure setting spring
5. Spring guide
6. Inlet-exhaust valve
7. Piston
8. O-ring
9. Inlet-exhaust spring
10. Filter

1. Unscrew the cover on top of the governor.
2. Loosen the locknut for the governor adjusting screw.
3. Use a screwdriver to turn the adjusting screw either counter-clockwise (to raise the pressure setting) or clockwise (to lower the setting).

NOTE: Adjustment will raise or lower both the cut-in and cut-out settings simultaneously.

4. After adjusting, tighten the locknut and install the cover. Test the pressure settings again to verify their accuracy.

Emergency Coach Brake Control Valve

The emergency coach brake control valve is a two-position push/pull valve mounted on the dashboard. This valve controls the pressurization of the coach unit brake systems. Test the parking brake control valve annually, using the following procedure.

1. With the locomotive on level ground, apply the parking brakes and block all wheels. Allow air system pressure to build to 110 psi and shut off the engine. The parking brakes should be engaged.
2. Carefully observe the dash-mounted air pressure gauge. Air loss must not exceed 3 psi per minute.
3. Coat the emergency coach brake valve with soap solution, and look for leakage, especially around the valve stem seal. No leakage is permissible.

NOTE: *If the emergency coach brake valve leaks or fails to function properly, replace it with a new part.*

Air dryer troubleshooting chart

Problem	Possible cause	Remedy
Dryer is constantly cycling or purging	1. Excessive leakage in system	1. Test for leakage and repair
	2. Poorly filtered inlet air	2. Check for damaged, defective or dirty compressor air filter, and damaged or defective air intake components
	3. Insufficient compressor cooling (compressor runs hot)	3. Check for proper cooling of compressor; cooling fins must be clean, with unrestricted air flow over fins
	4. Leakage at purge valve in dryer	4. Use soap solution to test for leaks
Desiccant material being expelled from dryer purge valve exhaust (may look like whitish liquid paste, or small beads) - or - unsatisfactory desiccant life	1. This symptom is almost always accompanied by one or more related problems. See related causes of these symptoms described elsewhere in this chart.	1. See possible causes and remedies for related problems
	2. Air dryer not securely mounted, causing excessive vibration	2. Check mounting bracket and tighten fasteners
	3. Air compressor passing excessive oil	3. See "Air Compressor Troubleshooting Chart"
	4. Faulty heater and/or heater wiring.	4. Repair heater wiring, or replace heater
Water in air tank	1. Desiccant requires replacement	1. Replace desiccant cartridge
	2. Air system charged from outside air source which has not passed through the air dryer	2. The practice of filling the system with an outside air source should be minimized
	3. Air dryer not purging	3. Test operation of air dryer; repair or replace
	4. Purge time not sufficient due to excessive system leakage	4. Check causes and remedies for "Dryer is constantly cycling or purging"

Air Compressor Troubleshooting Chart

Problem	Possible Cause	Remedy
Compressor fails to maintain sufficient pressure or adequate air supply	1. Dirty compressor air cleaner	1. Clean or replace element
	2. Restriction in compressor cylinder head intake, discharge cavities or line	2. Repair or replace cylinder head or other parts as necessary
	3. Leaking or broken intake or exhaust valves	3. Repair or replace cylinder head
	4. Excessive wear	4. Repair or replace compressor
	5. Drive belt slipping	5. Adjust or replace belt
	6. Excessive system leakage	6. Check all fittings and connections
	7. Defective governor.	7. Repair or replace governor
	8. Governor improperly adjusted	8. Adjust governor
	9. Defective gauge	9. Replace gauge
Noisy operation	1. Loose drive pulley	1. Tighten, repair or replace pulley
	2. Restrictions in cylinder head or discharge line	2. Repair or replace cylinder head or other parts as necessary
	3. Worn or burned out compressor bearings	3. Repair or replace compressor
	4. Compressor not getting proper lubrication	4. Check and repair the lubrication system
	5. Excessive wear	5. Repair or replace compressor

Air Compressor Troubleshooting Chart (continued)

Problem	Possible Cause	Remedy
Compressor not unloading (excessive pressure)	1. Defective unloader pins or seals	1. Replace pins or seals
	2. Defective governor	2. Repair or replace governor
	3. Air line between tank and governor restricted	3. Repair or replace line
	4. Unloader mechanism binding or stuck	4. Repair unloader
	5. Defective gauge	5. Replace gauge
Compressor passes excessive oil	1. Excessive wear	1. Repair or replace compressor
	2. Restriction in air intake	2. Remove restriction
	3. High inlet vacuum (obstructed intake)	3. Service intake as necessary
	4. Restricted oil return line	4. Repair or replace oil return line
	5. Excessive oil pressure	5. Service engine lubrication system as necessary
	6. Defective or worn seal in rear bearing cap	6. Replace seal
	7. Piston rings improperly installed	7. Remove rings and install properly
	8. Backpressure from engine crankcase	8. Check engine crankcase ventilation system; look for excessive "blow-by" from defective piston rings

Brakes

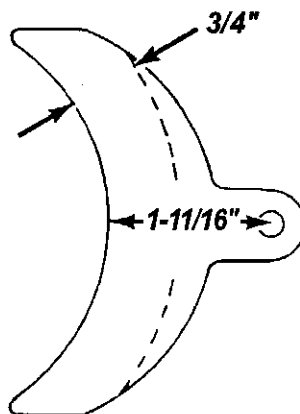
Brake Air Cylinder Inspection

Check the brake air cylinders for leakage after every 50 hours of operation or weekly, whichever occurs first. Check all air cylinders (four cylinders per truck on the locomotive and each coach).

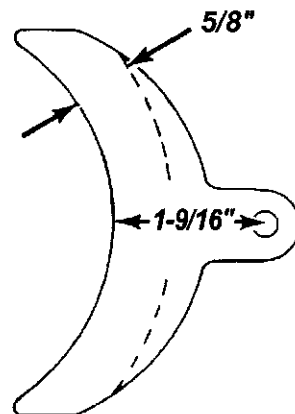
Make sure the air system is fully charged, then apply the brakes. Check each brake air cylinder for audible indications of leakage. If necessary, use soap solution to check for leakage around the piston rod and seal.

Brake Shoe Inspection

The brake shoes on the locomotive and all coaches must be replaced when they become worn or damaged. The replacement interval will be determined by the specific track layout on which the train is operated, and the corresponding use of the brakes. Frequent visual inspections of the brake shoes must be made to determine when replacement is required.



New brake shoe



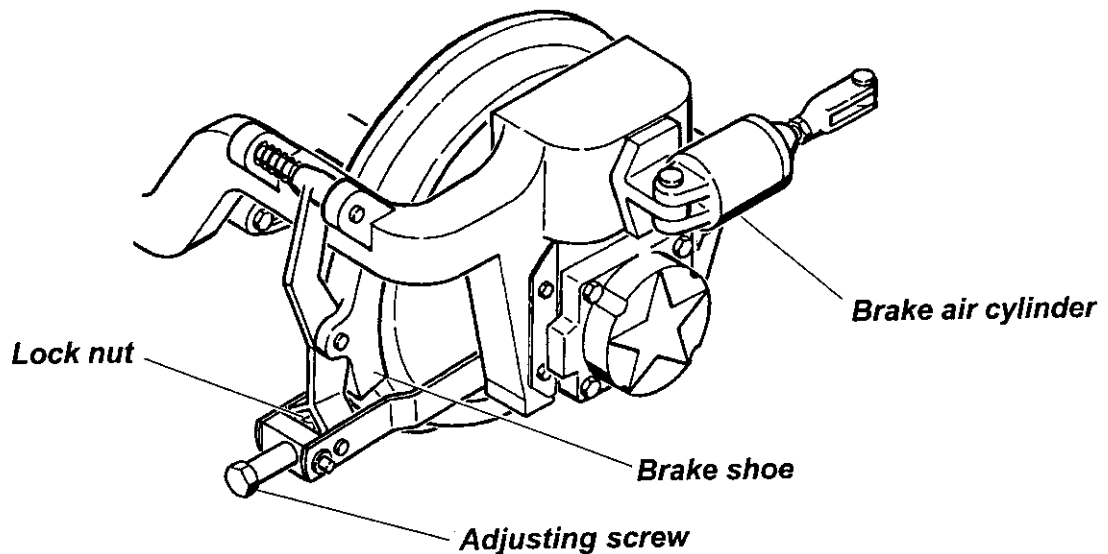
Worn brake shoe

Check the brake shoes for visible damage and wear. When a brake shoe is worn past the dimensions shown, it must be replaced with a new part.

Brake Adjustment

The brakes on the locomotive and all coaches must be kept properly adjusted. The adjustment interval will be determined by the specific track layout on which the train is operated, and the corresponding use of the brakes. Frequent visual inspections of the brakes must be made to determine when adjustment is required.

When adjustment is required, adjust all brakes (four per truck on the locomotive and each coach) as follows:



1. With the train parked on a level section of track, apply the parking/emergency brake. Release the service brakes.
2. Check the condition of each brake shoe (refer to the previous topic, "Brake Shoe Inspection"). If any brake shoe is worn out, replace it with a new part before proceeding with the adjustment.
3. Loosen the lock nut.
4. Turn the adjustment screw until the brake shoe is as close to the wheel as possible, without dragging.
5. Tighten the lock nut.

Electrical system

Booster Battery



WARNING: Incorrect connection of the booster battery to the train can result in uncontrolled machine movement and serious personal injury, as well as causing equipment damage. Always use the following procedure to start the engine using a booster battery.

- Connect the positive (“+”) jumper cable from the booster battery to the positive (“+”) terminal on the train battery.
- Then connect the negative (“-”) jumper cable from the booster battery to a good ground on the train’s engine or frame.
- Start the train engine only when seated in the operator’s seat. Stop the engine before leaving the seat.
- Disconnect the jumper cables in reverse order to that which they were connected.

If it is necessary to use a booster battery as an engine starting aid, attach the jumper cables exactly as instructed in the above warning.

When attaching jumper cables, always attach the positive (“+”) cable first, and the negative (“-”) cable last. When removing the cables, disconnect the negative cable first and the positive cable last.

IMPORTANT: *The alternator will be seriously damaged if the booster battery cables are not connected positive-to-positive and negative-to-negative. The train has a 12-volt, negative ground system. Be sure the booster battery is a 12-volt battery.*

Alternator Charging System

The following general rules must be observed when repairing or servicing any portion of the alternator charging system.

1. Always disconnect the battery ground ("–") cable at the battery before performing any work on the electrical system, or when charging the battery.
2. Never reverse the battery connections. This will damage the alternator diodes. The train has a negative ground system.
3. Do not ground the alternator output terminal. This will cause serious and expensive damage to the alternator.
4. Do not operate the train with the battery disconnected.
5. Do not attempt to polarize the alternator.
6. Do not use steam cleaner, high pressure spray or cleaning solvent to clean the alternator.

Battery Care and Maintenance



DANGER: POISON. Batteries contain acid which can cause severe burns. Avoid contact with skin, eyes or clothing. Keep batteries out of reach of children.

ANTIDOTES:

EXTERNAL: Flush with water.

INTERNAL: Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Call physician immediately.

EYES: Flush with water for 15 minutes and get prompt medical attention.



DANGER: Batteries produce explosive hydrogen gas. Keep sparks, flame and cigarettes away. Provide ventilation when charging batteries in an enclosed area. Always wear eye protection when working near the battery.



CAUTION: Never wear rings or metal watch bands when working near the battery. The metal can ground a live circuit, causing serious burns.



WARNING: Never check battery charge by placing a metal object across the terminal posts. The sparks can cause an explosion. Use a voltmeter or hydrometer.



WARNING: When removing the battery, always disconnect the negative ground ("-") cable first. When installing the battery, always connect the negative ground ("-") cable last. The sparks can cause an explosion.

1. Keep the battery fully charged as indicated by hydrometer readings for each cell.
2. The battery must be securely fastened in position. Cables leading to the battery must not touch the cell connectors or lay on the battery container.
3. Keep the battery clean and dry. If the battery will not hold a charge, replace it with a new one that meets the required specifications.

Fuses and Circuit Breakers

The electrical circuits for the locomotive and coaches are protected by fuses and/or circuit breakers. When a circuit is overloaded, the circuit breaker or fuse opens the circuit, causing the protected circuit to stop operating.

If a circuit is protected by a circuit breaker, the circuit breaker will automatically reset when the breaker element cools. As long as there is an overload in the circuit, the breaker will not remain closed. Turn off the switch controlling the circuit until the cause of the overload is located and corrected.

Similarly, if a circuit is protected by a fuse, the fuse will "blow", opening the circuit. The blown fuse must be replaced with a new fuse. Until the overload in the circuit is located and corrected, the new fuse will also blow when the switch is turned on.

IMPORTANT: *Always use a fuse or circuit breaker of the correct type and amperage rating. NEVER SUBSTITUTE A FUSE OR CIRCUIT BREAKER WITH A HIGHER AMPERAGE RATING. This can cause an electrical overload and result in damage to the locomotive and/or coaches.*

Four circuit breakers are located on a bracket behind the instrument panel. Access to these circuit breakers can be obtained by removing the side and rear engine covers as described elsewhere in this section. The following circuit breakers are installed on the bracket:

- (2) 6-amp circuit breakers
- (1) 8-amp circuit breaker
- (1) 15-amp circuit breaker

Four more circuit breakers are located on a bracket on the right hand side of the radiator. Access to these circuit breakers can be obtained by removing the operator's seat. The following circuit breakers are installed on the bracket:

- (2) 50-amp circuit breakers
- (1) 30-amp circuit breaker
- (1) 10-amp circuit breaker

A 15-amp in-line fuse protects the transmission cooler fan circuit. A 2.5-amp inline fuse protects the two cooling fans mounted in the top engine cover.

NOTE: *Refer to the electrical schematic for the specific circuit protected by each circuit breaker or fuse.*

Spark Plugs

Check the condition of the spark plugs and adjust the gap at approximately 400 hour intervals. The gap gradually widens as the electrodes wear under normal operating conditions.

NOTE: Always clean the area around each spark plug before removing it to prevent dirt from entering the cylinder as the plug is removed.

While each spark plug is out of the engine, carefully inspect the electrodes as this offers a good indication of engine operating conditions:

- A white, blistered coating indicates a lean fuel mixture and/or overheating.
- A sooty, black coating indicates too rich a fuel mixture, possibly caused by a clogged air filter.
- Normal operating conditions will show a light coating of gray or tan.

Do not sandblast, wire brush, scrape, or otherwise attempt to clean a plug that is badly fouled or in poor condition. Best results are obtained with a new plug. Set the gap and tighten the plug to the specification in the following chart.

Type	Torque	Gap
Motorcraft® AWSF-52-C	7 - 15 ft-lbs. (9 - 20 N•m)	0.042 - 0.046" (1.07 - 1.17 mm)

Coat the inside of each spark plug boot with silicone dielectric compound (Ford part number D7AZ-19A33 1-A or equivalent) before installation.

Storage

If the train is to be stored for 30 days or more, move it to a dry, protected place. The following precautions must be taken to prevent rust, corrosion and deterioration of parts.

NOTE: *It is highly recommended that a Fuel Stabilizer, Ford part number E8AZ-19C544-A or equivalent additive be used for any length of storage where the fuel will not be consumed within 30 days. Follow the manufacturer's directions for use.*

30 Day Storage

1. Perform all scheduled and required maintenance and inspections prior to storage.
2. Add fuel stabilizer to the fuel tank.
3. Park the train in its storage area and engage the parking/emergency brake. Chock the wheels if parked on a grade.
4. Allow the engine to warm up to normal operating temperature.
5. While the engine is running, treat the upper cylinders by spraying engine fogging agent (from a local aftermarket supplier) into the air intake for about two minutes. Open the throttle briefly, then stop the engine in the normal manner as described in the "Operation" section of this manual while continuing to spray into the air intake.
6. Check coolant protection.
7. Open the drain valves at each tank. When all air pressure has been exhausted from the system, close the drain valves.

Indefinite Storage

1. Perform all scheduled and required maintenance and inspections prior to storage.
2. Add fuel stabilizer to the fuel tank.
3. Park the train in its storage area and engage the parking/emergency brake. Chock the wheels if parked on a grade.
4. Drain the engine oil and refill the engine crankcase with the recommended engine oil.
5. Restart the engine. While the engine is running, treat the upper cylinders by spraying engine fogging agent (from a local aftermarket supplier) into the air intake for about two minutes. Open the throttle briefly, then stop the engine in the normal manner as described in the "Operation" section of this manual while continuing to spray into the air intake.
6. Check coolant protection.
7. Open the drain valves at each tank. When all air pressure has been exhausted from the system, close the drain valves.
8. Disconnect and remove the battery.
9. Clean the exterior surfaces of the engine.
10. Seal the air cleaner inlet and the exhaust outlet with weatherproof tape.
11. Check the fuel filler cap, radiator cap and oil filler cap to make sure they are tight.



Inspection Checklists

The following pages provide inspection checklists for the C.P. Huntington train. The pages can be copied and filled out as a permanent record for each inspection.

IMPORTANT: *These items are a minimum checklist. Other items which may be considered as standard check points in the industry must also be inspected. Refer to the appropriate portions of this service manual for specific procedures. Check applicable service bulletins for additions or changes to this checklist.*

C. P. HUNTINGTON (Ford 2.5L Engine)

Inspection Checklist

This form must be completed prior to daily opening

Page 1 of 6

Ride Serial Number: _____ Date: _____ Location: _____

Performed by: _____

IMPORTANT: The following items are a minimum checklist. Other items which may be considered as standard check points in the industry must also be inspected. Refer to the appropriate service manual for specific procedures. Check applicable service bulletins for additions or changes to this checklist.

Daily or every 8 hours of operation, whichever occurs first

General - Locomotive

	Satisfactory	Needs Attention	Corrective Action Completed
Inspect the hitch bars for visible signs of wear or damage. Check for proper installation of fasteners and hitch splice plates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect the wheels for visible signs of wear or damage. Check that wheel flanges are not excessively worn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visually inspect the entire locomotive for broken, damaged or missing components	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check that all safety signs and decals are properly installed and legible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

General - Coaches

Inspect the hitch bars for visible signs of wear or damage. Check for proper installation of fasteners and hitch splice plates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect the wheels for visible signs of wear or damage. Check that wheel flanges are not excessively worn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visually inspect all coaches for broken, damaged or missing components	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the overall condition of the seats and floors, including the anti-slip material	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the operation of the wheelchair ramp and wheelchair restraints (if equipped). Look for broken, damaged or missing parts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the overall condition of the closure bars and/or chains (if equipped)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check that all safety signs and decals are properly installed and legible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Air System - Locomotive and Coaches

Check all air hoses, fittings and components for leaks and/or damage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drain condensation from all air tanks (one on locomotive and two on each coach)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C. P. HUNTINGTON (Ford 2.5L Engine)

Inspection Checklist

This form must be completed prior to daily opening

Page 2 of 6

Ride Serial Number: _____ Date: _____ Location: _____

Performed by: _____

Daily or every 8 hours of operation, whichever occurs first (continued)

Track, Crossings, Station

Carefully inspect the overall condition of the track over its entire route. Look for obstructions and other obstacles close to the track

Check the condition and operation of all crossing gates, lights and other traffic control devices

Check all fences, ramps, platforms, and gates at the station and other areas

Engine, Transmission, Drive Line, Suspension, Wheels

Visually inspect the engine, transmission and all gearboxes for signs of leakage

Visually inspect the brakes for loose, worn, damaged or missing parts

Check engine oil level; fill if required

Check transmission oil level; fill if required

Check engine coolant level at the overflow tank; fill if required

Check that fuel tank is filled at the end of each day of operation

Check the engine air cleaner, hoses and connections for signs of damage

Check for proper lubrication of false drive wheel slide bars (2 places)

Check for proper oil level false drive wheel oil cups (2 places)

Train Operation

Check all controls and indicators for proper operation

Move the train a short distance and apply the brakes. Check for proper operation of the air brakes at all wheels. Check the parking brake operation at all drive wheels

Run the train at least once over the entire course to observe the overall performance of the train in relation to past performance of the train

Satisfactory

Needs
Attention

Corrective
Action
Completed

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C. P. HUNTINGTON (Ford 2.5L Engine)

This form must be completed prior to daily opening

Inspection Checklist

Page 3 of 6

Ride Serial Number: _____ Date: _____ Location: _____

Performed by: _____

Weekly or every 50 hours of operation, whichever occurs first

General

All "Daily" checklist items completed

Satisfactory

Needs
Attention

Corrective
Action
Completed

☐☐☐

Engine, Transmission, Drive Line, Suspension, Wheels

Drain the engine crankcase and refill with new oil

☐☐☐

Check water level in the battery; fill if required

☐☐☐

Check for proper oil level in the drop-down gearbox

☐☐☐

Check for proper oil level in the worm gearboxes (4 places)

☐☐☐

Check for lubrication of truck swivels (2 places per locomotive or coach)

☐☐☐

Air System - Locomotive and Coaches

Check for leakage at brake air cylinders (4 places per truck)

☐☐☐

C. P. HUNTINGTON (2.5L Continental Engine)

Inspection Checklist

This form must be completed prior to daily opening

Page 4 of 6

Ride Serial Number: _____ Date: _____ Location: _____

Performed by: _____

Every Two Weeks or every 100 hours of operation, whichever occurs first

General

All "Weekly" checklist items completed

Satisfactory

☐

Needs
Attention

☐

Corrective
Action
Completed

☐

Engine, Transmission, Drive Line, Suspension, Wheels

Check engine air cleaner; service if required

☐☐☐

Check for lubrication of false drive wheel swivel pins (2 places)

☐☐☐

C. P. HUNTINGTON (Ford 2.5L Engine)

This form must be completed prior to daily opening

Inspection Checklist

Page 5 of 6

Ride Serial Number: _____ Date: _____ Location: _____

Performed by: _____

	Satisfactory	Needs Attention	Corrective Action Completed
Monthly or every 200 hours of operation, whichever occurs first			
General			
All "Every Two Weeks" checklist items completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Engine, Transmission, Drive Line, Suspension, Wheels			
Replace the engine oil and filter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for lubrication of drive shaft u-joints (8 places) and slip joints (4 places)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for lubrication of truck journal box bearings (8 places per locomotive or coach)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for lubrication of coach free wheels (4 places per coach)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check condition and tension of serpentine drive belt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check transmission oil coolers for buildup of dirt and debris; clean as required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Replace in-line engine fuel filter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check fuel pressure regulator/filter; replace if required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean exterior of engine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Every 2 Months or every 400 hours of operation, whichever occurs first

General

All "Monthly" checklist items completed

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Engine, Transmission, Drive Line, Suspension, Wheels

Clean or replace spark plugs

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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C. P. HUNTINGTON (Ford 2.5L Engine)

Inspection Checklist

This form must be completed prior to daily opening

Page 6 of 6

Ride Serial Number: _____ Date: _____ Location: _____

Performed by: _____

Annually or every 1000 hours of operation, whichever occurs first

General

	Satisfactory	Needs Attention	Corrective Action Completed
All "Every 2 Months" checklist items completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Engine, Transmission, Drive Line, Suspension, Wheels

Replace transmission fluid and filter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Replace serpentine drive belt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Replace positive crankcase ventilation (PCV) valve	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Drain and flush engine cooling system; fill with new coolant	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Drain drop-down gearbox; fill with new oil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Drain worm gearboxes; fill with new oil (4 places)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Air System- Locomotive

Check and service air compressor unloader	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Check and service air dryer as required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Check and service air governor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Check and service coach emergency brake valve (if equipped)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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36-Foot Double-Decker Carrousel

Service Manual

Manual Number 420-050-001

PHONE: 316-942-7411 • WWW.RIDES.COM

FAXES: ADMINISTRATION 316-942-0320 • PURCHASING 316-945 3498 • CUSTOMER SERVICE 316-942-2012
P.O. BOX 12328 WICHITA, KS 67277-2328 • SHIPPING: 4200 W. WALKER WICHITA, KS 67209

36-FOOT DOUBLE-DECKER CARROUSEL

Introduction

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Manual Part Number 420-050-001
(Issued September, 2003)

Chance Rides Manufacturing, Inc.
4200 West Walker
P.O. Box 12328
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* Additional table of contents are provided in these sections

36-FOOT DOUBLE-DECKER CARROUSEL

CRM
Chance Rides Manufacturing, Inc.

MODEL NO. 420

SERIAL NO. [REDACTED]

DATE OF MANUFACTURE: [REDACTED]

MAXIMUM PASSENGER CAPACITY:

LOWER LEVEL 32 ADULTS AND 24 CHILDREN (7,800 lbs.)
UPPER LEVEL 12 ADULTS AND 8 CHILDREN (2,760 lbs.)

NUMBER OF SEATS:

LOWER LEVEL 24 HORSES AND 2 CHARIOTS OR SPINNING TUB
UPPER LEVEL 8 HORSES AND 2 CHARIOTS

MAXIMUM SEAT CAPACITY:

HORSES - 1 ADULT OR 1 CHILD (AVERAGE WEIGHT 170 lbs.)
STANDARD LOWER LEVEL CHARIOT - 4 ADULTS OR 6 CHILDREN (680 lbs.)
STANDARD UPPER LEVEL CHARIOT - 2 ADULTS OR 3 CHILDREN (340 lbs.)
HANDICAP CHARIOT - 2 ADULTS OR 3 CHILDREN (340 lbs.)
SPINNING TUB - 4 ADULTS OR 4 CHILDREN (680 lbs.)

MAXIMUM UNBALANCE:

MAXIMUM LOWER LEVEL 9 ADULTS ON ANY ONE SIDE (1530 lbs.)
MAXIMUM UPPER LEVEL 3 ADULTS ON ANY ONE SIDE (510 lbs.)

MINIMUM PASSENGER HEIGHT:

42 INCHES - UNACCOMPANIED BY ADULT UNLESS ADEQUATELY SECURED

MAXIMUM WIND SPEED:

35 MPH OPERATING, 90 MPH STATIC

POWER REQUIREMENT:

DRIVE - 8.3 kVA
LIGHTS - 15 kVA
CONTROL CIRCUIT - 3.7 kVA
TOTAL - 27 kVA
208/230 VOLT, 3 PHASE, 60 HZ

RISE CLEARANCE DIMENSIONS:

CENTER HUB HEIGHT - 20'-9 1/2"
CENTER POLE HEIGHT - 26'-8 1/2"
CORNICHE DIAMETER - 36'-5"
LOWER FLOOR DIAMETER - 32'-6"

RISE SPEED:

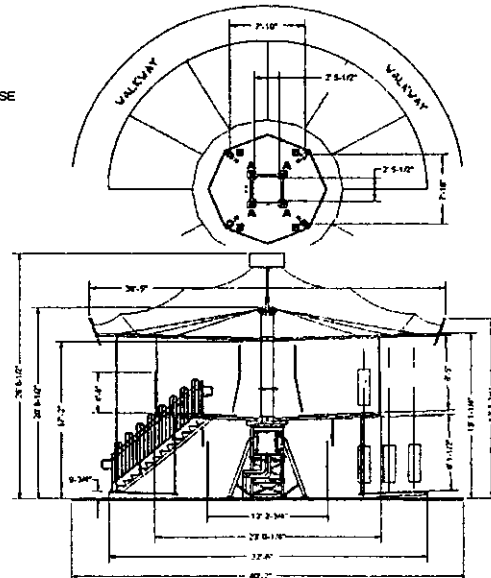
MAXIMUM 5 RPM COUNTER-CLOCKWISE

RISE CYCLE:

2.0 MINUTES RECOMMENDED
2.5 MINUTES MAXIMUM

MAXIMUM RIDE WEIGHT EMPTY:

34,038 lbs.
ADD 500 lbs. FOR FINAL



REFER TO INSTALLATION DRAWING FOR SPECIFIC FOOTING LOCATIONS AND MAXIMUM INDIVIDUAL GROUND LOADS

MANUFACTURED IN THE U.S.A. BY CHANCE RIDES MANUFACTURING, INC.

Conforms with all applicable ASTM amusement ride standards in effect on date of manufacture

IMPORTANT: The specifications shown are for reference only.
Always refer to the ride information plaque on your ride
for specifications.

The ride information plaque is located on the tower.

36-Foot Double-Decker Carrousel

Service Manual

Manual Number 420-050-001

36-FOOT DOUBLE-DECKER CARROUSEL

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Website www.rides.com
E-mail rides@rides.com

* Additional table of contents are provided in these sections



To the Owner

This manual is your guide to safe, productive operation. Read it carefully. It will help reduce trial and error learning and minimize downtime caused by improper maintenance.

For additional information, contact the Customer Service Department at CHANCERIDESMANUFACTURING, INC.

***NOTE:** Because we try to improve every CHANCE product, specifications and product design are subject to change without notice.*

Intended Uses

The equipment described herein 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 recommendations and instructions from CHANCERIDESMANUFACTURING, INC., ASTM standards on amusement rides and devices, applicable governmental 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, buyer agrees not to operate the equipment until proper repairs or corrections are made.

Ride Information Plaque

The ride information plaque is mounted to the main tower structure in the center of the ride. The plaque lists ride specifications, operating dimensions, ground loads, as well as model and serial number and date of manufacture. When ordering parts or requesting information from the Customer Service Department at CHANCERIDESMANUFACTURING, INC., always specify the model and serial number of your ride. Record this information in the spaces on the plaque shown.

36-FOOT DOUBLE-DECKER CARROUSEL

CRM
CHANCE RIDES MANUFACTURING, INC.

MODEL NO. 420

SERIAL NO.

DATE OF MANUFACTURE:

MAXIMUM PASSENGER CAPACITY:

LOWER LEVEL 32 ADULTS AND 24 CHILDREN (7,600 lbs.)

UPPER LEVEL 12 ADULTS AND 8 CHILDREN (2,760 lbs.)

NUMBER OF SEATS:

LOWER LEVEL 34 HORSES AND 2 CHARIOTS OR SPINNING TUB

UPPER LEVEL 8 HORSES AND 2 CHARIOTS

MAXIMUM SEAT CAPACITY:

HORSES - 1 ADULT OR 1 CHILD (AVERAGE WEIGHT 170 lbs.)

STANDARD LOWER LEVEL CHARIOT - 4 ADULTS OR 8 CHILDREN (680 lbs.)

STANDARD UPPER LEVEL CHARIOT - 2 ADULTS OR 3 CHILDREN (340 lbs.)

HANDICAP CHARIOT - 2 ADULTS OR 3 CHILDREN (340 lbs.)

SPINNING TUB - 4 ADULTS OR 4 CHILDREN (680 lbs.)

MAXIMUM UNBALANCE:

MAXIMUM LOWER LEVEL 9 ADULTS ON ANY ONE SIDE (1530 lbs.)

MAXIMUM UPPER LEVEL 3 ADULTS ON ANY ONE SIDE (510 lbs.)

MINIMUM PASSENGER HEIGHT:

42 INCHES - UNACCOMPANIED BY ADULT UNLESS ADEQUATELY SECURED

MAXIMUM WIND SPEED:

35 MPH OPERATING, 90 MPH STATIC

POWER REQUIREMENT:

DRIVE - 8.3 KVA

LIGHTS - 15 KVA

CONTROL CIRCUIT - 3.7 KVA

TOTAL - 27 KVA

208/230 VOLT, 3 PHASE, 60 HZ

RIDE CLEARANCE DIMENSIONS:

CENTER HUB HEIGHT - 20'-9 1/2"

CENTER POLE HEIGHT - 26'-8 1/2"

CORNICHE DIAMETER - 36'-5"

LOWER FLOOR DIAMETER - 32'-5"

RIDE SPEED:

MAXIMUM 5 RPM COUNTER-CLOCKWISE

RIDE CYCLE:

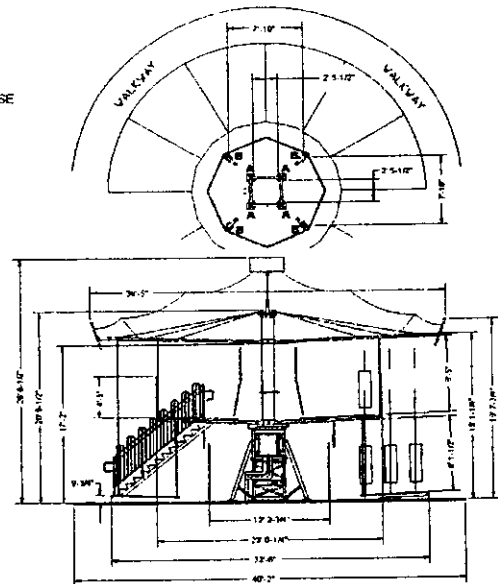
2.0 MINUTES RECOMMENDED

2.5 MINUTES MAXIMUM

MAXIMUM RIDE WEIGHT EMPTY:

34,038 lbs.

ADD 500 lbs. FOR FINAL



REFER TO INSTALLATION DRAWING FOR SPECIFIC FOOTING LOCATIONS AND MAXIMUM INDIVIDUAL GROUND LOADS

MANUFACTURED IN THE U.S.A. BY CHANCE RIDES MANUFACTURING, INC.

Conforms with all applicable ASTM amusement ride
ride standards in effect on date of manufacture.

IMPORTANT: The specifications shown are for reference only.
 Always refer to the ride information plaque on your ride
 for specifications.

The ride information plaque is located on the tower.

36-Foot Double-Decker Carrousel

Set-Up Manual

PHONE: 316-942-7411 • WWW.RIDES.COM

FAXES: ADMINISTRATION 316-942-0320 • PURCHASING 316-945-3498 • CUSTOMER SERVICE 316-942-2012

P.O. BOX 12328 WICHITA, KS 67277-2328 • SHIPPING: 4200 W. WALKER WICHITA, KS 67209

SET-UP

General Information

This manual provides detailed instructions for setting up and tearing down the ride. The general sequence is given for carrying out each procedure and should be followed. If the size of the set-up crew permits, some steps can be performed simultaneously. Extra caution must be used, however, to keep all workers clear of any potential hazard.



WARNING: The set-up procedure in this section requires wind speeds of **LESS than 25 mph**. If set-up is attempted with wind speeds exceeding 25 mph, serious personal injury and/or equipment damage may occur.



WARNING: When setting up or tearing down the ride, never allow bystanders and/or other workers in the area. Always know the whereabouts of all workers during the entire set-up or tear-down procedure.



CAUTION: Precautions for personal safety must be observed at all times when setting up or tearing down the ride. Be aware of elevated area, pinch points, suspended loads, moving equipment, etc. Keep a safe distance from these hazards to avoid serious personal injury.

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Introduction

Set-up Dolly

Ride set-up is accomplished with the aid of the set-up dolly. Using the dolly, The center pole can be installed before the tower is raised to its normal operating height.

The dolly incorporates a manually operated hydraulic leveling system and an electrically powered lift mechanism.

Electrical Connections

Before starting to set up the ride, electrical power must be connected as follows:

1. Check the main power circuit breaker in the main electrical box. Make sure it is in the "OFF" position. The main electrical box is located on the tower.
2. Ground per local code.

IMPORTANT: Make sure the small ground wire of the power cable is connected to an adequate ground per local code.

3. Connect the main electrical power supply to the ride. Check the electrical specifications on the ride information plaque for the power requirements of the ride. Note the color coding of the power cable.
 - GROUND - Green wire
 - NEUTRAL - White wire
 - 3-PHASE - Black, red and blue wires

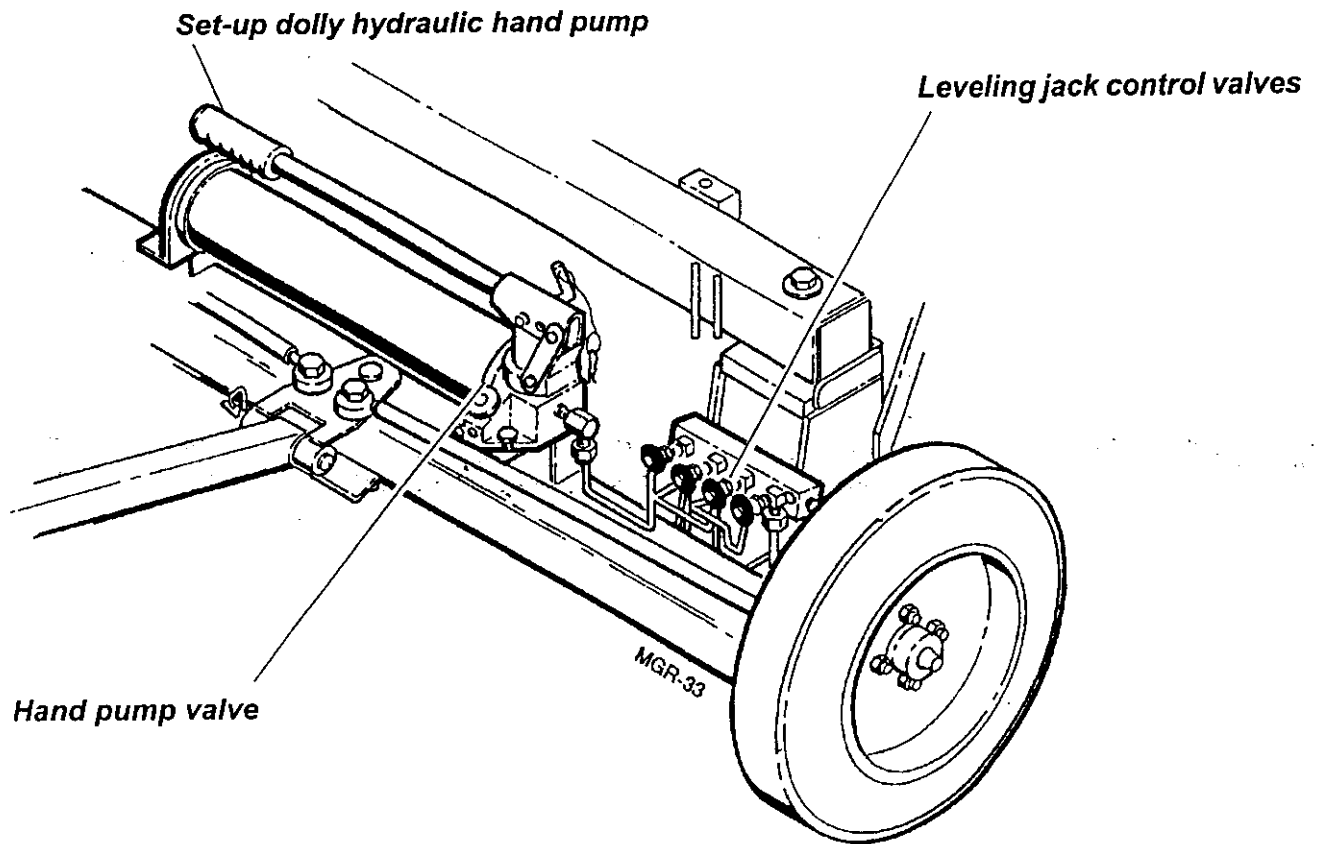
NOTE: Temporary electrical power can be connected to operate the lift and work lights only. Minimum power supply is 208 volt/60 amp, 3-phase, 60 Hz.

Hand Pump Operation

The set-up dolly is equipped with four leveling jacks. The jacks are hydraulically extended and spring retracted. A locking nut is provided to hold the jack in any extended position. A hand pump provides hydraulic pressure for the leveling jacks. Control valves for the pump and each jack are provided to direct the oil as required.

Hand Pump Valve - This valve is located on the hand pump. Close the hand pump valve (clockwise) to extend the selected jack. Open the valve (counter-clockwise) to release pressure and retract the jacks.

Leveling Jack Control Valves - These four valves, one for each leveling jack, are located on a manifold next to the pump. Open the appropriate valve and operate the pump to extend each jack. Close the valve to maintain pressure until the ride is level and the locking nuts are all tightened.



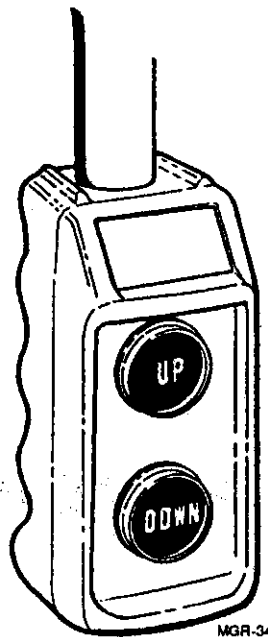
Lift Jack Operation

Tower lift is accomplished with a pair of screw-type lift actuators. Two synchronized electric motors keep the tower level as it is raised. A hand control box is provided to allow operation of the lift actuators from outside the ride area.

The hand control box installs into the receptacle in the main electrical box, mounted to the tower. Two switches control "RAISE" and "LOWER" functions.

IMPORTANT: Always turn off the main power circuit breaker before connecting the hand control box to the receptacle.

The correct phase rotation must be observed for the set-up dolly controls and limit switches to function properly. If the functions of the control switches are reversed, incorrect phase rotation is indicated. Do not operate the set-up dolly until this is corrected.



MGR-34

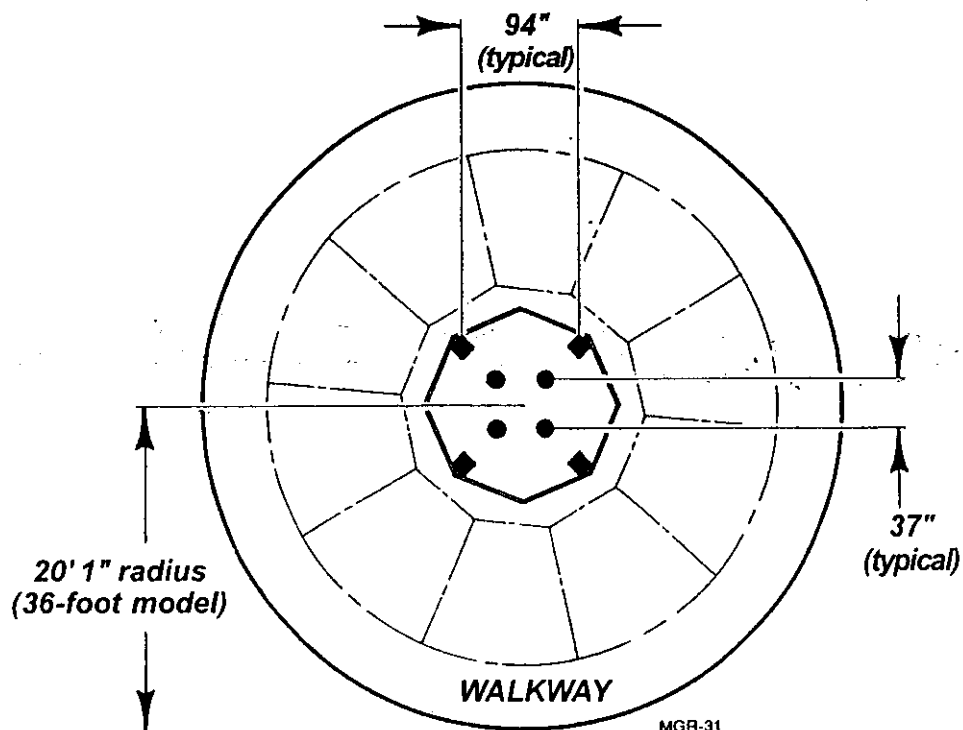
Set-up procedure

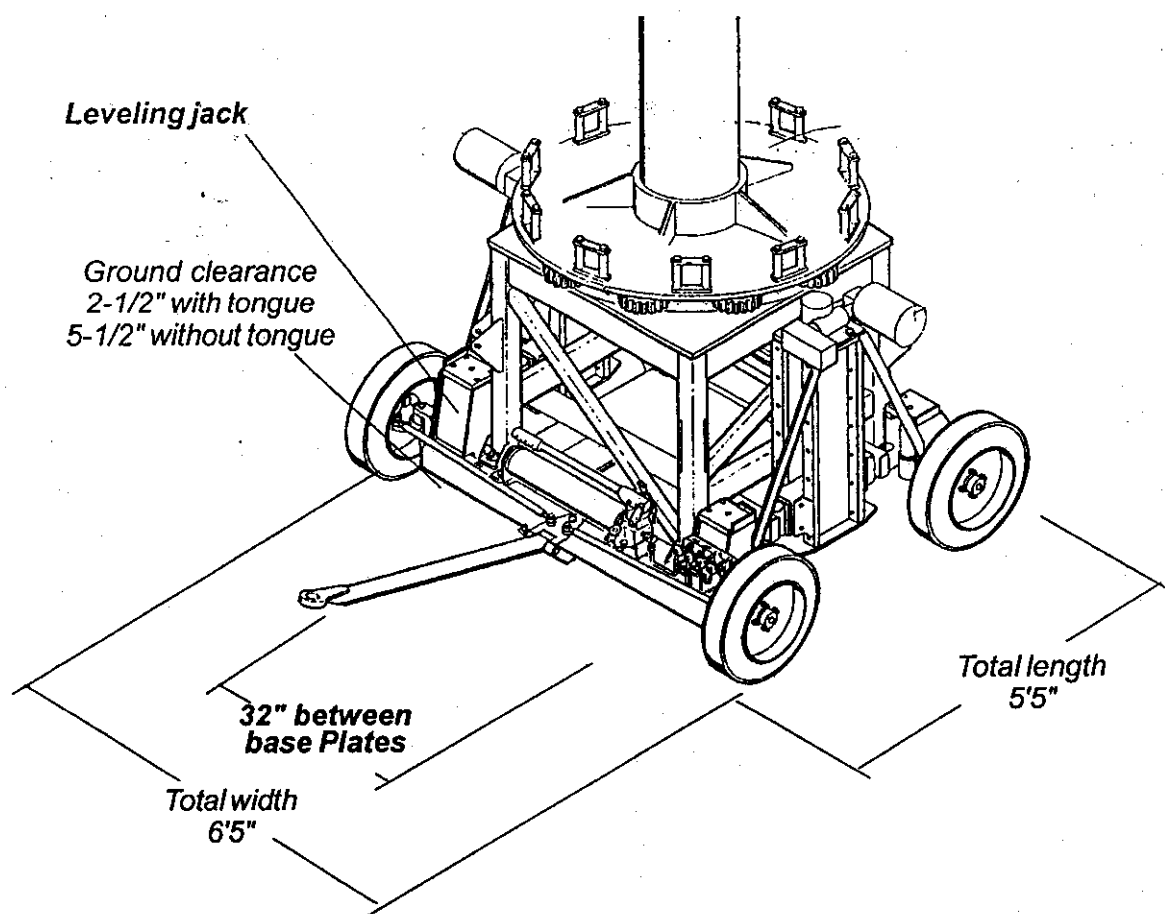
Tower Leveling.

1. Refer to the operating dimensions on the ride information plaque. Locate the center of the ride.

NOTE: The correct floor height is important for safe operation of the ride. Refer to the nominal floor heights listed on the ride information plaque when surveying the set-up site.

The ride must be set up and bolted to a concrete foundation. Specifications of load requirements for the foundation are available from the factory (refer to "Foundation Drawing" for the specific model carousel).





2. Roll the dolly into position.

NOTE: The tower assembly is shipped on the set-up dolly.

3. Place a jack pad under each of the four leveling jacks.
4. Use the hydraulic leveling jacks to raise the dolly high enough to take the weight off the tires. Using a bubble level on the tower structure, level dolly from side-to-side.

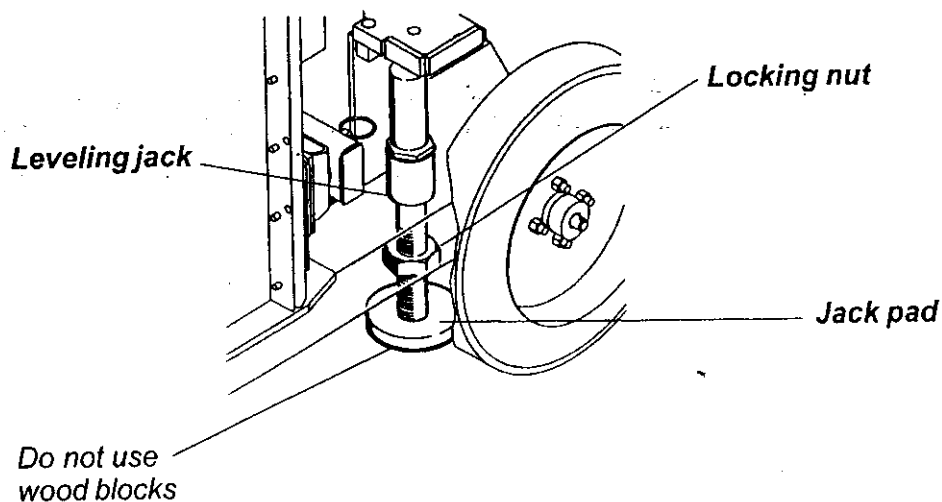
NOTE: The hydraulic jacks have a 4" stroke. As a jack reaches the end of its stroke, the pump will become harder to operate. Do not extend the jacks past this point. Damage to the jack can result.

6. Level the dolly from end to end, using a bubble level on the tower structure. Adjust the leveling jacks as required until the tower is level from all directions.
7. Turn the locking nuts on each leveling jack up against the base of the jack. Tighten the nuts by hand.



WARNING: The hydraulic system is for leveling only, and the jacks cannot be expected to maintain their position indefinitely. Be sure the locking nuts on all four jacks are tightened. Open the four leveling jack control valves and the hand pump valve to relieve hydraulic pressure, so the entire weight of the ride is on the locking nuts.

If this procedure is not followed, loss of hydraulic pressure due to leakage or oil expansion due to heat may cause the jacks to extend or retract, making the ride unstable. Injuries to workers and/or bystanders can result.



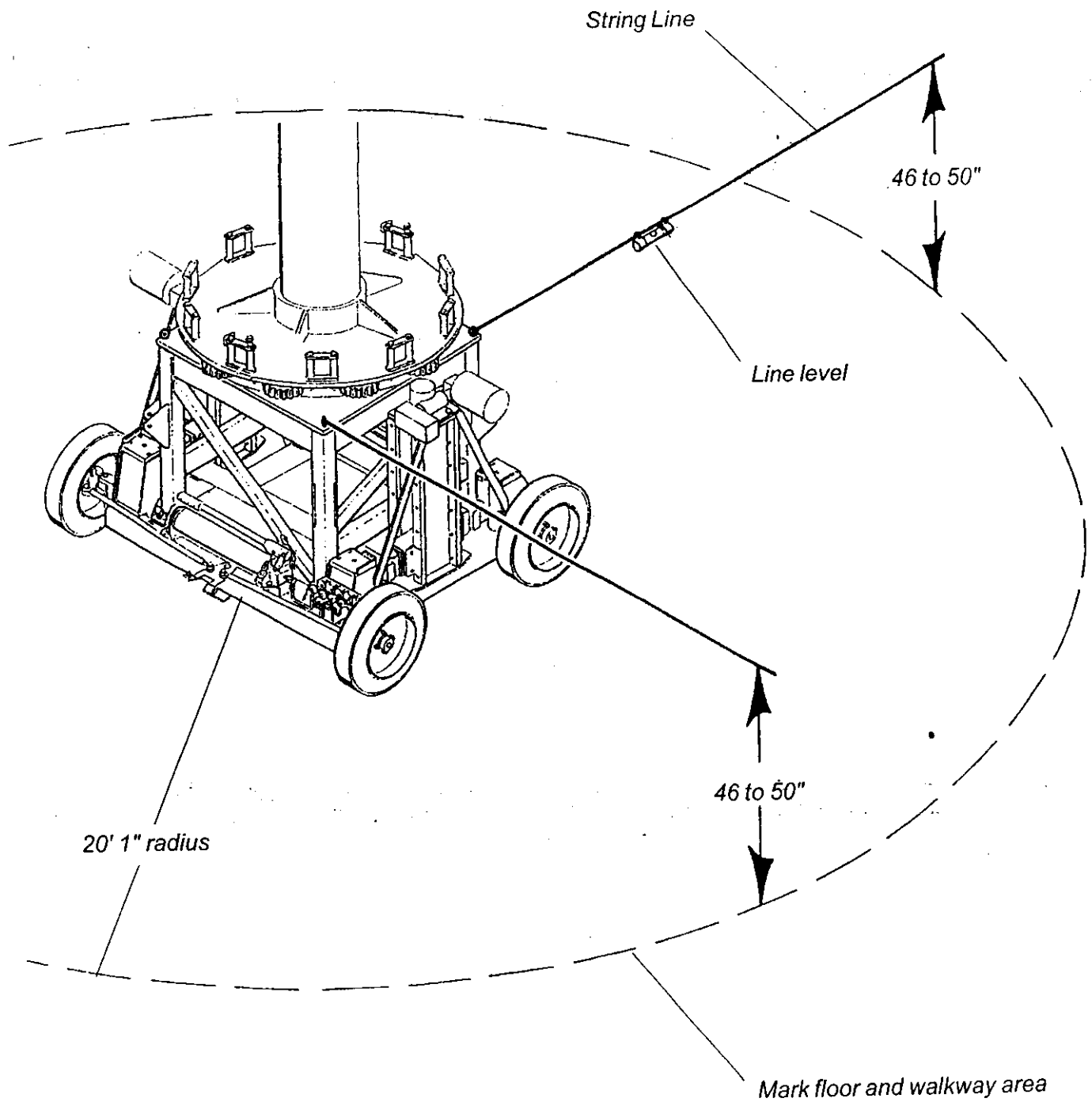
8 Chance Rides Manufacturing, Inc.

NOTE: During the tear-down procedure, extend the leveling jacks slightly to take the load off the locking nuts to allow loosening the nuts.

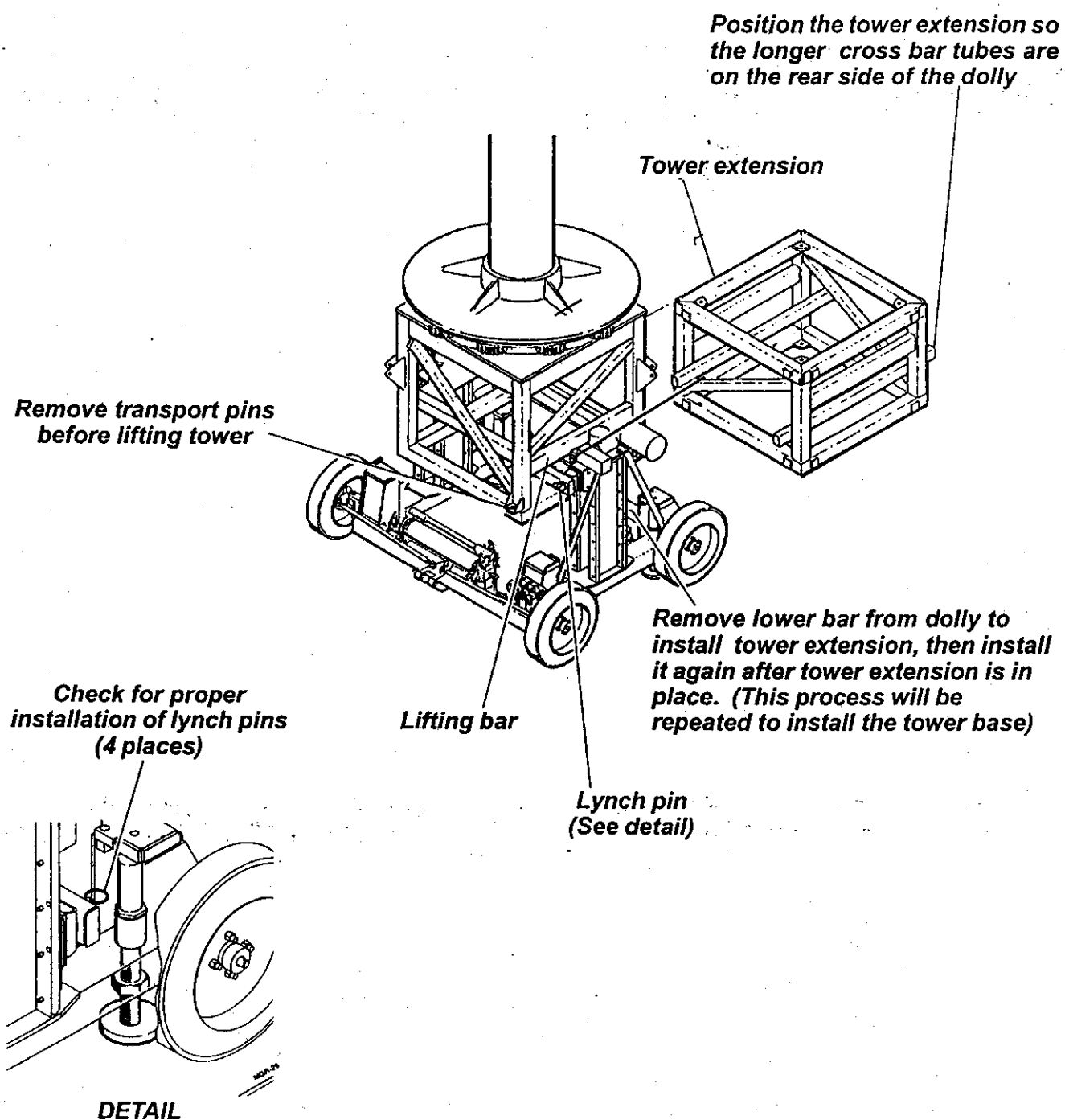
IMPORTANT: After the locking nuts have all been tightened, check the tower again to ensure proper leveling.

Use the following procedure to check the nominal height of the ride before continuing with the set-up.

8. Mark a circle around the center of the ride, to indicate the overall floor and walkway area, as shown. Refer to the operating dimensions on the ride information plaque.
9. Attach a string line as shown. Eyelets are provided on the upper corners of the tower frame.
10. Using a line level, hold the string line taut and level. Measure the distance between the string and the ground at various points within the circle. Move the string to the other corners of the tower frame and continue measurement.
11. The ground must be between 46 and 50 inches from the level string line at EVERY POINT WITHIN THE CIRCLE.
12. If the ground is either too high or too low in any area, raise or lower the tower as required, repeating Steps 1 through 7. If necessary, make corrections to the installation area to obtain the required level area.
13. Connect the set-up dolly power lead to the main control box. Turn on the main power circuit breaker.



Tower Erection



1. Check the lynch pins which secure the lifting bars to the lift tangs on the set-up dolly as shown. The lifting bars must be secured to the lift tangs before the tower is raised.
2. The tower is secured to the dolly by four transport pins. Remove these pins.
3. Stand outside the ride operation area and use the hand control box to carefully raise the tower. Watch the tower closely as it is raised.

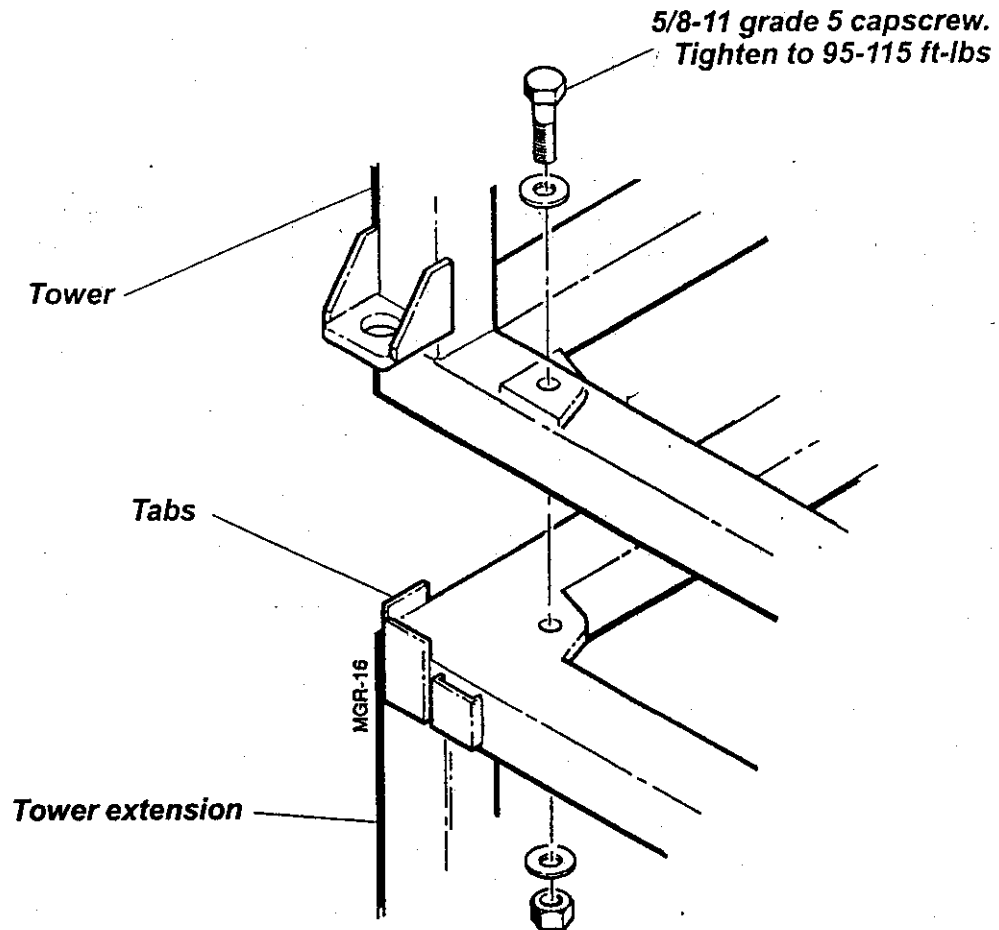


WARNING: Stay clear of the ride while raising or lowering with the set-up dolly. Do not stand under the sweeps as it is being raised or lowered. Serious personal injury can result.

4. When the tower is fully raised, remove the lower bar on the back of the set-up dolly. Move the tower extension into position.

IMPORTANT: *The tower extension must be positioned with the longer cross bar tubes toward the back side of the set-up dolly.*

5. Lift the tower extension onto the front of the dolly and align it with the tower.
6. After the tower extension is in place, install the lower bar on the rear of the dolly, under the longer cross bar tubes of the tower extension.
7. Carefully lower the tower onto the tower extension. Make sure the tabs engage to align the tower with the extension.



8. Install 5/8-11 Grade 5 capscrews in all 16 connections between the tower and tower extension as shown. Tighten to 95-115 ft-lbs.
9. Remove the lynch pins from the lifting bars and remove them.
10. Lower the tower lift jacks completely. Install the lifting bars through the tower extension. Install the lynch pins to secure the lifting bars to the lift tangs.
11. Stand outside the ride operation area and use the hand control box to carefully raise the tower.
12. Repeat Steps 4 through 9 to install the tower base. After the tower base is bolted to the foundation, retract the leveling jacks completely and remove the dolly.

13. Install the outriggers and turnbuckles with pins and hairpins.
14. Tighten the turnbuckles by hand until the outrigger pads contact the foundation. Tighten each turnbuckle two more full turns. Tighten the lock nuts against the turnbuckles. **DO NOT OVER-TIGHTEN!**
15. Secure the tower base and outriggers to the foundation as required (refer to "Foundation Drawing" for the specific model carrousel for loads).
16. Attach the center pole hinge to the top of the tower and secure with the pin and retainers.
17. Use a suitable crane or hoist, raise the center pole to the upright position. When it is fully upright, install fasteners in the flange connection and tighten to 565 to 690 ft-lbs.

Upper Sweeps

NOTE: Release the brake at the base of the drive motor to allow the ride to be turned by hand.

IMPORTANT: THE UPPER SWEEPS ARE NOT IDENTICAL AND MUST BE INSTALLED IN A PARTICULAR LOCATION ON THE RIDE AS SHOWN IN THE FOLLOWING "UPPER SWEEP LAYOUT".

NOTE THE FOLLOWING DIFFERENCES BETWEEN SWEEPS:

- Half the upper sweeps are electrically wired, and can be identified by sockets and plugs on the top or bottom of each upper sweep.
- Two upper sweeps have provisions for attachment of the sway rods on the underside. These two sweeps will be installed 180° apart, on opposite sides of the ride. Neither of these sweeps is electrically wired.

Before installing any upper sweeps, identify these differences and note the position of each sweep as shown in the following illustrations.

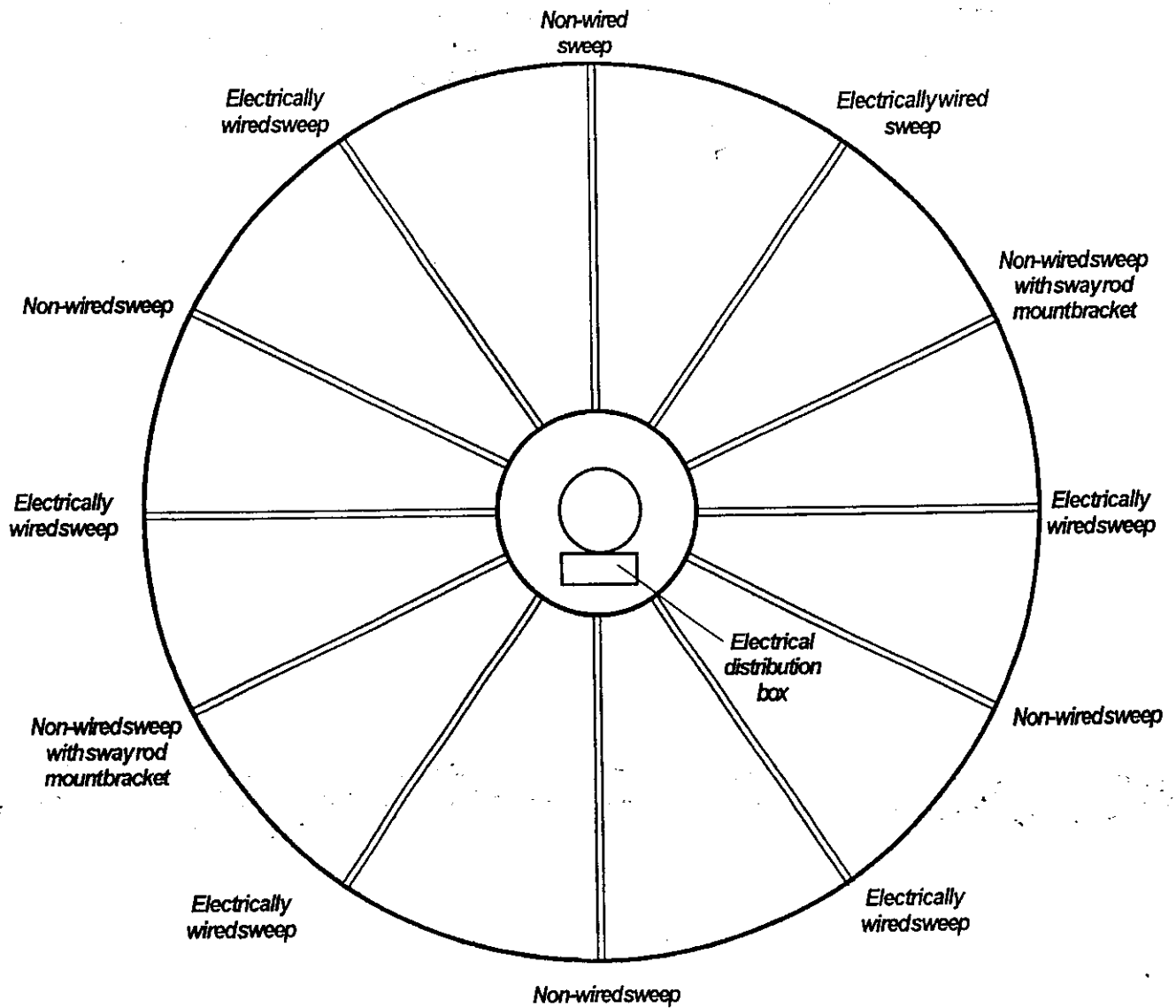


WARNING: If the ride becomes out-of-balance as it is erected, the tower can overturn, which can result in serious personal injury. Install the upper sweeps at evenly spaced points around the ride to keep it balanced. Install one upper sweep, then skip two spaces and install the next sweep, continuing around the ride until all sweeps are installed.



CAUTION: Stay clear of the upper sweeps while the ride is being rotated. Extreme care must be exercised. Serious injury can result from contact with the sweeps.

Sweep Layout - 36-Foot Carousel



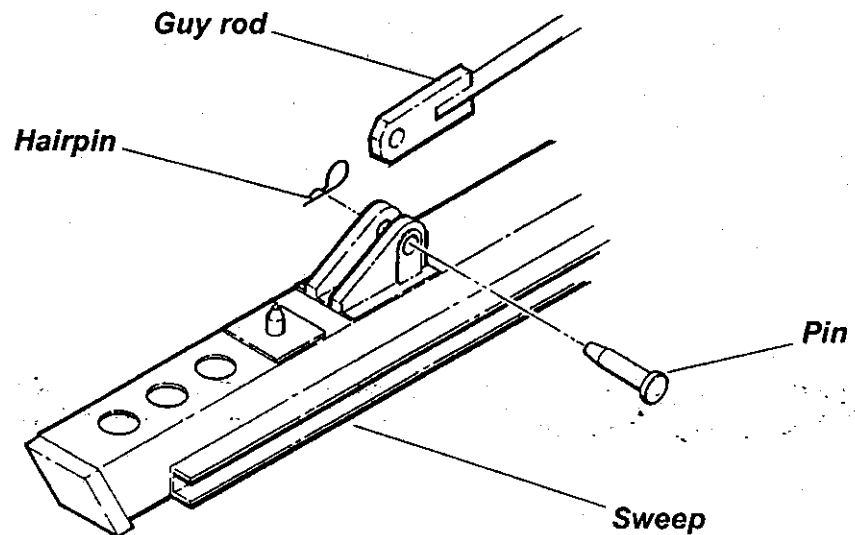
1. Install the guy rods for one upper sweep on the hook at the top of the hub.

NOTE: Each upper sweep has three guy rods.

2. Locate one of the non-wired sweeps. This will be referred to as Upper Sweep #1.

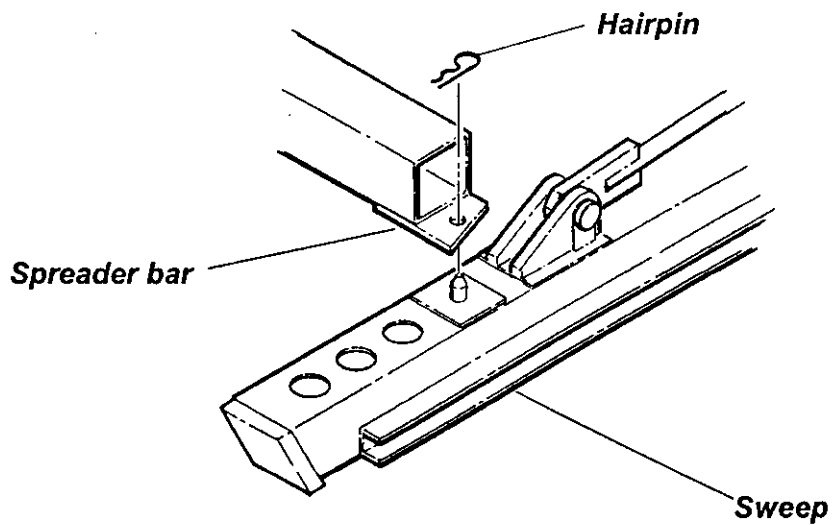
Install Upper Sweep #1 into the hub. Note the position of the sweep in relation to the electrical distribution box (refer to "Upper Sweep Layout" in this section). With one worker on the end of the sweep and another at the guy rods, lift the sweep slightly and attach each guy rod to the sweep with a pin and hairpin.

IMPORTANT: The guy rods must be securely attached at both ends or the sweep can fall.



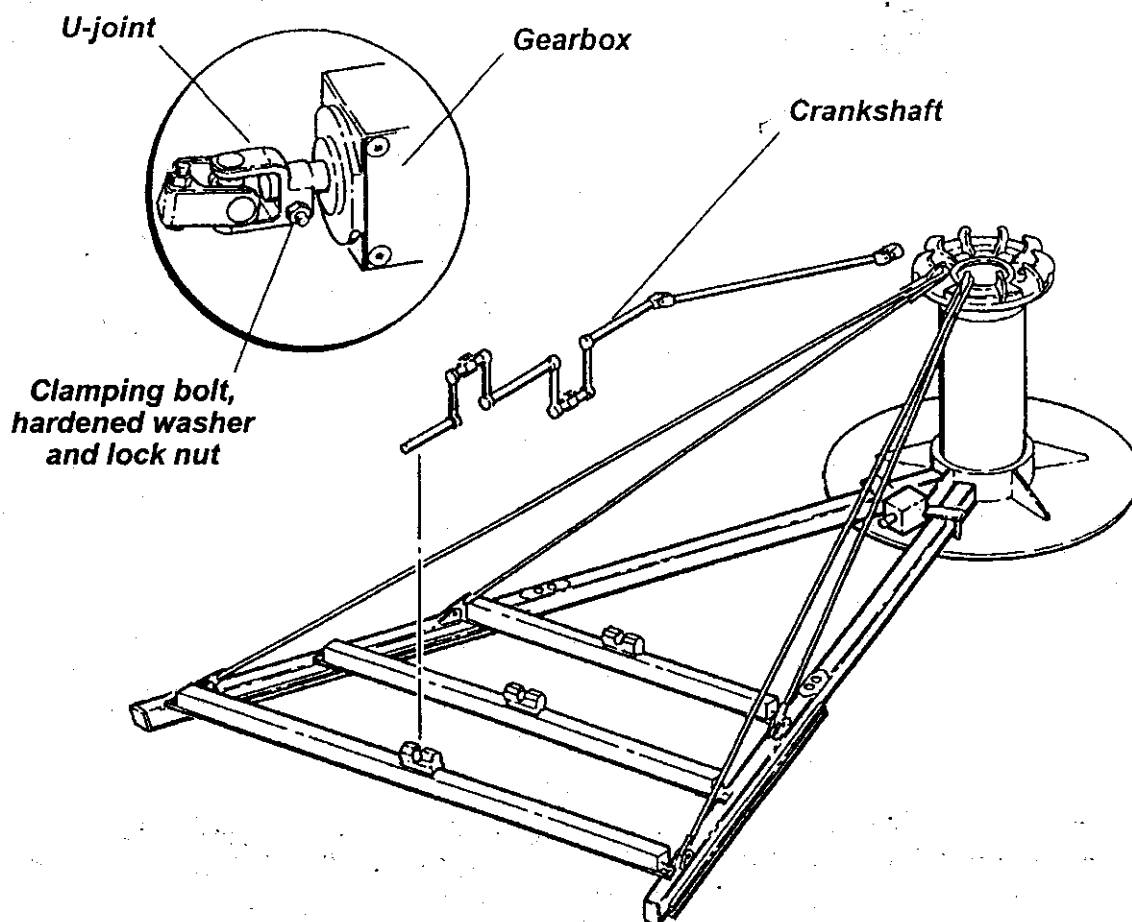
3. Repeat Steps 1 and 2 to install all remaining upper sweeps and guy rods in their correct locations.
4. Install the spreader bars and secure to the upper sweeps with hairpins as shown.

NOTE: If the ride is equipped with one or more chariots, note the location of the chariots. Install the spreader bars without bearings at these locations.



Crankshafts

1. Install the crankshafts. Remove the special clamping bolt from the universal joint. Install the joint onto the gearbox, then install the special clamping bolt, making sure it engages the groove in the gearbox output shaft. Install the special nut and tighten the nut to 75 ft-lbs.



IMPORTANT: If the ride is equipped with one or more standing horses, note the location of the "stander". Install crankshafts with no offset ("throw") at these locations.

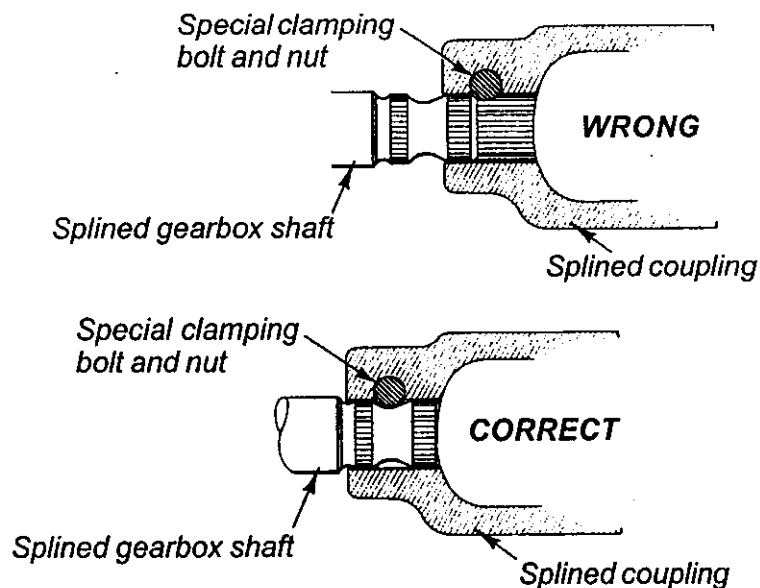
If the ride is equipped with kangaroo and/or okapi animals, note its location and install the special crankshaft with a shorter offset ("throw") at this location.

IMPORTANT: Do not substitute different fasteners for the special clamping bolt and nut provided with the u-joint. Tighten the nut to 75 ft-lbs.



CAUTION: The crankshaft universal joint must be properly installed to prevent the crankshaft from slipping.

The splined shaft of the gearbox must be fully engaged in the splined coupling of the universal joint. The special clamping bolt must engage the groove in the gearbox shaft.



Crankshaft Timing

IMPORTANT: To achieve an appealing ride operation, the crankshafts must be "timed" correctly. To accomplish this, all crankshafts must be installed so that as the ride rotates past a given point, each crankshaft is in the same position as it passes that point.

For example, if the outer crank on one crankshaft is pointed straight up as it passes one corner of the tower, install each remaining crankshaft so it is in the same position when rotated past the same corner.

Lower Sweeps and Upper Floors

IMPORTANT: THE LOWER SWEEPS ARE NOT IDENTICAL AND MUST BE INSTALLED IN A PARTICULAR LOCATION ON THE RIDE AS SHOWN IN THE FOLLOWING "LOWER SWEEP LAYOUT".

Note that two of the lower sweeps are electrically wired and can be identified by sockets and plugs on the top or bottom of each sweep. These two lower sweeps must be located 180° apart, on opposite sides of the ride.

One electrically wired lower sweep is for the optional wheelchair ramp; the other is for the optional spinning tub. If the ride is not equipped with these options, these sweeps still must be located as described in relation to the electrical distribution box.

The remaining lower sweeps are not wired.

Before installing any lower sweeps, identify these sweeps and note their positions as described.



WARNING: If the ride becomes out-of-balance as it is erected, the tower can overturn, which can result in serious personal injury. Install the upper sweeps at evenly spaced points around the ride to keep it balanced. Install one upper sweep, then skip two spaces and install the next sweep, continuing around the ride until all sweeps are installed.

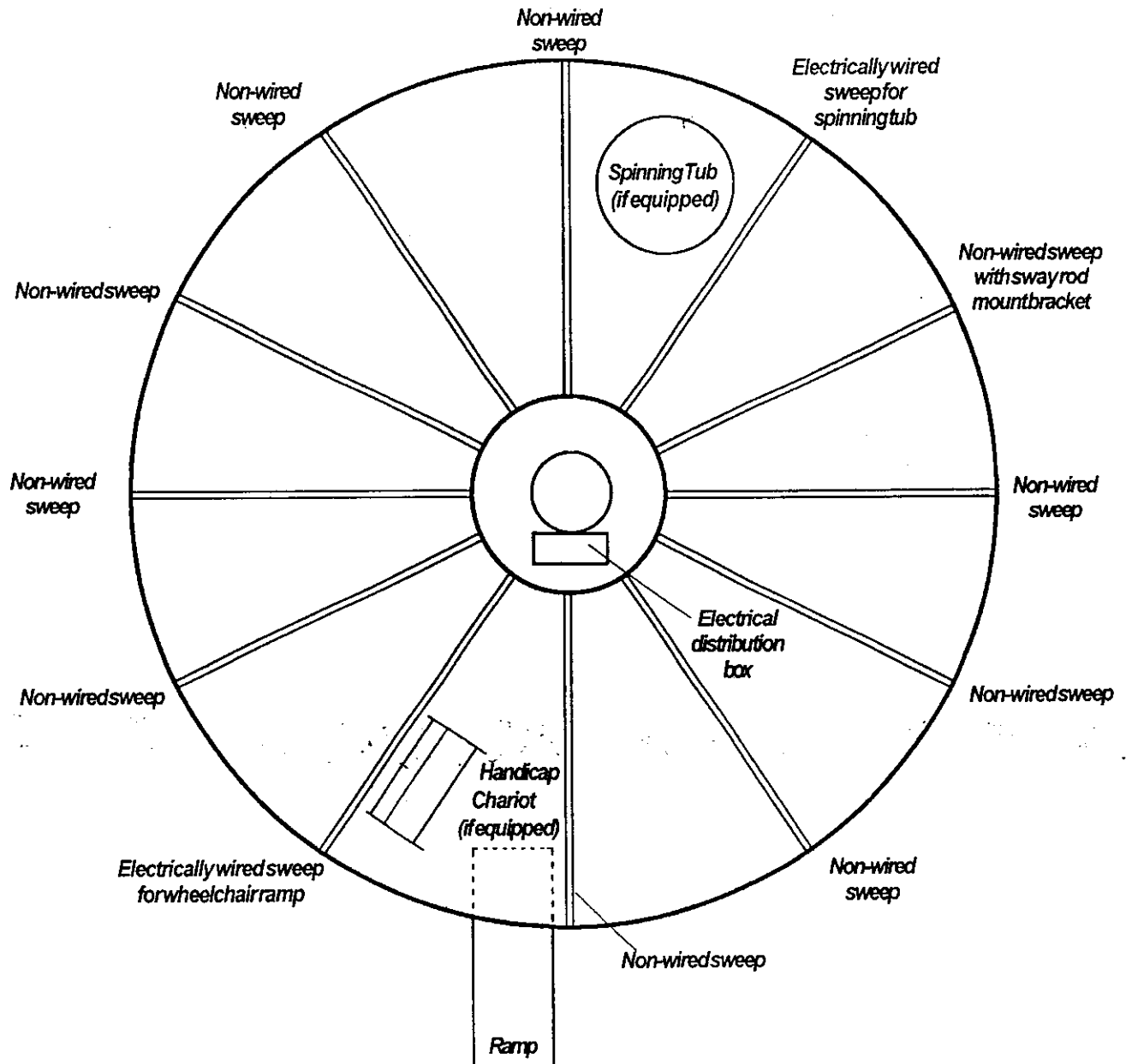


CAUTION: Stay clear of the lower sweeps while the ride is being rotated. Extreme care must be exercised. Serious injury can result from contact with the sweeps.

1. Install all the upper sweeps into the center pole one at a time. Install floor hanger rods between the upper sweeps and the lower sweeps as they are installed.

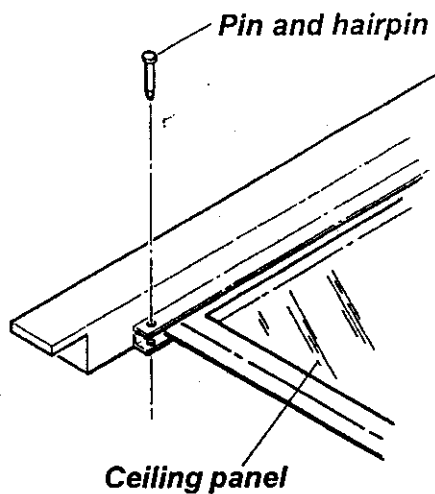
2. Install the lower sweeps and secure them to the floor hanger rods.
3. Install all floor sections. In the step locations, be sure to leave out the floor section(s) below the spreader bars without crankshaft bearings.

Lower Sweep Layout



Lower Ceiling Installation

1. Install the inner panels around the center pole on the upper floor. Secure with fasteners and install the panel trim at the joints.
2. Slide an inner ceiling panels into place in the channels between the sweeps, then install the outer ceiling panel.



3. Install a pin and hairpin at the outer edges of each outer ceiling panel. Slide the panels outward against the pin. As each ceiling section is installed, install the electrical jumpers.
4. On the lower floor, install two upper inner panels. Install a column over the edges of the two upper inner panels and secure with fasteners provided. Install the electrical jumpers to the upper inner panels and columns. Continue going counter-clockwise until all panels and columns are installed..

Lower Floors

IMPORTANT: If the ride is equipped with a wheelchair ramp and/or a spinning tub, install the electrically wired floor hanger rods on the inside location on the special electrically wired lower sweeps. Connect the cables to the lower sweeps.

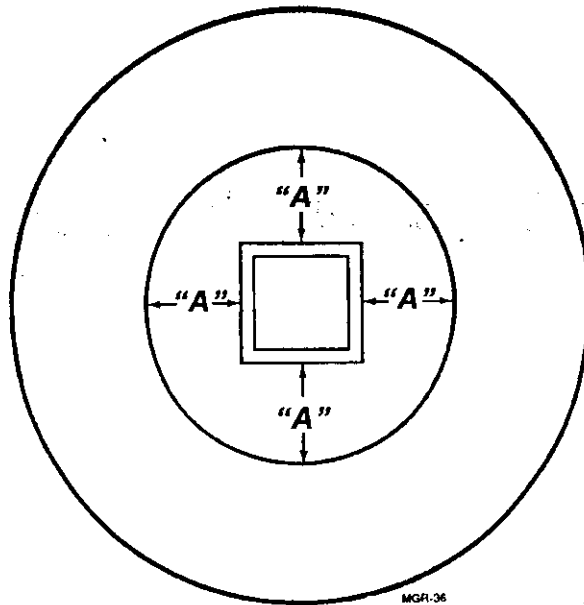
2. Install the lower floor supports. The nut at the bottom of the floor hanger must engage squarely in the slot of the floor support.

NOTE: The floor hanger rods are adjusted at the factory, and the bottom nut is secured with a set screw. All floor hanger rods must be adjusted to the same length.

3. Install the lower floor sections. If the ride is equipped with a chariot and/or spinning tub, be sure to install the correct floor section(s) below the spreader bars without crankshaft bearings.

NOTE: If the ride has a wheelchair ramp and/or spinning tub, connect the electrical cable between the floor hanger rod and the floor section. The wiring must be routed through the special floor hanger rods.

4. Install the four sway rods and tighten all floor nuts. Use the turnbuckles to adjust the sway rods so the floors are concentric about the center of the ride as shown. Tighten the locknuts against the turnbuckles.



Measure the distance from each side of the tower to the inside of the lower floor platform. All measurements taken at "A" must be within 1/2" of each other.

Horse Installation

NOTE: The following procedure applies to installation of horses on both the upper and lower levels. Differences between the two locations are noted.

In general, it is recommended that the inner rows of horses be installed first, working outward to the outer row of horses.

In locations where two-piece horse poles are used, install the upper section of the horse pole first as noted.

1. Rotate the crankshaft until one crank is in the down position. Hook the horse pole over the crankshaft bearing.

IMPORTANT: *The hook on the horse pipe can face either inward or outward, but all hooks must face the same way.*

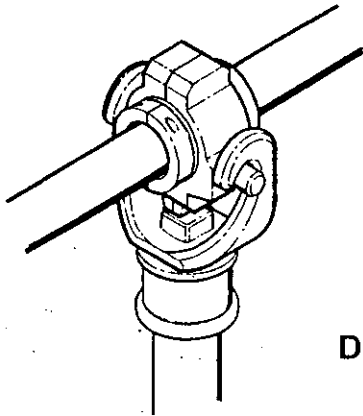
On the two-piece horse poles for the upper level horses, do not hook the horse pole over the crankshaft bearing at this time.

2. Slip the horse pole through the sewn loop in the end of the safety belt or wrap belt around pole.

NOTE: *The lock end of the safety belt must be removed to wrap the belt around the horse pole. Be certain to assemble the parts exactly as shown in the following illustration. The belt will slip if it is not installed correctly.*

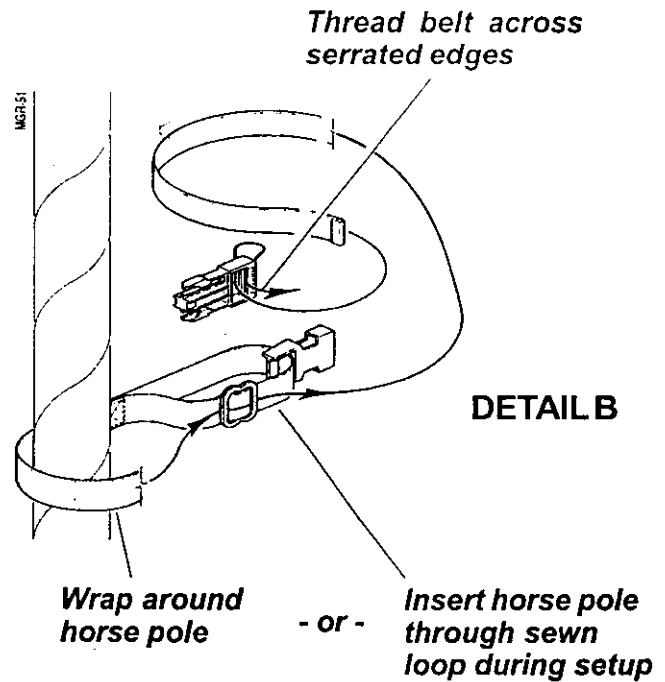
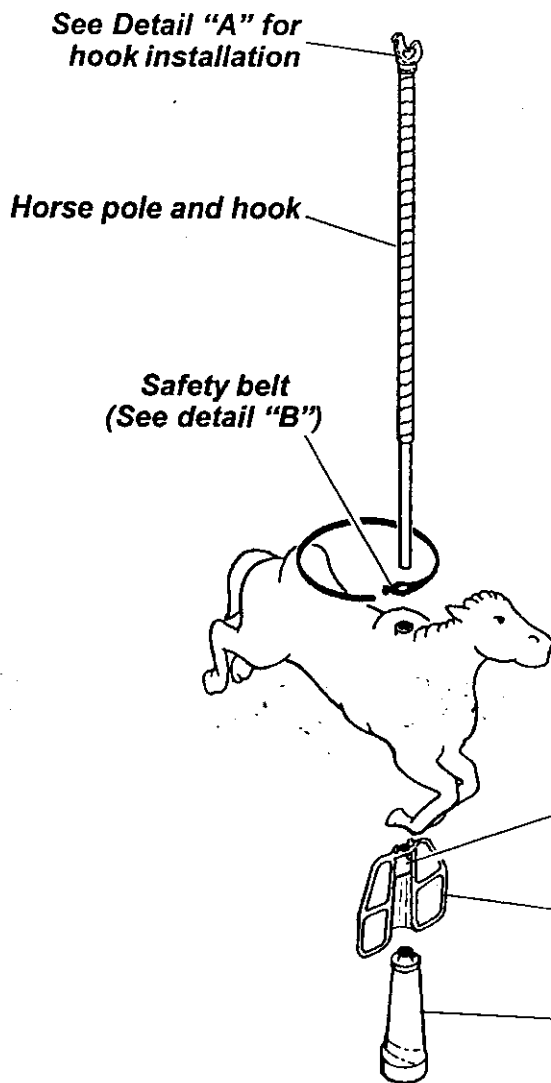
3. Install the horse and horse step. Secure the step to the pole with a capscrew and lock nut. Lower the horse over the step, engaging the locator pins.

NOTE: *For horses on the lower level, install the horse on the lower section of the two-piece horse pole. These must be installed AFTER the upper section of the horse pole is installed.*



DETAIL A

NOTE: The following steps describe the installation of horses. Start with the inner row (small horses), then the outer row (larger horses). If "Chance-style" horses are used on the outside row, distribute the "head up" and "head down" horses evenly around the ride. Pay attention to the position of any standing horses. The "standers" must be installed at locations with no crankshaft offset. The kangaroo and/or okapi must be installed at locations with 3" crankshaft offset.



Install pin and hair pin
(portable model rides)
or capscrew and lock nut
(park model rides)

Horse step

Pedestal

4. On upper level horses, slide the closeout cover onto the upper section of the two-piece horse pole. While holding the cover, move the horse pole into a vertical position so that it goes through the opening into the floor.
5. On the lower level horses, slide the pedestal onto the horse pole. While holding the pedestal, move the horse pole into position. Engage the pedestal into the floor socket and twist it counter-clockwise to lock it in place. Make sure it is securely engaged by twisting back against the lock. Tighten the six capscrews on the bottom of the pedestal after it is engaged in the floor socket. Then, tighten the thumbscrew and jam nut.

NOTE: *Certain carrousel animals require the use of a pedestal specifically for that animal. These pedestals will be labeled. Make sure that the correct pedestal is used on these animals.*

6. On the lower level horses on two-piece horse poles, install and tighten the fasteners which secure the lower section of the horse pole to the upper section.
7. Repeat this process until all horses are installed.
8. If the ride is equipped with a chariot and/or spinning tub, install these components into the floor locations provided. Install all fasteners to secure these components.

NOTE: *If the ride is equipped with a wheelchair ramp, secure the chariot with four plugs in the chariot mounting slots. Fasten the plugs to the floor with the hardware provided.*

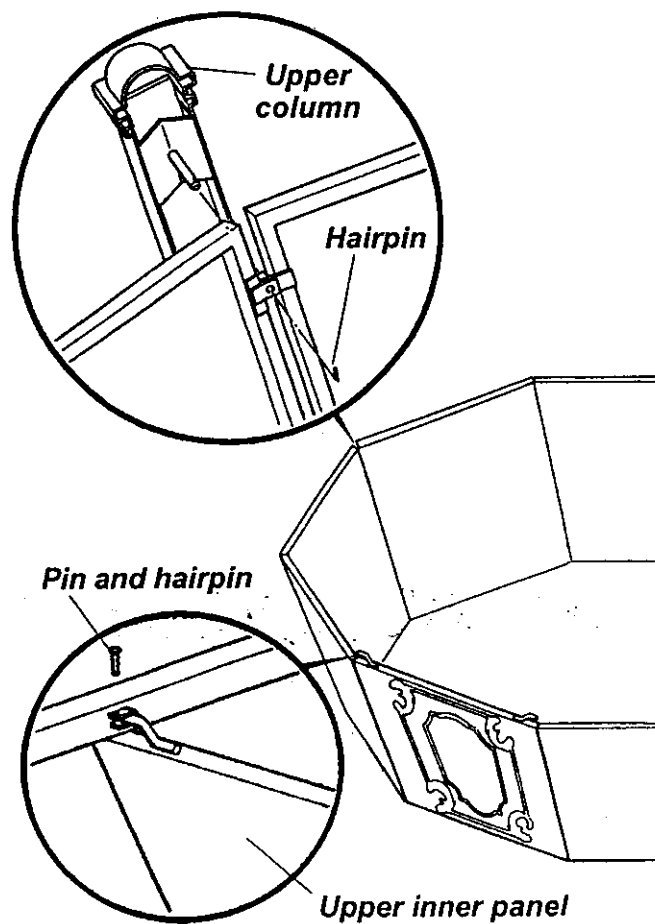
9. After all horses are installed, check the horse hanger bearing stop collars and adjust as necessary. Locate the closeout covers on the upper floor so as to allow the horse pole to move freely through its entire range of travel. Secure the covers to the floor.

Lower Level Upper Inner Panel Installation

1. On the lower floor, install two upper inner panels.
2. Install a column over the edges of the two upper inner panels and secure with fasteners provided.

IMPORTANT: Be sure upper inner panels stay securely engaged on the sweeps as the columns are installed.

3. Install the electrical jumpers to the upper inner panels and columns.
4. Continue going counter-clockwise until all panels and columns are installed.



Lower Inner Panels

1. Install left-hand and right-hand panel supports on three sides of the tower extension.

NOTE: *Left-hand panel supports have attaching plates that angle to the left. Right-hand panel supports have attaching plates that angle to the right.*

On the side of the tower where the main electrical control box is mounted, install the left hand panel support only.

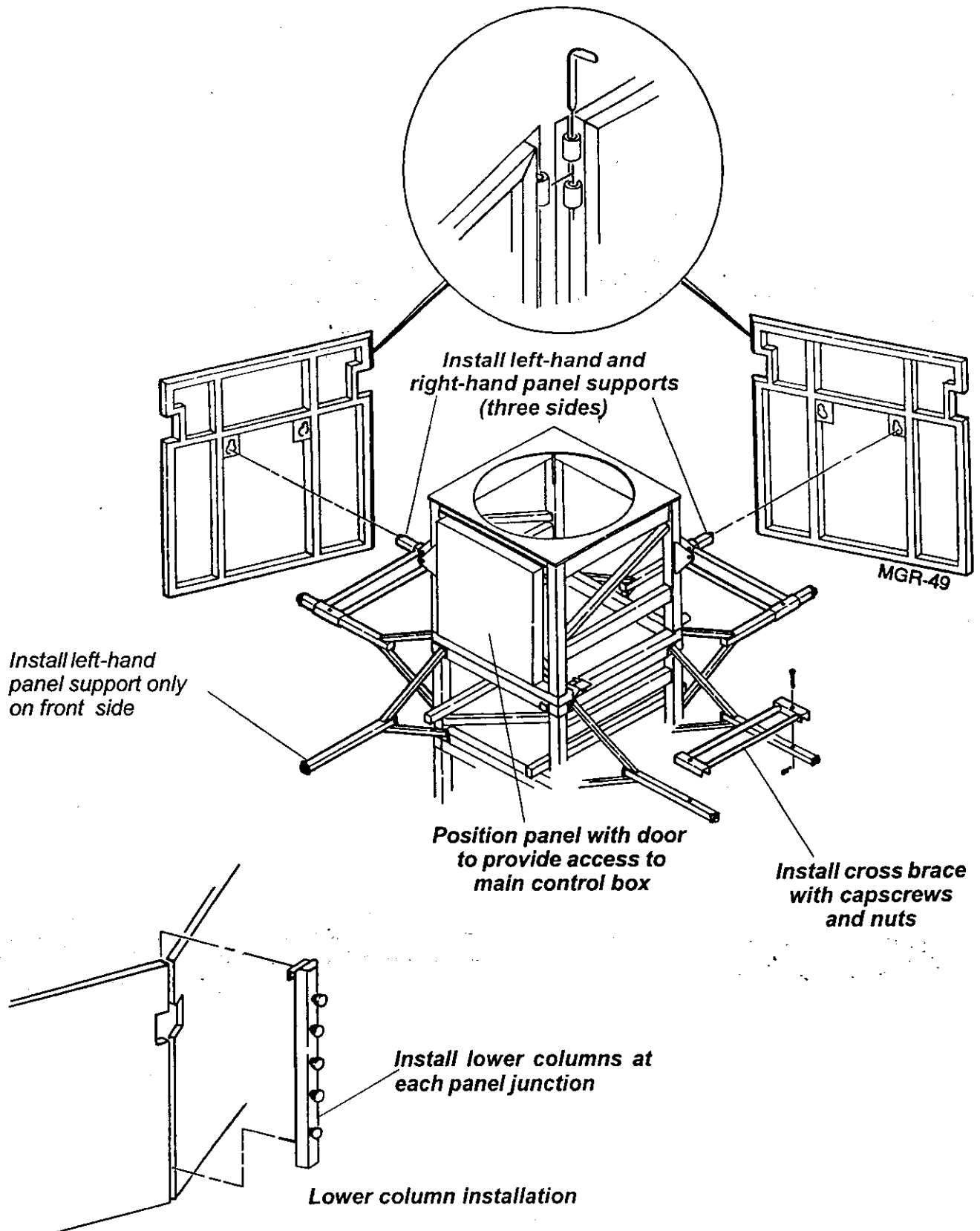
2. Install a cross brace on each set of left-hand and right-hand panel supports and secure with capscrews and nuts, but do not tighten yet.
3. Install seven lower inner panels on panel supports by inserting panel keyhole plates over the panel support plates as shown and secure to adjacent panel with two pins.

NOTE: *The lower inner panel with the access door does not install on a panel support. This door provides access to the electric control panel on the tower extension. It attaches to the adjacent panels.*

4. Adjust the lower inner panels to clear the upper inner panels, then tighten the capscrews on the cross braces

Lower Columns

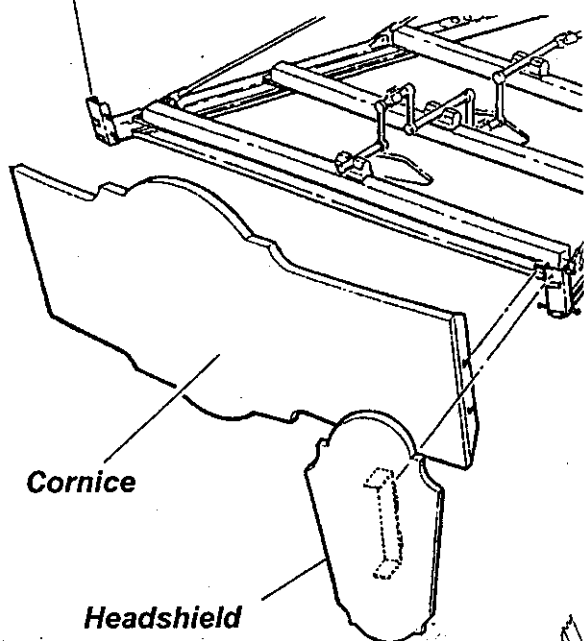
1. Install the lower column assemblies at the junctions between the lower inner panels. Hook the upper bracket over the top of both panels, then insert the retaining stud through the space between panels. Secure with the retainer clip and lock nut.
2. Install power cord from main control box to the upper electric socket of the lower column immediately to the left of the lower inner panel access door.
3. Install power cord from the lower electric socket of the lower column to the adjacent lower column.
4. Repeat step 3 for each lower column until all columns have been connected.



Upper Level Scenery Installation (Inner Panels, Cornices, Headshields and Upper Ceilings)

1. Install the inner panels around the center pole on the upper floor. Secure with fasteners and install the panel trim at the joints.
2. Install the cornice hanger brackets with pins and hairpins.
3. Install the cornices. Install the corresponding ceiling panel above the crankshaft and spreaders after each cornice is installed. Slide the edges of the ceiling panel into the channels on each sweep.

**Cornice and
headshield
hanger bracket**

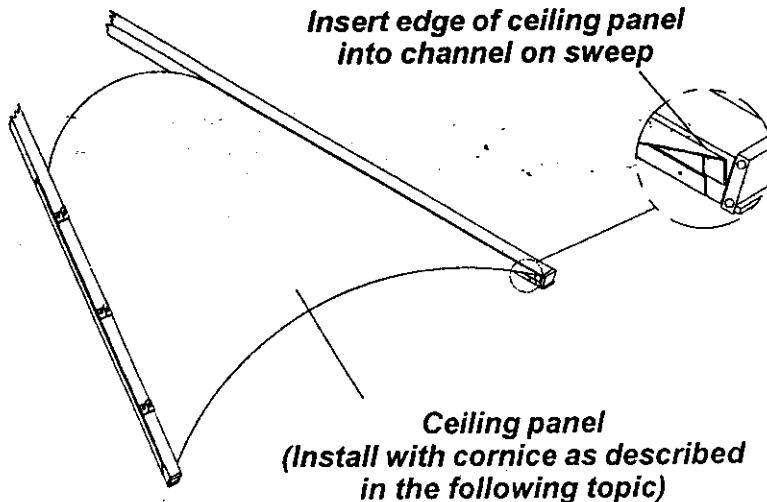


Cornice

Headshield

NOTE: The upper ceilings are made as left and right hand parts, depending upon the location of the electrical connector. Install the correct ceiling panel in each location or the electrical jumper will not reach the receptacle in the sweep. The ceiling panel lights operate on low voltage, and the receptacles are different than those for the cornice. This prevents incorrect connection of the electrical jumpers.

**Insert edge of ceiling panel
into channel on sweep**

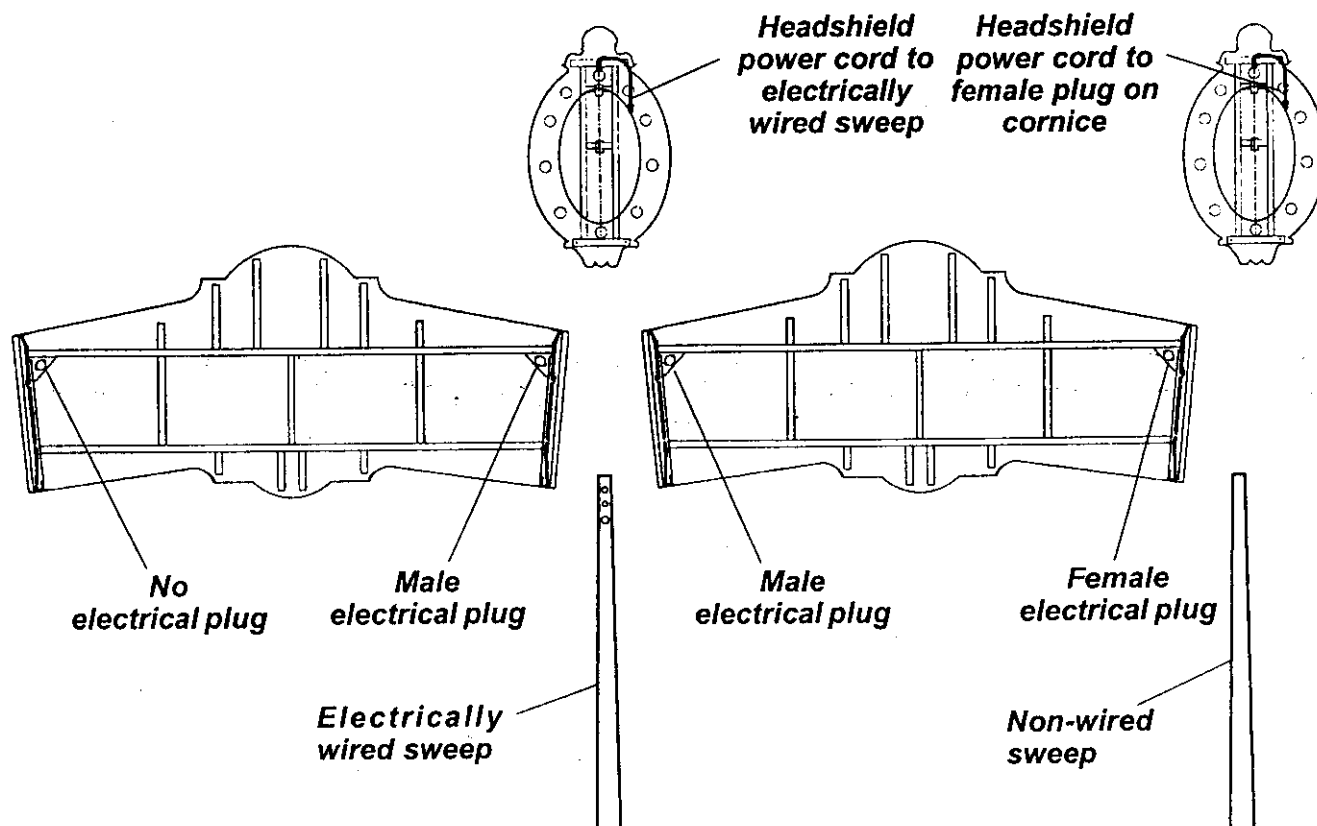


**Ceiling panel
(Install with cornice as described
in the following topic)**

NOTE: Cornices are made with both male and female electrical plugs at the ends, or with only a male electrical plug at one end. These plugs are for attaching the power cords from the headshields. Alternate these right hand and left hand cornices. See illustration below.

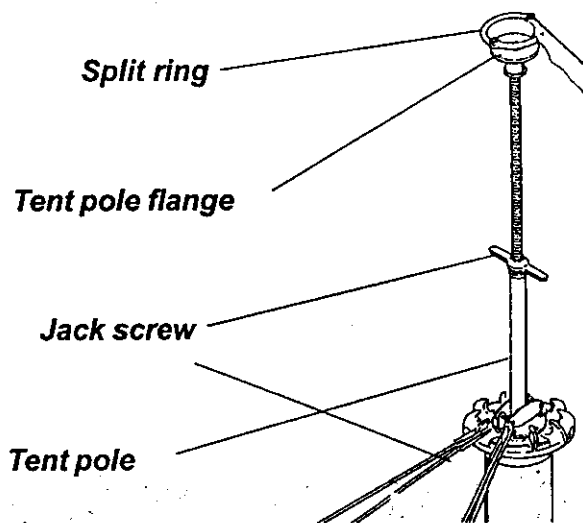
4. Install the headshields.
5. Install power cords from headshields in this manner:
 - Connect power cord from the headshield male plug to the electrical outlet for headshield on an electrically wired sweep.
 - Connect power cord to the female receptacle on the adjacent cornice assembly for headshield on a non-wired sweep. Install the headshields. Install the electrical jumpers between the sweeps and the cornices and headshields as shown.

NOTE: At this point, the canvas tent top can be installed, if desired. Refer to "Tent Top Installation" in this section.

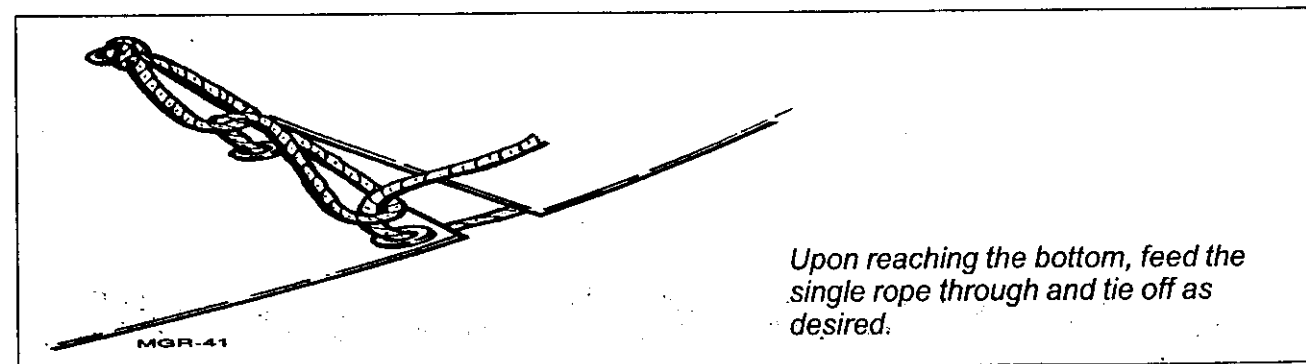
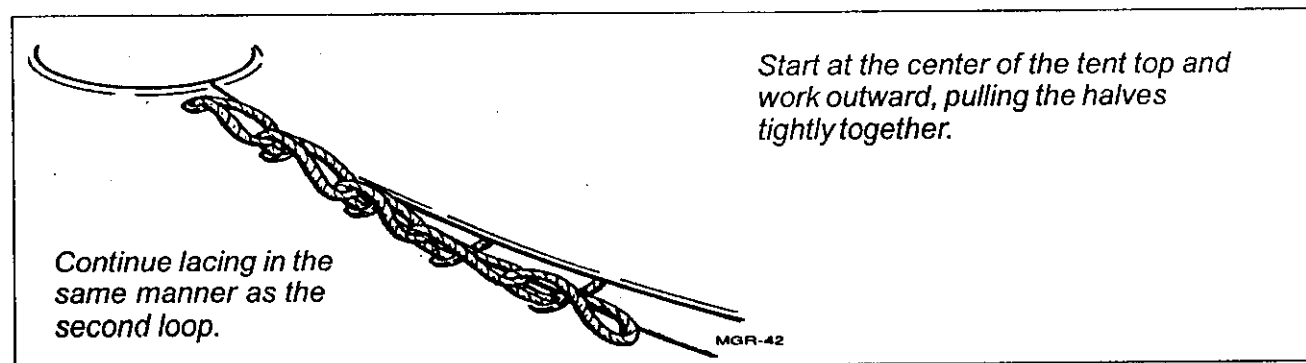
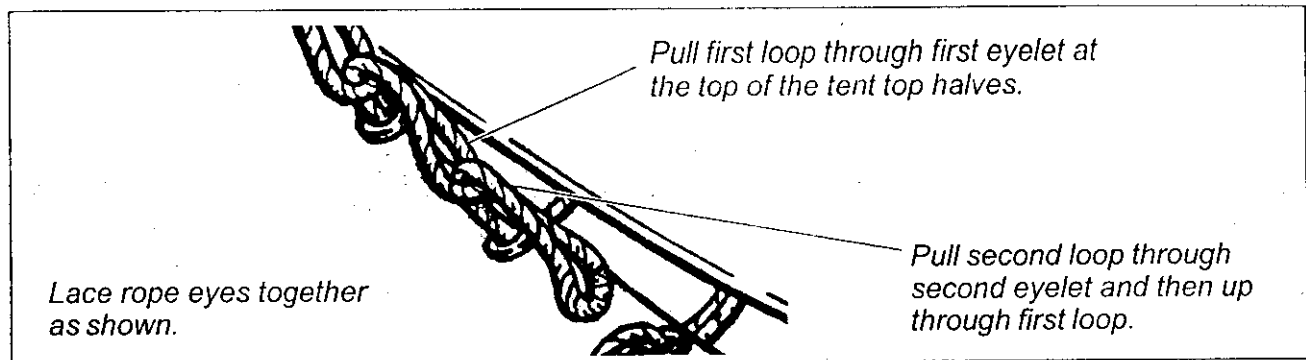


Tent Top Installation

1. Stand up the tent pole and pin in place. Make sure the jack screw is fully retracted.
2. If the ride is equipped with a crown or finial, install it over the tent pole before the fabric top is installed. Connect the jumper from the crown or finial to the distribution box.
3. Lay out the fabric top over the guy rods.
4. Fasten the split ring together on top of the tent pole by installing the bolts and washers through the ring halves into the tent pole flange.



5. Lace the two tent halves together as shown on the following page.



6. Snap the tent top fabric to the cornices.
7. Turn the jack screw handle to raise the top high enough to install the quarter poles. Continue to raise the top until taut.

NOTE: The tent top can also be laced from the bottom up, allowing easier access to the crown or finial for light bulb replacement and other maintenance. Use the method described above, but start at the bottom.

Final

IMPORTANT: *If the brake on the drive motor was released during set-up, it must be engaged before the ride is operated.*

1. Turn off the main power circuit breaker in the main electrical box.
2. Disconnect the hand control box and connect the operator's control console.
3. Inspect the entire ride for obstructions. Remove all racks, tools, loose components and other objects from the ride area.
4. Install the perimeter fences and gates.
5. Install the side walls, if equipped.
6. Test run the ride, using the instructions in the "Operation" section of this manual.

36-Foot Double-Decker Carrousel

Operation Manual

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OPERATION

General Information

Safe operation is a combined responsibility and effort of the ride manufacturer and the owner/operator. This manual provides detailed information on the operation of the ride and provides the operator with important safety information.

All operators must be thoroughly familiar with the contents of this section before attempting to operate the ride. This information must be immediately available to all operators of the ride.

Contents

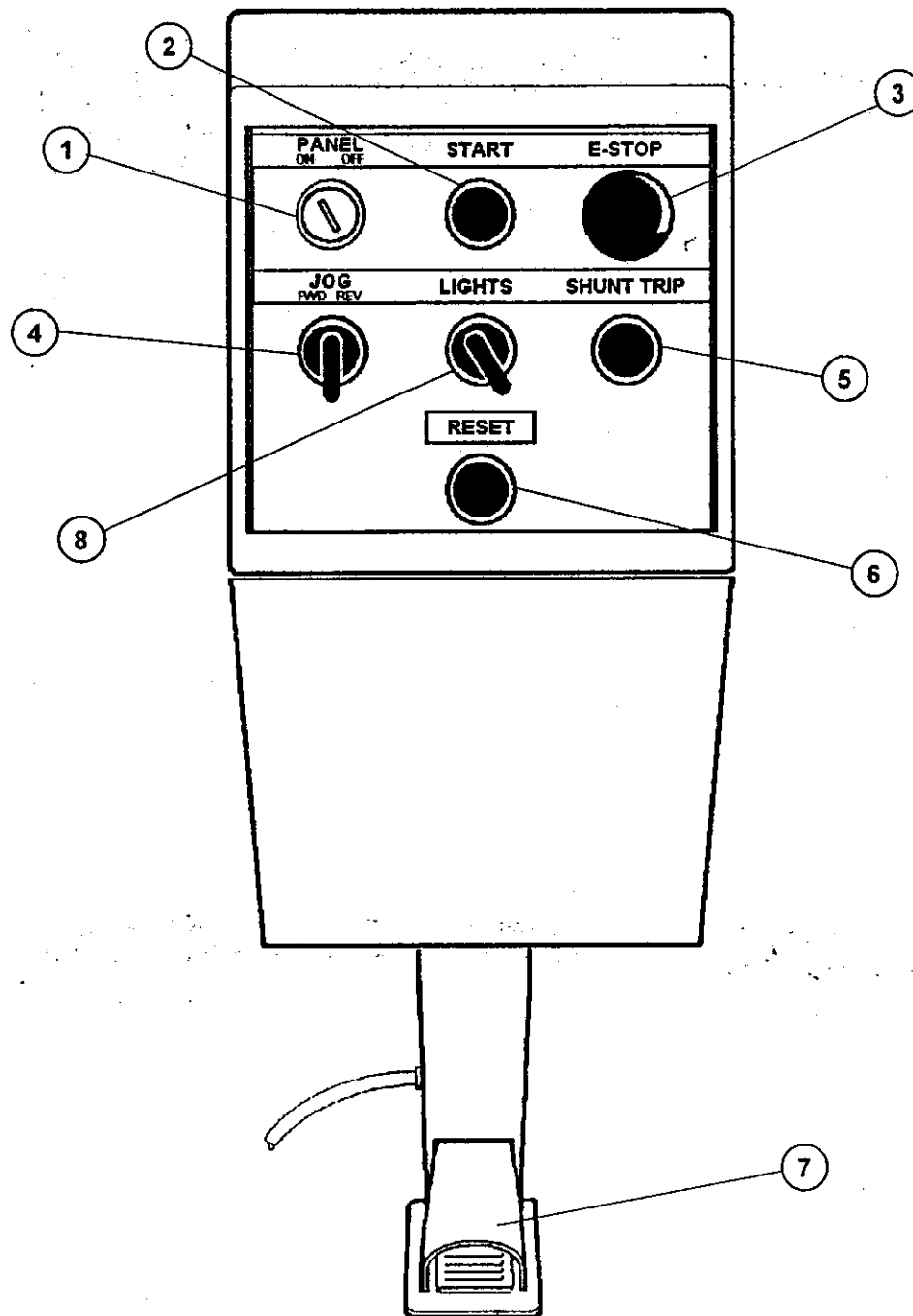
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Operator Selection and Instruction

1. Select competent, mature operators, capable of understanding the function, use and control of amusement rides.
2. Instruct each operator fully in the proper use and function of the ride he/she 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 the manufacturer's operation manual for the ride he supervises.
3. Require the operator to inspect the ride he supervises before each day of operation.
 - a. Determine that no portion of the ride is damaged, missing or worn in such a manner that it is unsafe, or that can develop into an unsafe condition.
 - b. Report any irregularities to superintendent or owner.
 - c. If any irregularities are found, do not operate the ride until such condition is corrected.
4. Instruct operators 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 that cannot be properly secured due to passenger size or malfunction of the securing device. Stop the ride immediately if any passenger is observed tampering with any restraining device or behaving dangerously, such as changing positions or walking around the ride.
6. Advise the operator against starting the ride while any person (passenger, spectator or employee) is in a dangerous 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. The operator's full attention must be given to the ride and its passengers.
8. Instruct the operator to allow no other person, except for another trained operator, to operate the controls of the ride (excepting portions of the ride that are designed to be controlled by the passenger).
9. Instruct the operator and attendants fully as to the proper method of assembly and disassembly of portable rides. Always supply adequate personnel and equipment to do it safely.
10. Instruct the operator to inspect and correct damaged, lost or worn parts that are unsafe or that can develop into unsafe parts, during assembly or disassembly.
11. Advise the operator that factory-installed safety devices must not be tampered with or removed.
12. Instruct operator of owner's or supervisor's procedure for assisting ill or injured passengers.
13. 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.

Operator's Control Console



1. **Panel Switch** - Use this key-operated switch to turn on the power to the operator's control console. When this switch is in the "On" position, the green light in the START SWITCH will be on.

Before leaving the control panel unattended, always turn the switch to "Off" and remove the key to prevent unintentional operation of any control. The key can only be removed in the "Off" position.

IMPORTANT: Before turning on the MAIN POWER CIRCUIT BREAKER (located on the front of the main electrical cabinet in the center of the ride), make sure the PANEL SWITCH is in the "Off" position. After the main power is on, turn the PANEL SWITCH to "On".

2. **Start Switch** - Use this push-button to start the programmed ride cycle. A green light in this switch will be on when the PANEL SWITCH is in the "On" position. The following conditions must exist to start the ride:
 - The green light in the START SWITCH is on
 - The EMERGENCY STOP (E-Stop) SWITCH is pulled out to its operating position
 - The OPERATOR PRESENT SWITCH was released after the last ride cycle, and is now engaged
 - The wheelchair ramp (if equipped) is in the stowed position
 - The ALARM INDICATOR LIGHT/RESET SWITCH is off

When the START SWITCH is pressed, a warning bell will sound one long ring, signalling the start of the ride.

3. **Emergency Stop (E-stop) Switch** - Press this palm switch to remove electrical power to the drive motor. The ride will come to a complete stop as quickly as possible.

After pressing the switch, it must be pulled back out to its normal operating position.

IMPORTANT: Pressing the EMERGENCY STOP (E-STOP) SWITCH creates a fault condition. The amber ALARM INDICATOR LIGHT/RESET SWITCH will flash a fault code, indicating that the EMERGENCY STOP SWITCH was pressed. See the description for the ALARM INDICATOR LIGHT / RESET SWITCH for the procedure to clear the fault.

Refer to "Emergency Procedures" in this manual for additional information on use of the EMERGENCY STOP SWITCH.

4. **Jog Switch (wheelchair ramp equipped rides only)** - Use this switch to slowly turn the ride in either "FWD" (counter-clockwise) or "REV" (clockwise) direction. This allows the operator to precisely position the wheelchair ramp.

When the JOG SWITCH is pressed, a warning bell will sound one short ring, signalling movement of the ride in the jog mode.

5. **Shunt Trip Switch** - Use this switch to turn off the MAIN POWER CIRCUITBREAKER.
6. **Alarm Indicator Light/Reset Switch** - This amber light flashes when a fault in the drive program has occurred.

The following conditions must exist to reset a fault:

- The PANEL SWITCH must be in the "On" position
- The OPERATOR PRESENCE SWITCH must be disengaged

Push the switch to reset the fault. When the indicator light stops flashing, normal operation of the ride can be resumed.

NOTE: *If faults require frequent resetting, or if the ALARM INDICATOR LIGHT/RESET SWITCH is still flashing after pressing it, notify the appropriate maintenance personnel.*

7. **Operator Presence Switch** - This foot switch is located at the base of the operator's control console, and must be engaged to operate the START SWITCH or the JOG SWITCH. It must be engaged throughout the entire programmed ride cycle, and released at the end of each cycle. The OPERATOR PRESENCE SWITCH interrupts the drive program when released. The ride will come to a normal, programmed stop.

IMPORTANT: *Improper operation of the OPERATOR PRESENCE SWITCH creates a fault condition. The amber ALARM INDICATOR LIGHT/RESET SWITCH will flash a fault code, indicating that the OPERATOR PRESENCE SWITCH was either released during the ride cycle or was not released at the end of the ride cycle.*

8. **Lights Switch** - Use this switch to turn on all the decorative lighting on the ride.
9. **Ride Duration Switch (not shown)** - This three-position switch is located on the side of the main electrical box on the center tower.

To change the length of the programmed ride cycle:

- Turn the PANEL SWITCH to the "Off" position (do not turn off the main power)
- Use the RIDE DURATION SWITCH to select the "Short," "Normal" or "Long" program.
- Turn the PANEL SWITCH back to the "On" position to resume normal operation.

The newly selected program will be effective at the next cycle.

10. **Main Power Circuit Breaker (not shown)** - This control is located on the main electrical cabinet, which is mounted to the center tower of the ride. Turn it to the "ON" or "OFF" position to control the main power for the ride at the control console.



Loading



CAUTION: Do not operate the ride unless all parts of the horse are in good condition, including the horse poles and seat belts. All safety signs and placards must be legible.

Any broken or missing parts must be repaired or replaced immediately.



CAUTION: All persons less than 42 inches in height must be accompanied by an adult, or be adequately restrained with the seat belt properly fastened.



CAUTION: Do not allow any passenger on the ride who cannot be properly secured because of passenger size or condition.

Never allow a passenger who is visibly ill or under the influence of drugs or alcohol on the ride.

Pregnant women or persons who have physical impairments must be advised of potential risks before riding.



CAUTION: Never allow two persons to ride on one horse. Do not allow anyone to ride side-saddle.



CAUTION: Never allow the ride to become overloaded. Maximum capacity of each horse is one adult or one child, with an average weight of 170 pounds. Maximum capacity of each standard chariot is four adults or six children, with a total weight of 680 pounds. Maximum capacity of each handicapped chariot is two adults or three children, with a total weight of 340 pounds.

If the ride is being operated at less than its full capacity, direct passengers to horses and/or chariots on each side of the ride to balance the load.



WARNING: When loading passengers, make sure that the passengers are properly seated. Passengers on horses must hold onto the horse pole with the seat belt latched and adjusted. Passengers' feet must be at the horse steps.

Never operate the ride while anyone is standing inside the fence area.



WARNING: Instruct passengers that, for their own safety, they must not move around while the ride is in motion. Do not allow anyone to walk on the ride platform while the ride is in motion. Passengers on horses must stay seated, holding onto the horse pole, with their feet on the horse steps and the seat belt latched and adjusted. Passengers in chariots must stay seated.

10 Chance Rides Manufacturing, Inc.

(Revised September 22, 2003)

Standard Loading

The ride can be loaded from all sides simultaneously. Two staircases provide access to the upper level.

When loading an empty ride, it is necessary to maintain a balanced load.

IMPORTANT: *Never operate the ride with an imbalance of more than:*

- 9 adults on any one side of the lower level (1530 lbs.)
- 3 adults on any one side of the upper level (510 lbs.)

Optional Handicapped Accessible Loading Features

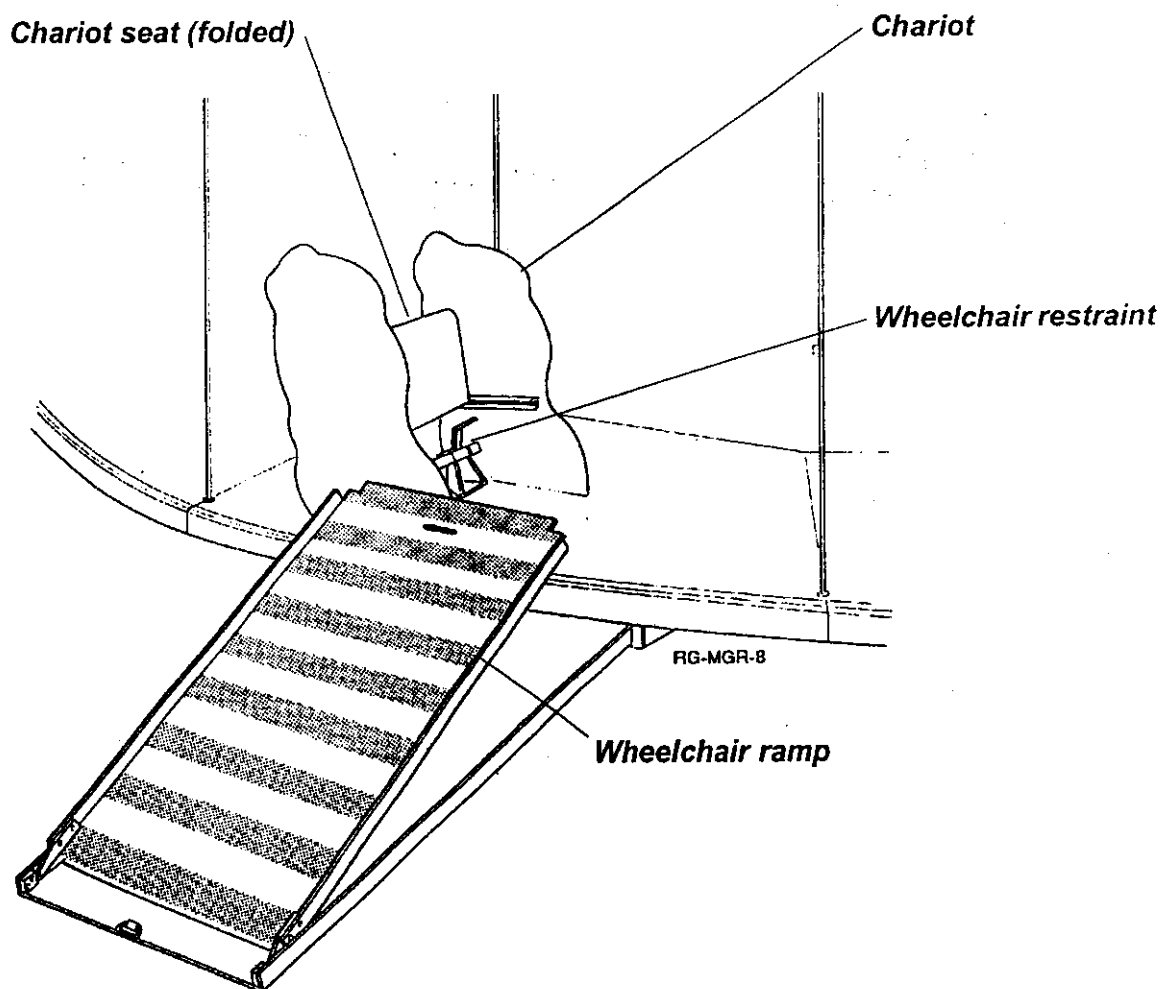
The ride can be specially equipped with one or more handicapped accessible positions. The position consists of a wheelchair ramp and a special chariot which converts from normal seating (capacity - two adults or three children) to a handicapped position (capacity - one wheelchair passenger).

Wheelchair Ramp

A wheelchair ramp is provided under the floor of each handicapped accessible position. The ramp is mounted on a roller track and is stowed in the retracted position when not in use. An interlock system prevents the ride from starting if the ramp is not fully retracted and locked.

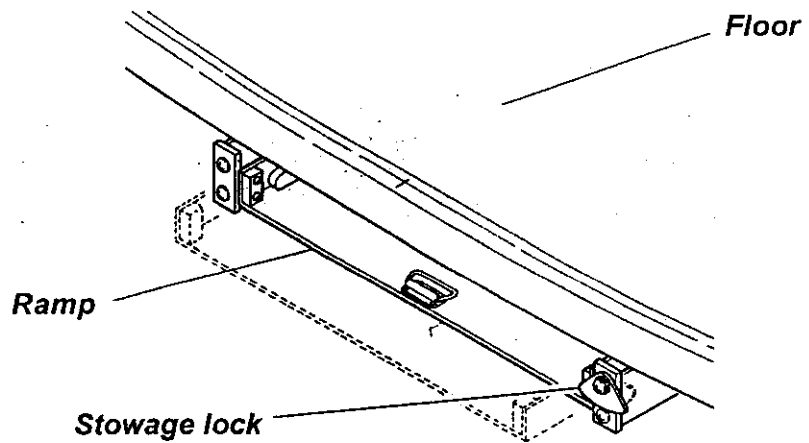


WARNING: Never operate the ride unless the wheelchair ramp is in good working condition, and the interlock system is operating correctly. Do not tamper with or attempt to defeat the purpose of the ramp interlock system. Serious injury to passengers can result.



To Load Wheelchair Passengers

1. With the ride completely stopped, release the ramp stowage lock. Pull the ramp assembly out until it stops, then lower it to the ground.
2. Using the handle cut-out in the ramp bed, lift the front edge of the bed. Slide it toward the ride until its back edge engages with the ramp frame. Lower the front edge onto the ride platform.



3. Load the wheelchair passenger onto the ride. Secure the wheelchair and passenger as described in "Wheelchair Restraints".
4. Using the handle cut-out in the ramp bed, lift the front edge high enough to disengage its back edge from the frame. Slide the ramp bed back in the frame, then lower it completely.
5. Lift the ramp assembly and slide it completely into the retracted position under the floor. Make sure the stowage lock engages after the ramp is fully retracted.

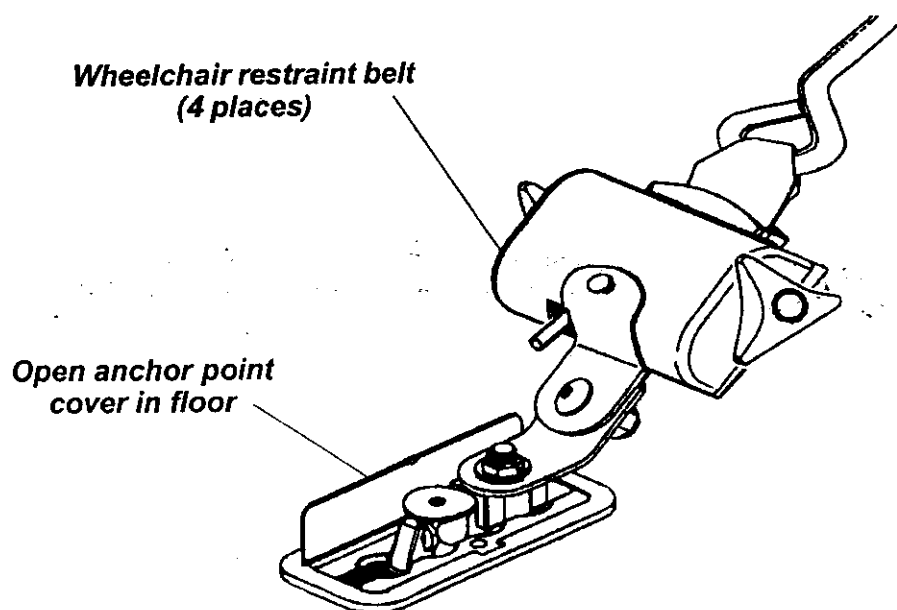
Wheelchair Restraints

Once the wheelchair passenger is on board the ride, secure him/her with the wheelchair restraint system. The wheelchair restraint system consists of four wheelchair restraint belts and a two-piece lap belt.



CAUTION: All wheelchair restraining devices must be properly engaged to insure the safety of ALL passengers. Do not operate the ride without first establishing that all passengers are secure.

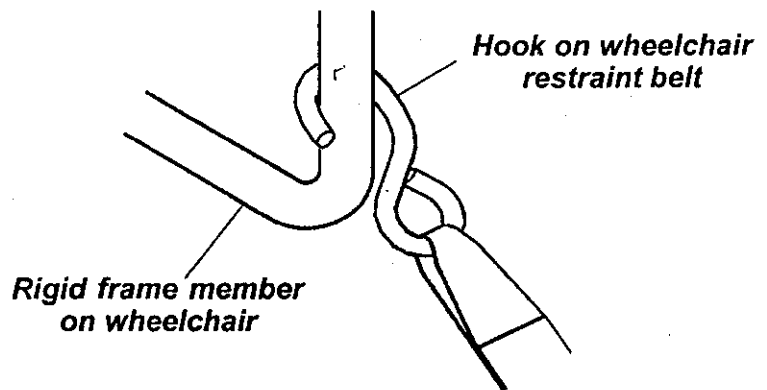
1. Lift the front edge of the chariot seat to gain access to the wheelchair anchor points in the floor.
2. Open the anchor point covers and install the four wheelchair restraint belts as shown. Position the ends of the belts out of the path of the wheelchair as it is backed into position.



3. Roll the wheelchair back so that both wheels are against the folded chariot seat, centered between the anchors.

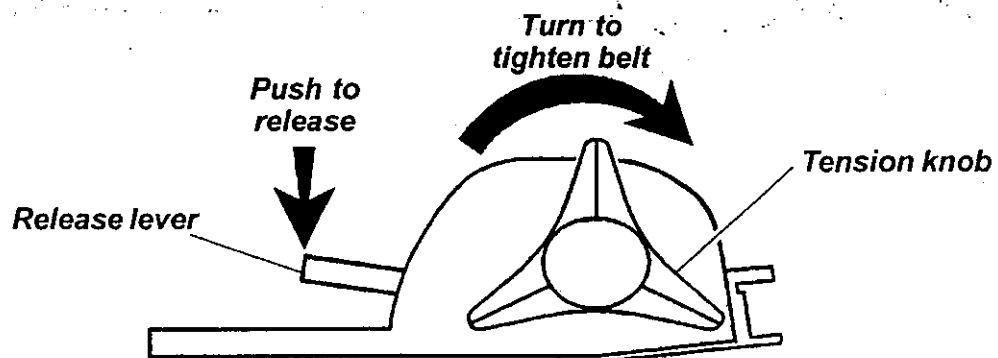
NOTE: The wheelchair must be positioned squarely in the restraining position.

4. Attach the four hooks on the restraint belts to a rigid frame member on the wheelchair.



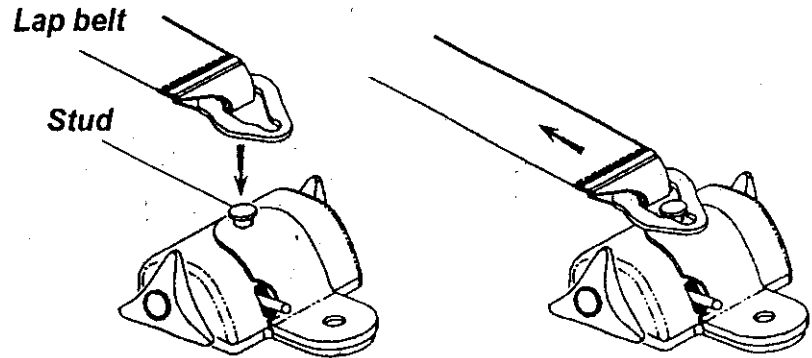
5. Use the knobs on each retractor to tighten the four belts. Make sure the belts are installed in a straight line between the anchor and the wheelchair, without twisting. Do not allow the belt to be twisted inside the retractor. All wheels of the wheelchair must be firmly in contact with the floor when in the belts are tightened.

IMPORTANT: To release the tension on the belts, press the release lever down as shown.



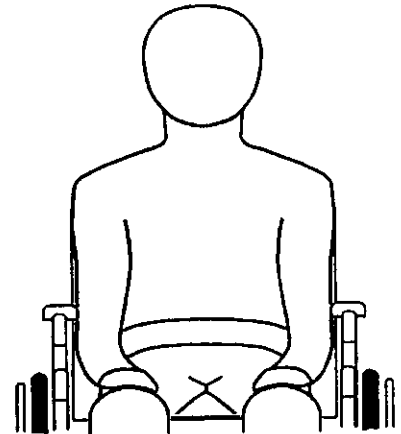
6. Once the wheelchair has been secured, connect the lap belt on each of the rear belt retractors as shown.

Install the lap belt over the stud on the retractor, then pull on the lap belt to lock it onto the stud.



7. Restrain the wheelchair passenger with the lap belt. Pull each side of the belt through the arm of the wheelchair and attach over the passenger's lap as shown.

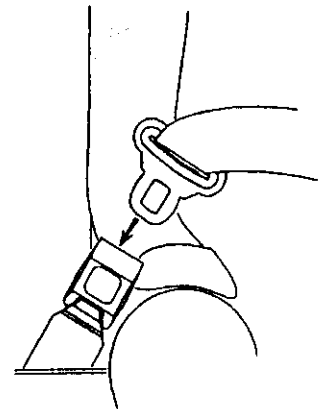
IMPORTANT: Lap belts must not be twisted. Make certain both parts of the lap belt are straight. Pay particular attention to the placement of the lap belt. It must be as low as possible with the passenger seated well back in the wheelchair.



WARNING: A snug fit, with the lap belt positioned low on the hips is necessary to reduce the chance of injury in an accident. This spreads the force over the strong hip bone structure instead of the soft abdomen.

To help reduce the chance of injury and/or the amount of injury in an accident:

1. Do not use the same safety belt for more than one person at a time.
2. Never wear twisted safety belts.
3. Do not damage safety belts or hardware by pinching them in the seat.



Operator's and Attendants' Positions



CAUTION: The operator must remain in full control of the operating controls at all times during the operation of the ride. The ride and its passengers must be given the full attention of the operator at all times.

Never leave the operating controls while the ride is in operation

The operator at the control console is responsible for the safety of the passengers as they enter, exit and ride. The operator must know and fully understand all operation and emergency procedures for this ride, and must be at the control console at all times when the ride is in motion. The ride must have the operator's complete attention at all times.

When determining the required number and location of attendants, crowd size and other factors must be taken into consideration.

Attendants are responsible for the safety of the passengers as they wait in line to board the ride, as well as during loading and unloading. Attendants should do the following:

1. Control access to the ride through the entrance gates.
2. Make sure all passengers remain clear of the ride as they wait to board the ride. Persons waiting in line must not be allowed to hang over the fences or sit on the fences.
3. Make sure the passengers are properly loaded before the operator starts the ride.
4. Make sure that only passengers meeting height and other ride restrictions are allowed to ride.



WARNING: Before starting the ride, make sure there is no one around the ride structure, close to any exposed electrical components, or any other areas where there is a possibility of personal injury.

Operating the Ride

1. Turn on the MAIN POWER CIRCUIT BREAKER.
2. Turn the PANEL SWITCH on.
3. Load the passengers as described in the "Loading" procedure in this manual.
4. Walk completely around the ride to make sure that all passengers are properly seated, with those on horses holding onto the horse poles.
5. Take your place behind the operator's control console.
6. Engage the OPERATOR PRESENCE SWITCH.
7. Press the START SWITCH to start the ride.
8. The ride cycle is programmed and will stop automatically when the cycle is completed. Keep the OPERATOR PRESENCE SWITCH depressed to complete the normal programmed ride cycle.
9. At the end of the ride cycle, the OPERATOR PRESENCE SWITCH must be released before starting the next cycle.

NOTE: *There is a 20-second delay before the next ride cycle can be started.*

Emergency Procedures

Emergency Stop During Ride Operation

Use the following procedure in the event of any unsafe condition requires the ride to be stopped:

- Release the OPERATOR PRESENCE SWITCH the ride will come to a normal, programmed stop.
- If the nature of the emergency requires that power be removed from the drive motor, press the EMERGENCY STOP SWITCH. The ride will come to a normal programmed stop before power is interrupted.

NOTE: If the EMERGENCY STOP SWITCH is pressed, it will stay in until pulled back out to its operating position.

Pressing the EMERGENCY STOP SWITCH will create a fault condition. Reset the fault as described under "Operator's Control Console" in this section.

IMPORTANT: After pressing the EMERGENCY STOP SWITCH, it will take approximately one minute for the drives to initialize. If the ALARM INDICATOR LIGHT/RESET SWITCH is pushed before this time, the amber light will stop flashing and stay on solid for a short time. When the light goes off, normal operation of the ride can resume.

When the ride is completely stopped, unload the passengers.

Loss of All Electrical Power to the Ride

In the event of loss of electrical power to the ride during operation, the ride will come to a stop. If electrical power is not restored, carefully unload passengers.

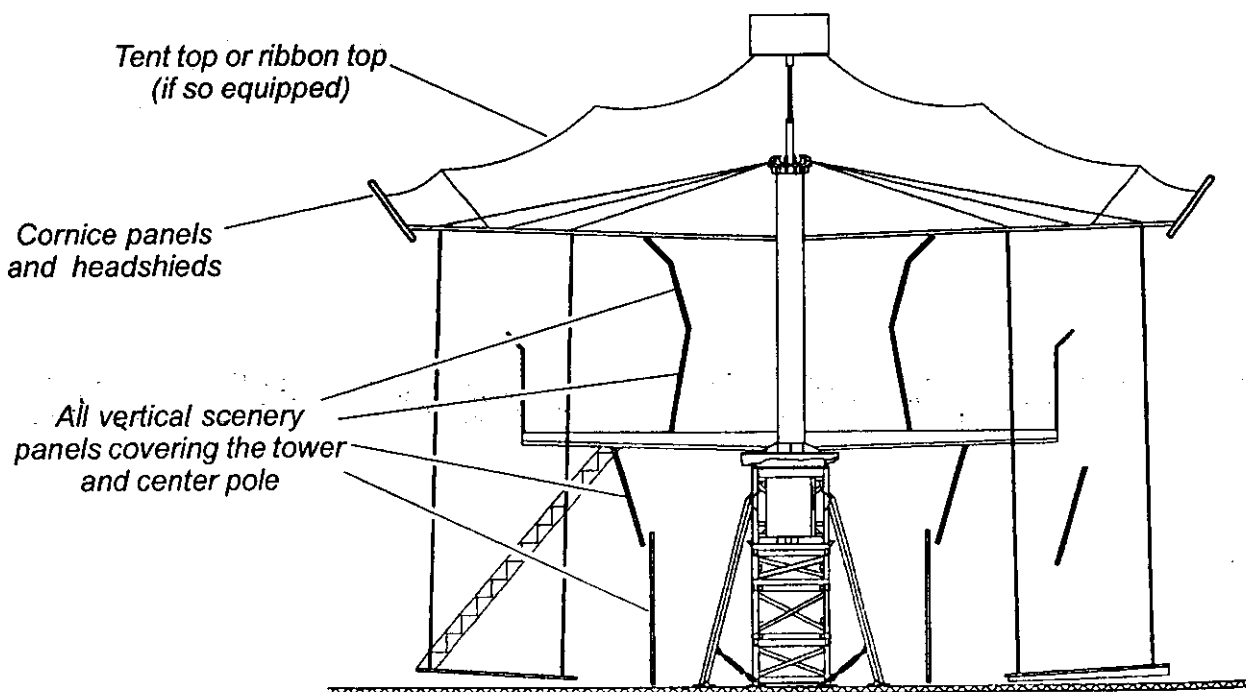
High Wind Precautions



WARNING: Always observe the following precautions to help prevent damage to the equipment and injuries to passengers and/or bystanders.

Never operate the ride with passengers in winds exceeding 35 mph.

1. Remove all loose items on the ride as well as any lightweight components including, but not limited to the following:
 - The arched upper ceiling panels
 - The round-top panels through which the crankshafts protrude
 - The small closeout panels below the crankshafts
 - Any other parts which could become dislodged by high winds
2. If winds over 90 mph are expected, remove the parts shown below.



3. After high wind conditions have occurred, inspect the ride carefully to make sure that all components are undamaged and securely mounted.

36-Foot Double-Decker Carrousel

Maintenance Manual

MAINTENANCE

General information

Proper maintenance of the ride is vital to safe operation, reduced operating costs and longer equipment life.

This manual provides detailed information on scheduled maintenance and lubrication of the ride. It also includes troubleshooting information.

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Preventive Maintenance

Preventive maintenance is the easiest and most economical means of assuring many satisfactory, productive hours of operation. Properly scheduled maintenance is the key to lower operating costs and longer service life.

Hourly intervals have been established for servicing the ride. Intervals are based on the number of hours the ride has run.

The items listed in this section are separated into maximum hourly intervals. These intervals are based on "average" operating conditions. Actual conditions under which your ride is operated are the determining factors when setting up a maintenance schedule. When operating under "severe" conditions, such as excessive heat, cold, dust, mud or water, more frequent servicing is necessary.

First Week Of Operation

The ride has been completely serviced and tested before leaving the factory. However, during the first week of operation and after each set-up, the ride operator must be especially observant and watch for loose parts, leaks, etc.

In addition to scheduled maintenance, check the following:

1. Check the torque of all functional load-carrying capscrews after the first week of operation and after each set-up. This allows for initial seating of components. Check the torque at monthly intervals thereafter.
2. Check for leaks in the hydraulic system and air system, if equipped. During transport, vibrations can cause leaks at hoses and fittings.
3. Check for lubricant leaks from gearboxes.

Fluids and Lubricants

Timely lubrication and the use of high quality lubricants is necessary to obtain the maximum life of the ride and its components. Use only the fluids and lubricants specified in the following chart.

Fluids and Lubricants Chart		
Component	Capacity	Specification
Main drive gearbox	2.75 quarts initial fill. Replenished monthly with 2 fluid ounces of additional grease	NLGI No. 00 lithium grease Example: Mobil Oil Co. Mobilith SHC 007 or equivalent
Crankshaft gearboxes (1 per crankshaft)	1 pint	SAE 90 EP Multi-purpose gear lube meeting A.P.I. specification GL-5.
Main bearing zerks (2 places)	As required	NLGI No. 2 lithium base grease
Crankshaft U-joint zerks (2 per crankshaft)	As required	NLGI No. 2 lithium base grease
Drive shaft U-joint zerks (2 per drive shaft)	As required	NLGI No. 2 lithium base grease
Crankshaft gearbox pinions	*No lubrication required	
Crankshaft support bushings	*No lubrication required	
Horse hanger bearings	*No lubrication required	
Horse pedestals	*No lubrication required	

* Although lubrication is not required, a spray lubricant such as WD-40 can be applied to Nylatron® bearings to eliminate minor squeaks and other noise.

(Revised November 4, 2003)

Monthly Lubrication Schedule

[illegible]

Annually												
Ref. No.	Inspection Point	Inspection Required										
13	Main drive pinion gear (not shown)	Check mesh. Adjust as required.										
14	Drive shaft pinion gears	Check mesh. Adjust as required.*										
15	Main drive gearbox	Open the lower plugs to drain any condensation. These plugs are located on two sides of the gearbox, just above the electric motor.										
Every Three Years												
Ref. No.	Service Point	Service Required										
16	Crankshaft gearboxes	Drain and refill with new oil.										
17	Main drive gearbox	Dismantle the gearbox. Remove the old grease, inspect the seals, and flush with gear oil. Repack with new grease as the gearbox is assembled.										

* Check the mesh on the drive shaft pinions after the first 3-4 months of operation, then annually thereafter.

Safety

The following is a list of general rules which should be observed by everyone.

Remember that the key to safe and successful operation is to have well trained and well supervised employees.

General Safety Guidelines

1. All work must be performed by competent, qualified mechanics, capable of understanding the function of the parts and their proper installation.
2. Inspect the ride before each day of operation to determine that no portion of the ride is damaged, missing, or worn in such a manner that unsafe conditions can develop.
3. Perform the manufacturer's recommended maintenance procedures at the intervals specified and in the manner described in this manual.
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. Use only OSHA approved safety items. Ladders must be clean and unpainted.
6. Use the proper tool or equipment for each job. Ground all hand electric power tools before use.
7. Wear close-fitting, comfortable clothing when working on or close to moving parts or live electrical circuits. Avoid finger rings, jewelry or other articles which can be caught in moving parts or come in contact with electrical circuits.
8. Protect your eyes by wearing approved safety glasses or goggles.
9. Wear a hard hat at all times. When working in elevated areas, use a safety belt.

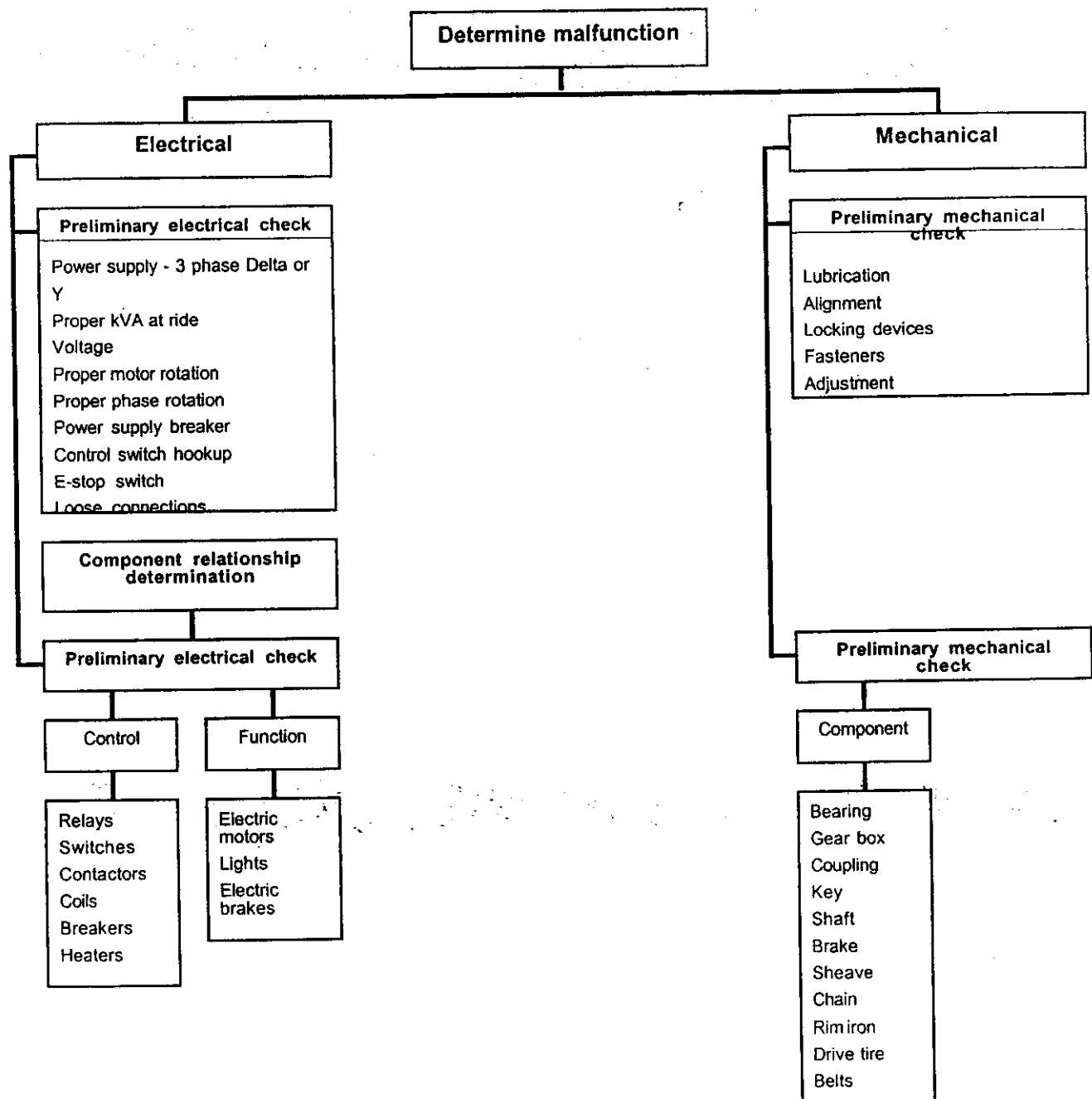
10. Where work to be performed is hazardous, at least two persons shall work together.
11. If guards must be removed from equipment, make sure they are replaced before leaving the job. Check that all safety decals, signs and placards are properly installed and legible.
12. Clean up after each job, and properly dispose of surplus materials.
13. Keep a record of parts replaced and the date of replacement. Inform the manufacturer of any replacement requirements that are frequent or cause unsafe conditions.
14. Make modifications and additions as outlined in manufacturer's service and safety bulletins.

Troubleshooting Procedures

Before calling the Customer Service Department at CHANCE RIDES MANUFACTURING, INC. for help, be prepared with the following information:

1. Have the ride serial number and name available.
2. Have the service manual ready to use as a reference.
3. If ride was previously owned, by whom? (Factory records often show changes made to a ride by its previous owner).
4. Have the same person make all calls. Be sure to get the name of the person to whom he is speaking at the factory. All calls should then be made to that person.
5. Have a phone number ready at which you can be reached.
6. Have shipping instructions ready (how, when, and where to ship parts).
7. Have a list of any alterations, modifications or kits that have been added to the ride.
8. The person calling the factory must be familiar with the problem and be able to describe symptoms of the ride problem (such as: was the problem gradual, did it suddenly quit; are any sounds occurring that are not normal; does the problem occur continuously or is it intermittent; does the ride run in one direction only; does the ride run but have no braking, etc.).
9. Many times the problem that completely stops a ride from working is one of many simple things that are forgotten or overlooked. Listed on the following chart are many of the items that can cause this, as well as all items that must be checked before any calls are made to the factory. Use this chart to try to determine the cause. It can save several expensive phone calls or a more expensive visit by a factory representative, as well as a valuable time.

Troubleshooting Chart



Fasteners

Capscrews

Capscrews used by CHANCE RIDES MANUFACTURING, INC. are classified as functional load-carrying capscrews if:

- They are used as tension members in the erection or operation of the ride
and/or
- They are required to resist shear through friction-type connections in the erection or operation of a ride.

Capscrews are selected with consideration to grade, size and quantity, using joint capacities based on tightness torques of 60% rated yield and group joint efficiencies of 62.5%

Torque Requirements

Capscrews must be tightened to the torque values listed in the *Torque Chart*, unless otherwise specified. These values were selected to produce a tightening torque range of 60% to 70% of proof load, when tightened with a hardened washer under the nut or capscrew head (whichever is accessible for tightening). When the capscrew is tightened from the head end, apply anti-seize lubricant to the shank end of the capscrew. When the threads are lubricated, use 10% less torque to tighten the capscrew.

DONOT TIGHTEN CAPSCREWS OVER THERECOMMENDED TORQUE. This can damage the capscrew, due to variances in coefficients of friction and torque wrench accuracy. Always use a torque wrench. It is impossible to accurately measure the tightness of a capscrew by other methods. Torque wrenches must be checked for accuracy twice each operating season.

Capscrew Grades

CHANCE RIDES MANUFACTURING, INC. uses only grade 5 or better capscrews and grade 8 locknuts, with A325 hardened washers for functional loads. The *Grade Markings Chart* shows the capscrew markings to be found on CHANCE products. The manufacturer's identification symbols must be present on all functional load carrying capscrews.

SIZE (DIAMETER) - Threads per Inch	Torque Range in foot -pounds (see notes 1, 2 and 4) with locknut and hardened washer	
	SAE J429 Grade 5 ASTM A325	SAE J429 Grade 8 ASTM A490
1/4 - 20 1/4 - 28	5-6 6-7	7-8 8-10
5/16 - 18 5/16 - 24	11-13 12-15	15-18 17-21
3/8 - 16 3/8 - 24	19-24 22-27	27-33 31-38
7/16 - 14 7/16 - 20	30-35 35-40	45-55 50-60
1/2 - 13 1/2 - 20	50-60 55-65	65-80 75-90
5/8 - 11 5/8 - 18	95-115 105-130	130-160 150-180
3/4 - 10 3/4 - 16	165-200 185-225	235-285 260-320
7/8 - 9 7/8 - 14	270-325 295-360	380-460 415-505
1 - 8 1 - 14	400-490 440-535	565-690 620-755
1 1/8 - 7 1 1/8 - 12	495-600 555-675	800-975 900-1095
1 1/4 - 7 1 1/4 - 12	700-850 775-940	1135-1380 1255-1525
1 1/2 - 6 1 1/2 - 12	1215-1480 1370-1660	1975-2390 2220-2700
NOTES: 1. Use anti-seize lubricant on capscrew shank when tightened from head end. 2. Use 10% less torque when anti-seize or other lubricant is used on threads. 3. Use same torque range for holes tapped in steel. 4. Use these torque values unless otherwise specified.		

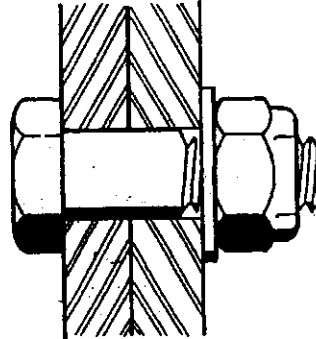
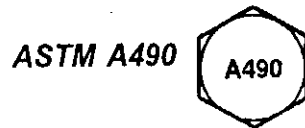
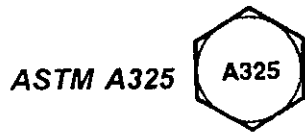
Torque Chart

Torques for functional load carrying cold finished hex head capscrews with dry rolled threads, used with locknuts (see note 3), and tightened with an ASTM A325 hardened washer under the capscrew head or locknut (whichever is accessible for tightening).

This torque range will develop 60% to 70% of proof load.

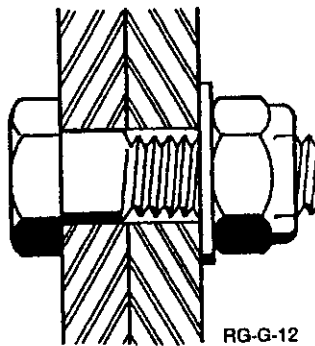
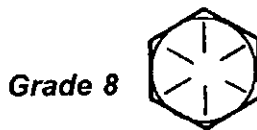
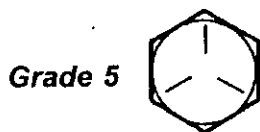
Refer to **Replacement of Capscrews and Locknuts** for conditions requiring replacement

CHANCE RIDES MANUFACTURING, INC. requires the use of cold-formed hex head capscrews with rolled threads. Hex bolts and hot formed hex head capscrews are not recommended because they may have machined threads and can have die seams along the shank.



Capscrew Comparison

ASTM A325 or ASTM A490
Capscrew - Longer shank, shorter
threads



Grade 5 or Grade 8 cap screw -
Shorter shank, longer threads

RG-G-12

Replacement of Capscrews and Locknuts

When permanently installed capscrews and locknuts are disassembled for repair or adjustment, they must be replaced if they have been in service over five (5) years, or corrosion, or other damage requires over-torquing for removal. If a torque wrench is not used to measure excessive removal torques, the capscrews and locknuts must be replaced.

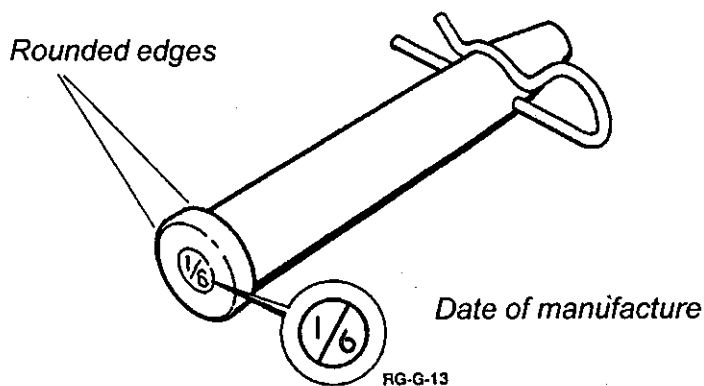
Capscrews and locknuts which are frequently disassembled for portability must be replaced each operating season. If the capscrews and locknuts become damaged, corroded or require excessive torque for removal, they must be replaced. If a torque wrench is not used to measure excessive removal torques, the capscrews and locknuts must be replaced.

Pins

Tapered pins used on amusement rides are subject to deterioration due to improper use and wear. CHANCE RIDES MANUFACTURING, INC. specifies certain pins for certain applications on amusement rides. These pins have been developed over a period of years, taking into account size, design, material and hardness characteristics.

Use only the pins specified by CHANCE RIDES MANUFACTURING, INC. These pins are identified as shown in the following illustration. Always use the correct hairpin.

Pin Identification

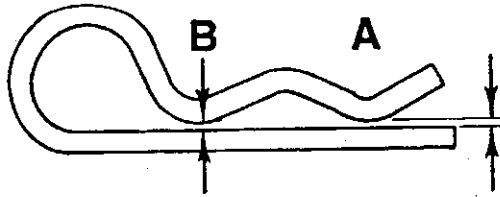


Use care when installing and removing tapered pins. Since these pins are hardened (as are hammers and punches) care must be taken to strike the pin straight on. Striking a pin at an angle can cause the pin to chip, resulting in personal injury. For this reason APPROVED SAFETY GLASSES OR GOGGLES MUST BE WORN AT ALL TIMES when tapered pins are being installed or removed. If a tapered pin is chipped, bent, or "mushroomed" on either end, discard it and replace it with a new pin.

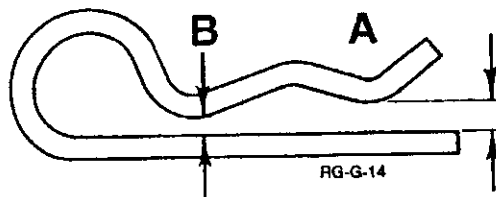
Pin Keepers

All keepers (R-keys, hair pins, lynch pins, etc.) must be inspected for wear. If a keeper is bent out of shape or "sprung", it must be replaced.

Hairpins are expendable parts. After repeated use, they become worn and "sprung" as shown.



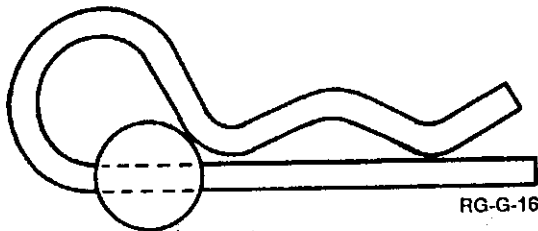
Acceptable Hair Pins
Dimension "A" equals dimension "B" in a relaxed position



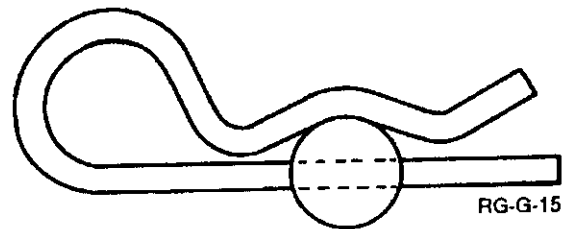
Unacceptable Hair Pins
Dimension "A" is greater than dimension "B" in a relaxed position

NEVER ATTEMPT TO BEND A HAIRPIN BACK INTO SHAPE. REPLACE IT WITH A NEW PART.

The correct installation of a hairpin is shown. Incorrectly installed hairpins are more likely to fail, and will distort after only a few uses.



Incorrect



Correct

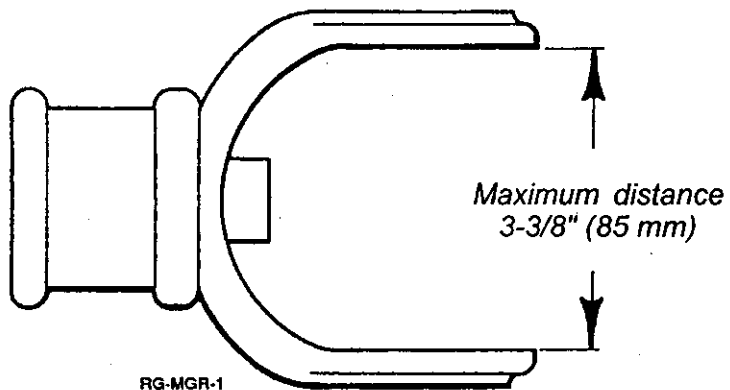
CHANCE RIDES MANUFACTURING, INC. recognizes and recommends the safety procedures specified in *ASTM Standards F770 Operation Procedures for Amusement Rides and Devices* and *F853 Maintenance Procedures for Amusement Rides and Devices*.


Inspection

Horse Hanger Hook

Perform the following inspection on ALL horse hanger hooks and bearings once a month or at every set-up, whichever occurs first.

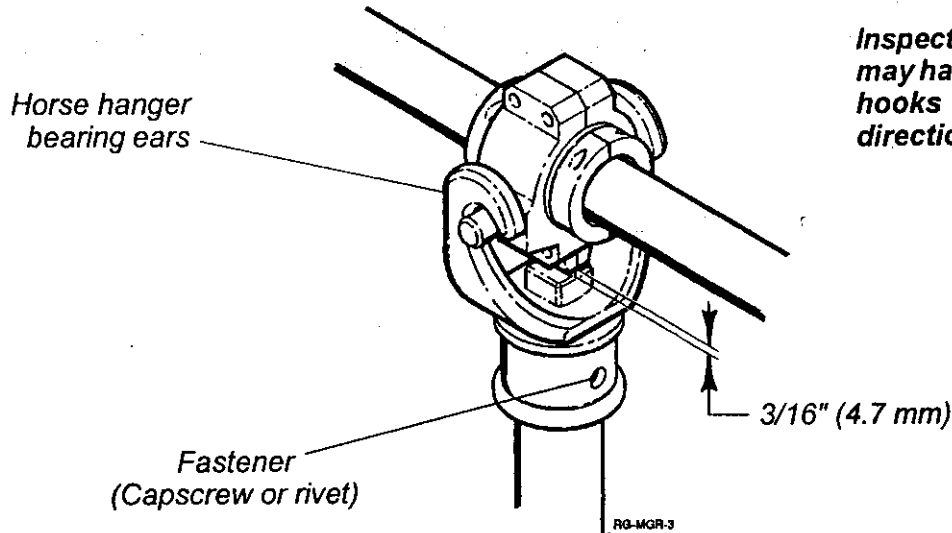
1. Measure the distance between the hooks as shown. The dimension must be 3-3/8 inches (85 mm). Report any variations to the CHANCE CUSTOMERSERVICEDEPARTMENT.



 **WARNING: DO NOT HEAT THE HORSE HANGER HOOK TO STRAIGHTEN IT. THIS WILL WEAKEN THE CASTING.** Personal injury can result from a damaged horse hanger hook.

NOTE: The hooks can face either inward or outward from the center of the ride when attached to the crankshaft, but all hooks must face the same direction.

2. Check for wear on the top of the horse hanger bearing ears and the underside of the horse hanger hook. Wear at this point increases the clearance between the safety stops. Clearance must not exceed 3/16 inch.



Inspect for excessive wear. Hook may hang in either direction. All hooks must hang in the same direction.



WARNING: Excessive clearance between the safety stops can allow the hook to come off the bearing during operation, causing serious personal injury. Do not operate the ride if clearance is more than 3/16 inch (4.7 mm).

Use a piece of 3/16 inch (4.7 mm) bar to check the clearance between the safety stops on every horse pole.

IMPORTANT: The horse pole must be vertical when measuring clearance.

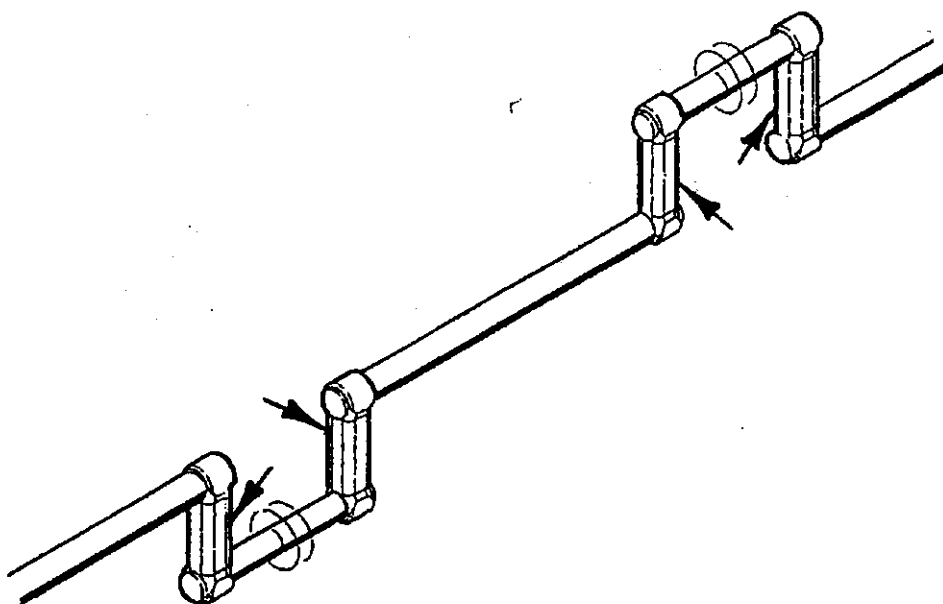
If the bar passes easily through the gap, the hanger bearings must be replaced. Inspect the horse hanger hook and replace it if excessive wear is evident.

3. Inspect for excessive wear between the horse hook, horse pole and the connecting fastener. Maximum allowable vertical play is 1/8 inch (3mm).

Crankshaft

Inspect all crankshafts once a month or at every set-up, whichever occurs first.

Visually inspect the crankshaft throws for indications of cracks. If indications are found, contact the Customer Service Department at CHANCE RIDES MANUFACTURING, INC.



RG-MGR-2



WARNING: DO NOT ATTEMPT TO WELD OR REPAIR THE CRANKSHAFT THROWS. THIS WILL WEAKEN THE CASTING. Personal injury can result from a damaged crankshaft.

Do not operate the ride until the crankshaft has been replaced, or an approved repair has been made.

Wheelchair Ramp Interlock Operational Check

The wheelchair ramp interlock switch prevents the ride from starting if the wheelchair ramp is not properly stowed and/or locked. Check the interlock system daily.



WARNING: Extreme care must be taken while checking this system. If the ride starts when the ramp is unlocked serious personnel injury and /or equipment damage can occur.

1. Stow and lock the wheelchair ramp.
2. Depress the "OPERATOR PRESENCE SWITCH" and start the ride. It should start and run normally.
3. Stop the ride and unlock the wheelchair ramp. Pull the ramp out approximately one inch (1"). **DONOT PULL THE RAMP COMPLETELY OUT.**
4. Depress the "OPERATOR PRESENCE SWITCH" and push the "JOG SWITCH." The ride **MUST NOT START OR RUN** when the wheel chair ramp is unlocked.



WARNING: If the ride starts with the wheelchair ramp unlocked, **STOP THE RIDE IMMEDIATELY** to avoid serious injury and equipment damage.

5. If the ride starts, adjustment or repair of the wheelchair ramp interlock system is necessary. **DONOT OPERATE THE RIDE UNTIL REPAIRS ARE MADE.**

If the ride does not start the wheelchair ramp interlock system is working properly.

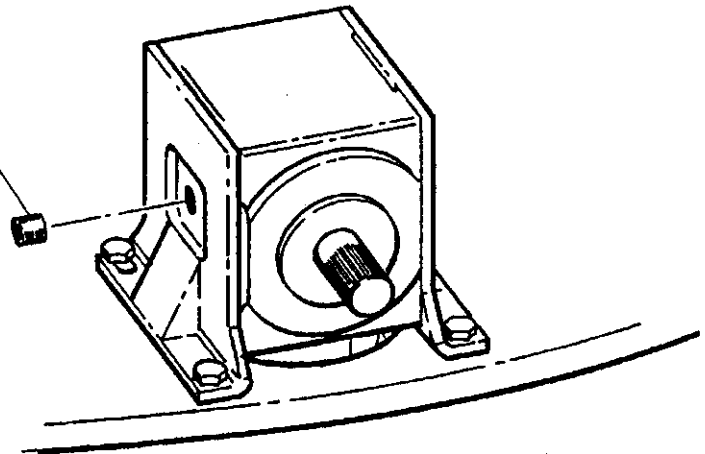
Lubrication

Crankshaft Gearbox

Oil Level

Visually check the crankshaft gearboxes for signs of oil leakage around the input and output shafts monthly or at every set-up, whichever occurs first. If leakage is indicated, repair or replace the gearbox as required and fill with new oil as described in the following procedure.

*Drain, fill
and check plug*



1. With the gearbox mounted in position, or on a level surface, remove the plug from the side of the gearbox.
2. Add oil as required, in accordance with the "Fluids and lubricants chart" in this manual until level with the opening. **DO NOT OVERFILL.**
3. Install and tighten the plug.

Oil Change

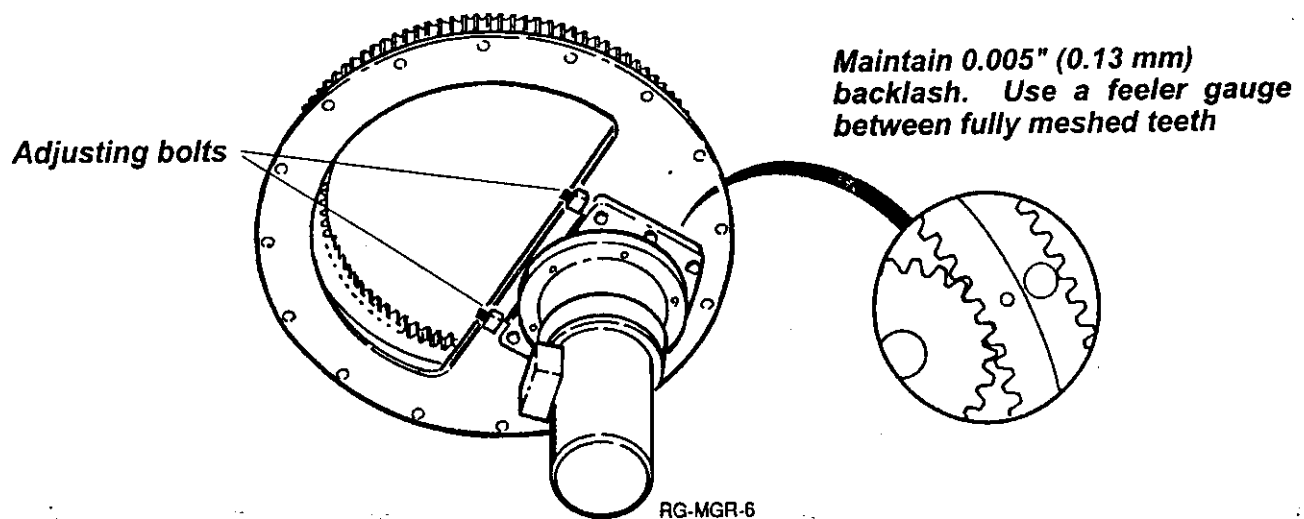
The oil in the crankshaft gearboxes must be changed every three years. Remove the plug from the side or top of each gearbox and remove the old oil with a suction gun. Refill the gearbox with new oil as specified in the "Fluids and lubricants chart" in this section. Install and tighten the plug.

Adjustments

Main Drive Pinion

Check the adjustment of the main drive pinion once a year or as required. The pinion must be adjusted to maintain 0.005 inch (0.13 mm) backlash. Use a feeler gauge to measure the clearance between fully meshed gear teeth. If adjustment is required, use the following procedure.

1. Loosen the six capscrews which mount the gearbox to the center hub.
2. Loosen the jam nuts on the two adjusting bolts.

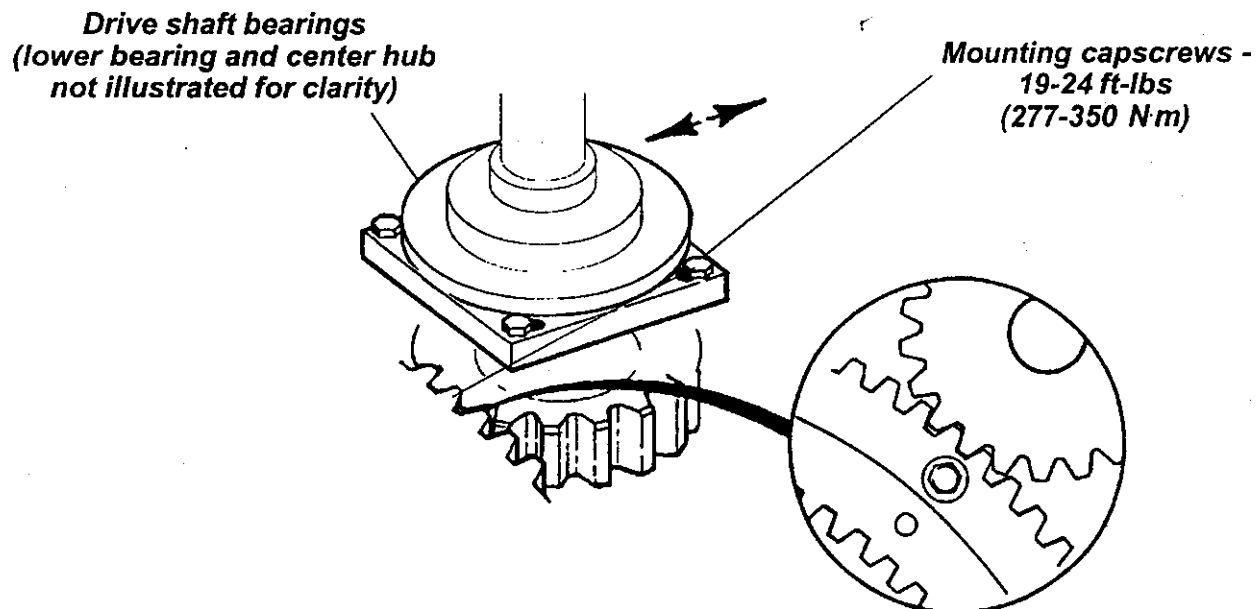


3. Turn the adjusting bolts to move the gearbox in or out as required to obtain 0.005 inch (0.13 mm) backlash. Turn both adjusting bolts an equal number of turns.
4. Tighten the jam nuts.
5. Tighten the capscrews to 95 to 115 ft-lbs (1385 to 1680 Nm).
6. Re-check backlash.

Drive Shaft Pinion Adjustment

Check the adjustment of the drive shaft pinions after the first 3-4 months of operation, than annually thereafter. Also, unusual noise or irregular movement of the horses on one row can indicate a drive shaft pinion which requires adjustment.

The pinions must be adjusted to maintain ZERO BACKLASH. Observe the pinion on one drive shaft. Have a helper alternately load one horse, then another to reverse the load on the crankshaft. Look for movement between the pinion gear and the stationary gear. If adjustment is required, use the following procedure.



Maintain ZERO backlash. Gears must mesh with no clearance, but DO NOT PRE-LOAD GEARS.

1. Loosen the four capscrews which mount the drive shaft bearings to the center hub. Loosen the capscrews just enough to allow the bearing to move.
2. Move the drive shaft toward the stationary gear to remove all clearance. DONOT PRE-LOAD THE GEARS.
3. Tighten the capscrews to 19 to 24 ft-lbs (277-350 N m).
4. Re-check backlash.

Horse Hanger Bearing Stop Collars

A stop collar is installed on each side of the horse hanger bearings. The collars must be installed with a total of 1/8 inch (3.2 mm) clearance between the bearing and the collars.

If inspection, or an unusual noise indicates that the stop collar clearance requires adjustment, loosen the clamping screws on the collar and re-position it as required. Make sure the bearing is positioned so that the horse pole is centered in the opening in the ceiling, then tighten the screws.

NOTE: *Be sure there is no paint on the crankshaft surface which contacts the bearing. Prolonged wear against the painted surface can reduce bearing life. Completely remove the paint from the bearing area.*

Electrical System

Air intake on Main Electrical Box

The air intake on the main electrical box can become restricted by a build-up of dust and other debris. This can reduce the supply of cooling air, resulting in short service life of electrical components. **KEEP THIS AIR INTAKE CLEAN.** Check the intake at least monthly, or more often if conditions require.

Troubleshooting - Diagnostic Code Identification

The ALARM INDICATOR LIGHT / RESET SWITCH provides diagnostic information as a series of flashes. When a fault condition is created, the light will flash to indicate the type of fault which has occurred so that corrective action can be taken.

Count the number of flashes and refer to the following chart to identify fault.

NOTE: *The flashing fault code will be followed by a two second pause, then the code will flash again. This will repeat until the fault has been reset.*

Fault Codes	
Number of Flashes	Fault Indicated
One flash	The OPERATOR PRESENCE SWITCH is not engaged -- or -- The OPERATOR PRESENCE SWITCH was released during the ride cycle
Two flashes	The wheelchair ramp is not stowed and locked
Three flashes	The surge suppression unit has malfunctioned
Four flashes	The emergency stop relay has been actuated
Five flashes	The START SWITCH was pressed without The OPERATOR PRESENCE SWITCH being released at the end of the previous ride cycle
Six flashes	The dynamic brake resistor is overheated
Seven flashes	The variable speed drive has faulted. Refer to the Allen-Bradley PowerFlex 70 Adjustable Frequency AC Drive User's Manual
Eight flashes	One of the three stop system proximity switches failed to come on (rides equipped with wheelchair ramp)
Nine flashes	One of the three stop system proximity switches failed to go off (rides equipped with wheelchair ramp)

Inspection Checklists

The following pages provide inspection checklists for the 36-Foot Double-Decker Carousel. The pages can be copied and filled out as a permanent record for each inspection.

IMPORTANT: *These items are a minimum checklist. Other items which may be considered as standard check points in the industry must also be inspected. Refer to the appropriate portions of this service manual for specific procedures. Check applicable service bulletins for additions or changes to this checklist.*

36-FOOT DOUBLE-DECK CARROUSEL Model 420

Inspection Checklist

Page 1 of 3

This form must be completed prior to daily opening

Ride Serial Number: _____ Date: _____ Location: _____

Performed by: _____

IMPORTANT: The following items are a minimum checklist. Other items which may be considered as standard check points in the industry must also be inspected. Refer to the appropriate service manual for specific procedures. Check applicable service bulletins for additions or changes to this checklist.

Daily

General

	Satisfactory	Needs Attention	Corrective Action Completed
Check the adjustment of the sway rods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect all panels, fences, gates, ramps, steps and walkways for proper installation, damage or obstructions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check that all safety signs and decals are properly installed and legible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Horses and Chariots

Check the overall condition of each horse and chariot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the condition of the seat belts on all horses and latches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect the step shields on all horses. Check for overall condition and proper attachment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Wheelchair Ramp and Tie-Downs(if equipped)

Test the operation of the wheelchair ramp safety interlock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect the overall operation of the track, rollers and stowage lock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the condition of the anti-slip surface on the wheelchair ramp	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the operation of the wheelchair restraints and belts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Ride Operation

Run the ride through at least three (3) complete ride cycles to observe the overall performance of the ride in relation to past performance of the ride	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all controls and indicators for proper operation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

36-FOOT DOUBLE-DECK CARROUSEL

Model 420

Inspection Checklist

Page 2 of 3

This form must be completed prior to daily opening

Ride Serial Number: _____ Date: _____ Location: _____

Performed by: _____

Monthly

General

All "Daily" checklist items completed

Satisfactory

☐

Needs
Attention

☐

Corrective
Action
Completed

☐

Horses

Inspect horse hanger hooks

☐☐☐

Check safety stop clearance at all horse hanger hooks

☐☐☐

Check horse hanger hooks attachment for excess play at the attaching capscrew. On two-piece horse poles, inspect the fasteners which connect the lower and upper sections of the horse pole.

☐☐☐

Sweeps, Sweep Hanger Rods, Spreader Bars and Crankshafts

Inspect all sweep attach points for visible cracks or signs of wear

☐☐☐

Inspect all spreader bars and attach points for visible cracks or signs of wear

☐☐☐

Inspect the installation of all sweep hanger rods and attach points

☐☐☐

Visually inspect all crankshafts for indications of cracks or signs of wear

☐☐☐

Drive System

Check for lubrication of the main bearing

☐☐☐

Check for lubrication of the main drive gearbox

☐☐☐

Check for lubrication of the ring gear (inside teeth only)

☐☐☐

Check for lubrication of crankshaft u-joints (2 places per crankshaft)

☐☐☐

Check for lubrication of drive shaft u-joints (2 places per drive shaft)

☐☐☐

Check for lubrication of drive shaft bearingss (2 places per drive shaft)

☐☐☐

Check for signs of leakage at the crankshaft gearboxes

☐☐☐

Inspect the crankshaft bearings for damage, wear and proper lubrication

☐☐☐

Inspect the horse hanger bearings for damage, wear and proper lubrication

☐☐☐

Inspect the horse pedestal bearings (lower level) and the closeout covers (upper level) for damage, wear and proper lubrication

☐☐☐

36-FOOT DOUBLE-DECK CARROUSEL

Inspection Checklist

Model 420

(Revised November 4, 2003)

Page 3 of 3

This form must be completed prior to daily opening

Ride Serial Number: _____ Date: _____ Location: _____

Performed by: _____

Satisfactory

Needs
Attention

Corrective
Action
Completed

Annually

General

All "Monthly" checklist items completed ☐ ☐ ☐

Drive System

Check the backlash of the main drive pinion ☐ ☐ ☐

Check the backlash of the crankshaft drive pinions ☐ ☐ ☐

Drain any condensation from the main drive gearbox ☐ ☐ ☐

Every Three Years

General

All "Annual" checklist items completed ☐ ☐ ☐

Drive System

Drain the crankshaft gearboxes and refill with new oil ☐ ☐ ☐

Dismantle, clean, inspect, flush and repack the main drive gearbox ☐ ☐ ☐

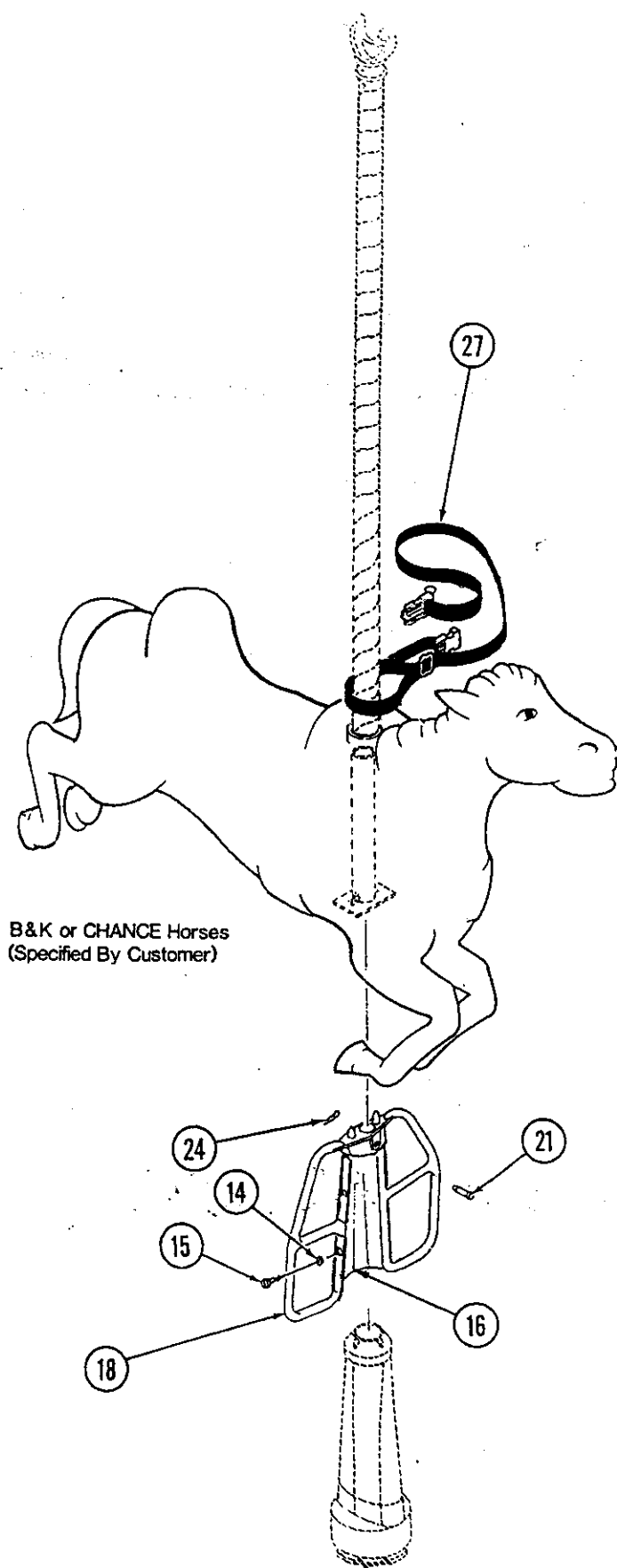
36-Foot Double-Decker Carrousel

Parts Catalog

PHONE: 316-942-7411 • WWW.RIDES.COM
FAXES: ADMINISTRATION 316-942-0320 • PURCHASING 316-945-3498 • CUSTOMER SERVICE 316-942-2012
P.O. BOX 12328 WICHITA, KS 67277-2328 • SHIPPING 4200 W WALKER WICHITA, KS 67209

HORSE AND CHARIOT



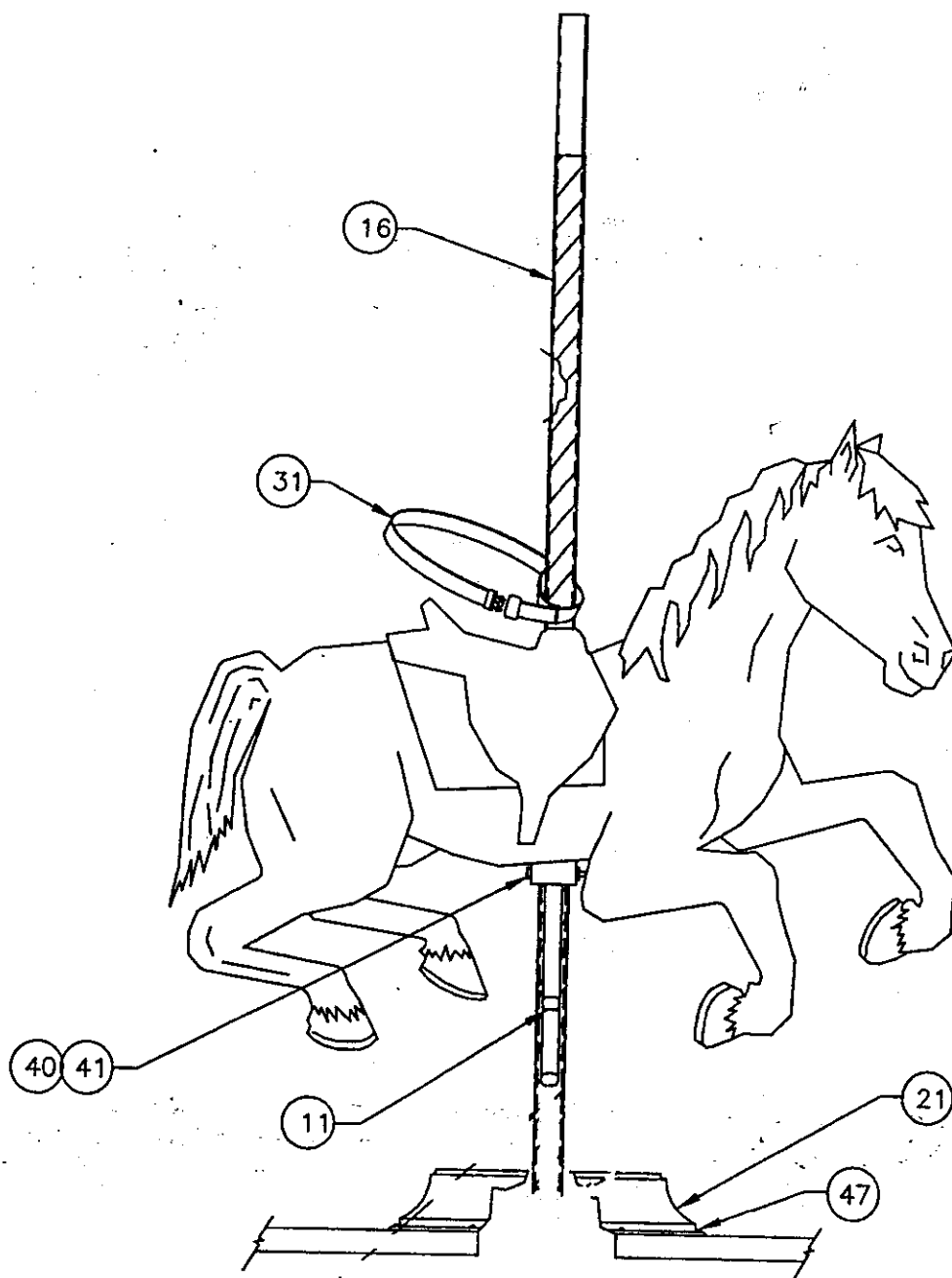


B&K or CHANCE Horses
(Specified By Customer)

HORSE AND STEP INSTALLATION

Index number	Part number	Drawing number	Description	Quantity per assembly
14	68529800		WASHER SAE 3/16	6 per horse
15	66408000		SCREW #10X1/2 S/T PAN H D PH +	6 per horse
16	36675000	403-101-001	SHIELD-STIRRUP 403-101-001	1 per horse
18	37382200	OMG-527-001	STEP-HORSE OMG-527-001*	1 per horse
21	35229000		PIN-TPR 1/2X2-7/8GL CSN10A03-05*	1 per horse
24	65190000		HAIRPIN 1/8	1 per horse
27	20541400		BELT ASM SAFETY	1 per horse

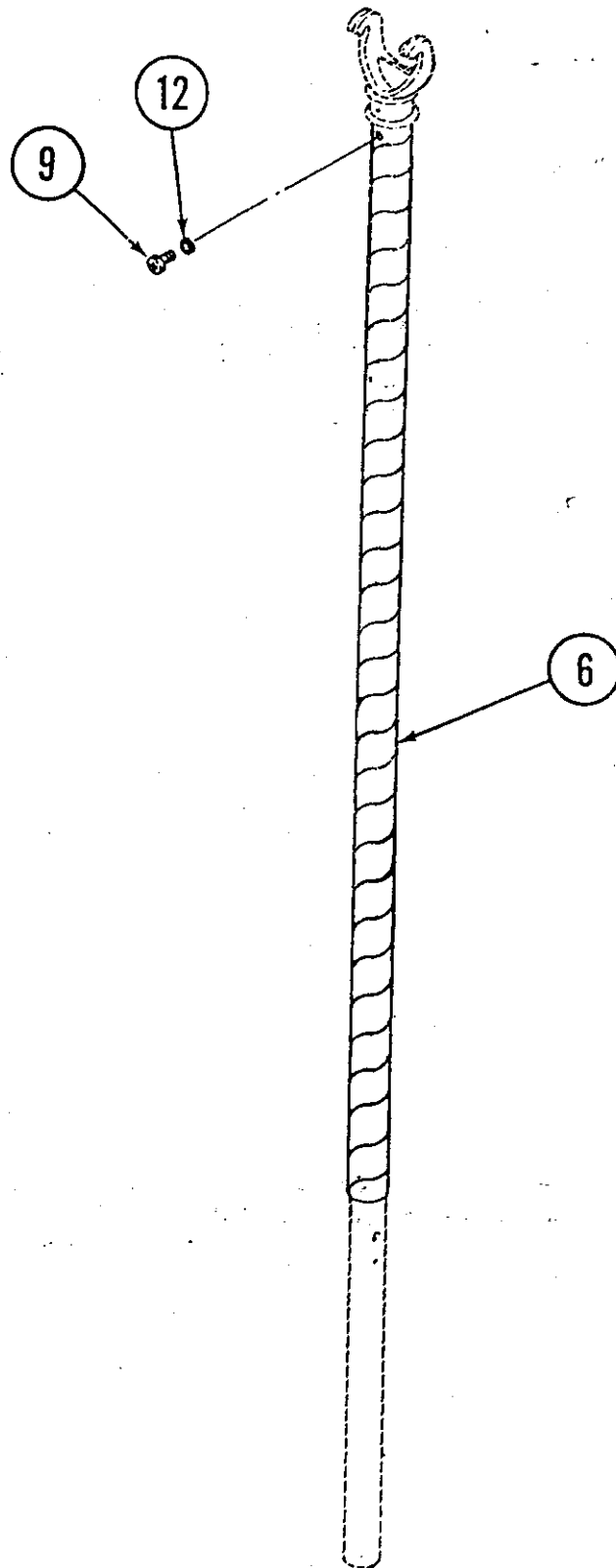
HORSE AND STEP INSTALLATION



HORSE AND STEP INSTALLATION

Index number	Part number	Drawing number	Description	Quantity per assembly
11	37382200	OMG-527-001	STEP-HORSE OMG-527-001*	1
16			SLEEVE-HORSE	1
21	409-134-001	409-134-001	HORSE DRIVE COVER ASSEMBLY	1
31	20541400		BELT ASM SAFETY	1
40	35229000		PIN-TPR 1/2X2-7/8GL CSN10A03-05*	1
41	65190000		HAIRPIN 1/8	1
47	66408400		SCREW #10X1 S/T PAN H D PH **	6
	66401200		SCREW #10X1/2 S/T HH PH *	8

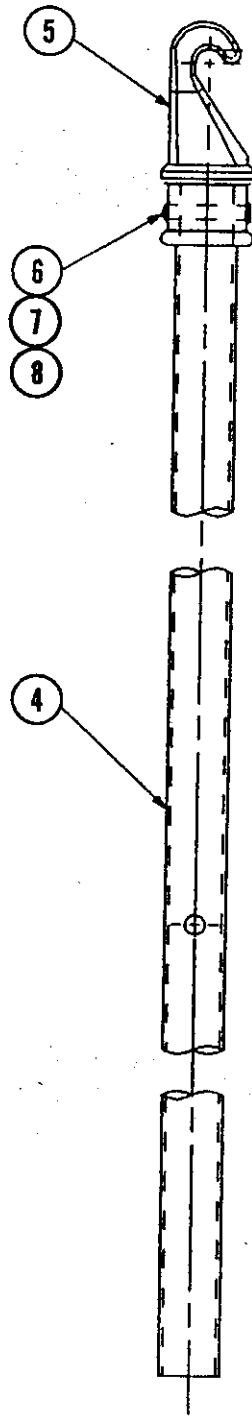
HORSE AND STEP INSTALLATION



HORSE PIPE SLEEVE INSTALLATION - Spiral brass

Index number	Part number	Drawing number	Description	Quantity per assembly
6			SLEEVE-HORSE	1 per horse
9	61160600		SCREW MS 1/4-20X1/2 BRS RHP	1 per horse
12	68542000		WASHER LOCK 1/4 INTERNAL	1 per horse

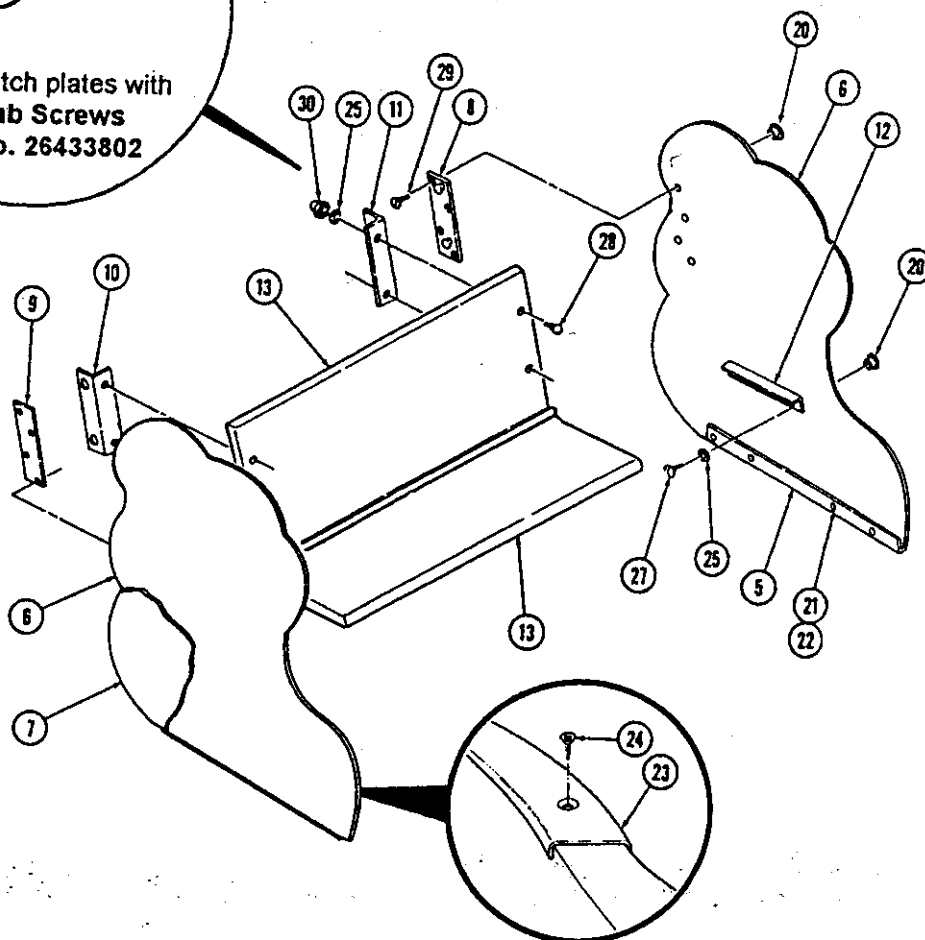
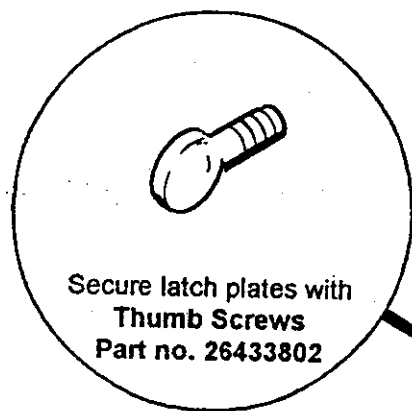
HORSE PIPE SLEEVE INSTALLATION - Spiral brass



HORSE PIPE ASSEMBLY

Index number	Part number	Drawing number	Description	Quantity per assembly
4	35265400	403-121-004	PIPE-HORSE 403-121-004	1
5	21445500		CSTG HOOK INVESTMENT 403-161-001	1
6	60768200		HHCS 3/8-16 X3 GR5	1
7	68531000		WASHER SAE 3/8	2
8	64781600		LOCKNUT N/I 3/8-16 ZP	1

HORSE PIPE ASSEMBLY

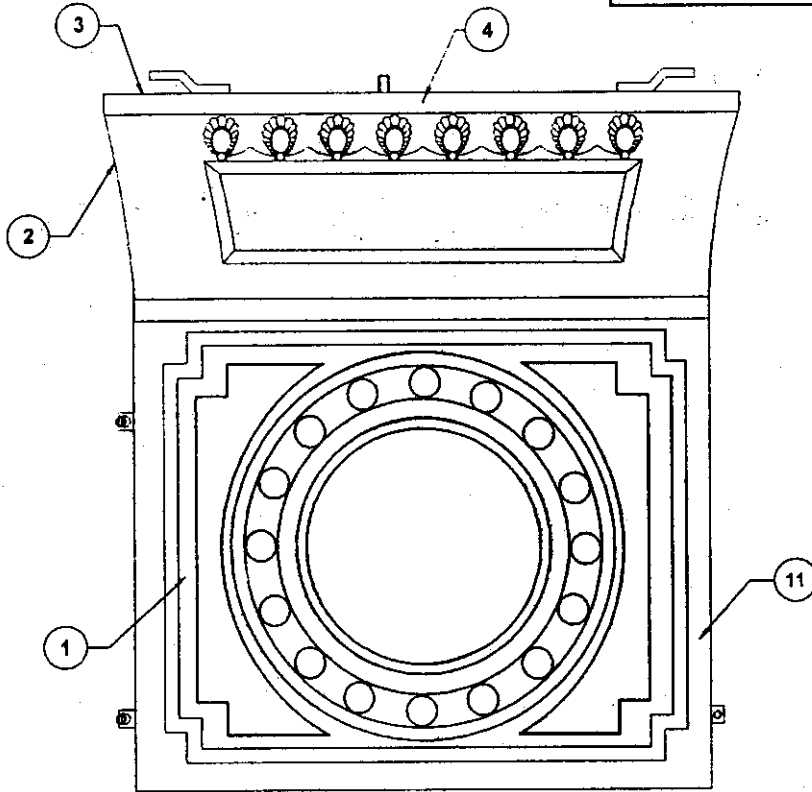


HANDICAPPED CHARIOT ASSEMBLY

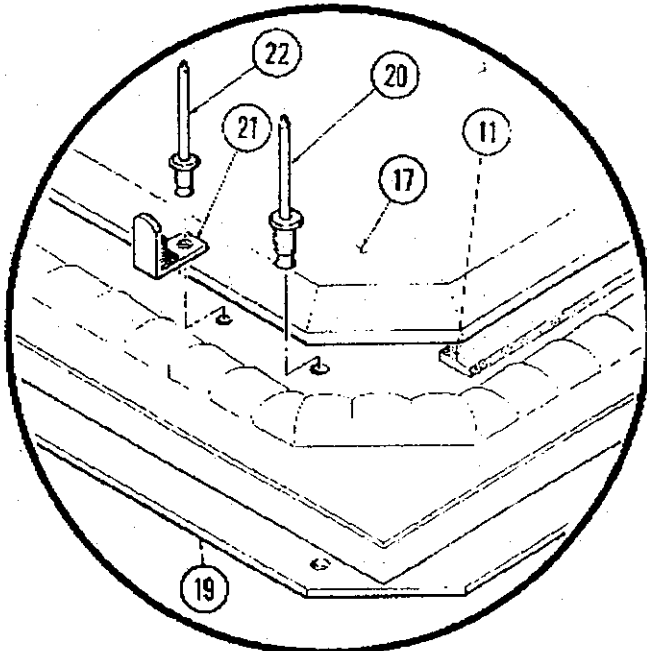
Index No.	Part Number	Drawing Number	Description	Qty Req'd
1	415-747-001	415-747-001	HEADSHIELD-LEXAN	1
2	415-740-001	415-740-001	FRAME WELDMENT-HEADSHIELD	1
3	415-748-001	415-748-001	BACKING-HEADSHIELD, TOP	1
4	415-748-001	415-748-001	BACKING-HEADSHIELD, BOTTOM	1
5	66149000		RIVET 3/16x3/8 ALUM/DOME(STLST	4
6	61115800		SCREW #10-24X1/2 S/T PHRD	8
7	64792600		NUT, HEX 10-24	8
10			MIRROR-HEADSHIELD, LEXAN	1
11	44713200		TAPE .045X1 ACRD/B FOAM	A/R
12	23744000		ROSETTE ACRYLIC STAR LARGE	3
13	61114000		SCREWS MS 6-32 X3/4 RHP	3
14	68529100		WASHER SAE #6	3
15	64780300		LOCKNUT N/I #6-32 ZP	3
17	415-777-001	415-777-001	MIRROR BEVELED GLASS, HEADSHIELD	1
19	415-777-003	415-777-003	MIRROR PLATE, HEADSHIELD	1
20	66144000		RIVET, 3/16 AD66ABS	4
21	21677700		CLIP, BENDABLE	4
22	66141000		RIVET, 5/32 AD56ABS	4

HEADSHIELDS

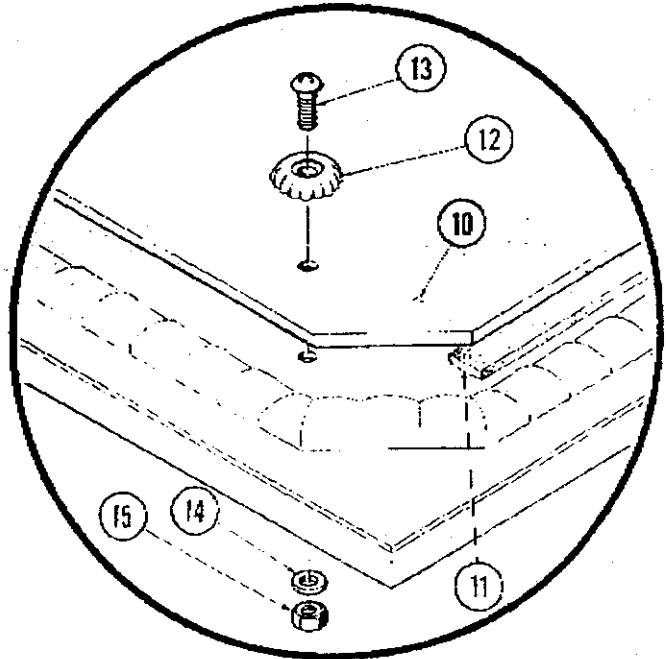
NOTE: When ordering formed Lexan® parts, specify cutouts for Turbo® lights, ASL® lights, or medium base incandescent bulbs.



BEVELED GLASS MIRROR INSTALLATION



LEXAN® MIRROR INSTALLATION

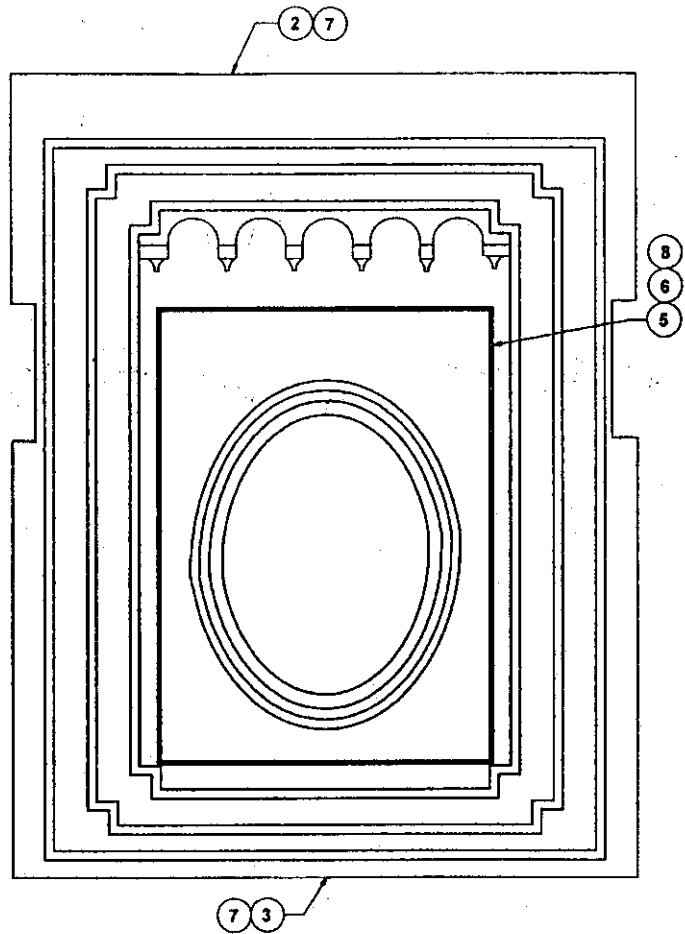


UPPER INNER PANELS

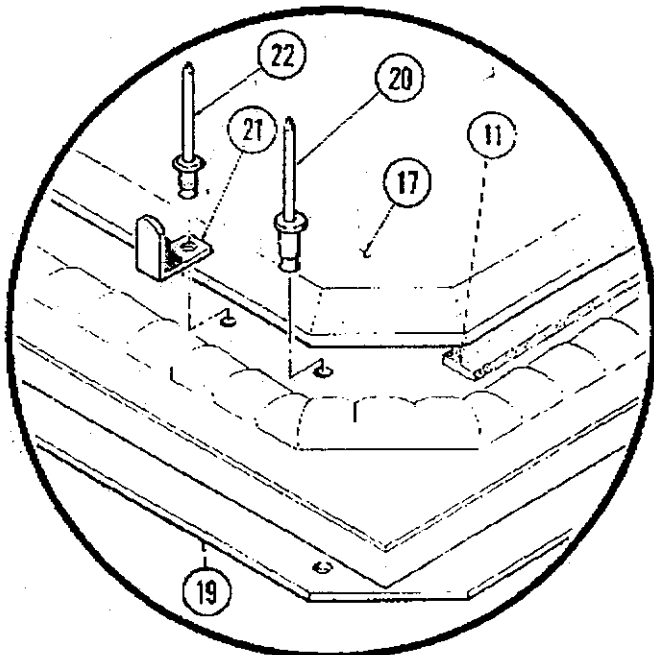
Index	Part	Drawing	Description	Qty
No.	Number	Number		Req'd
1	416-745-001	416-745-001	PANEL-UPPER INNER, LEXAN	1
2	416-750-001	416-750-001	PANEL-UPPER CURVED, LEXAN	1
3	416-724-001	416-724-001	FRAME WELDMENT-UPPER INNER PANEL	1
4	66149000		RIVET 3/16x3/8 ALUM/DOME (STL ST)	27
10	416-778-001	416-778-001	MIRROR, LEXAN-UPPER INNER PANEL	1
11	27771500		TAPE FOAM MT-6 WHITE*	A/R
12	23744000		ROSETTE ACRYLIC STAR LARGE	4
13	61114000		SCREW MS 6-32 X3/4 RHP	4
14	68529100		WASHER SAE #6	4
15	64780300		LOCKNUT N/I #6-32 ZP	4
17	416-775-001	416-775-001	MIRROR BEVELED GLASS 1/4"	1
19	416-775-002	416-775-002	PLATE-MIRROR, UPPER INNER PANEL	1
20	66144000		RIVET 3/16x3/8 ALUM/DOME	8
21	21677700		CLIP-BD METAL BENDABLE C380L	5
22	66141000		RIVET 5/32x3/8 ALUM/DOME	5

UPPER INNER PANELS

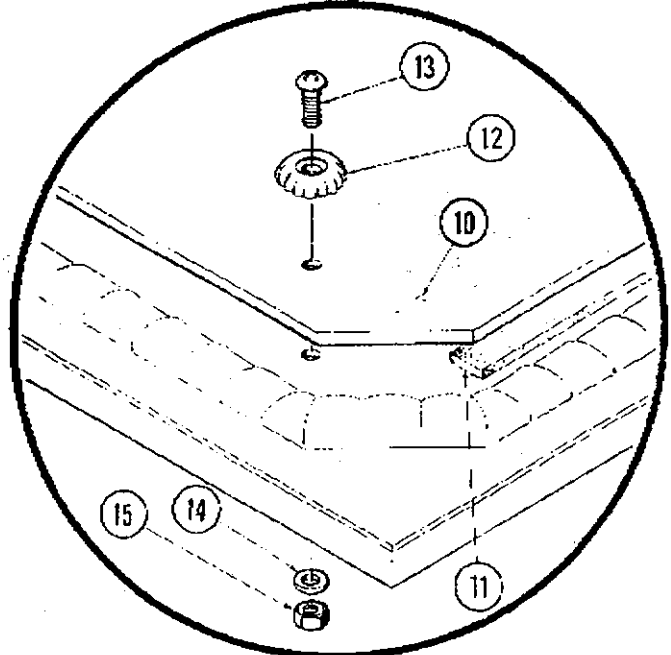
NOTE: When ordering formed Lexan® parts, specify cutouts for Turbo® lights, ASL® lights, or medium base incandescent bulbs.



BEVELED GLASS MIRROR INSTALLATION



LEXAN® MIRROR INSTALLATION

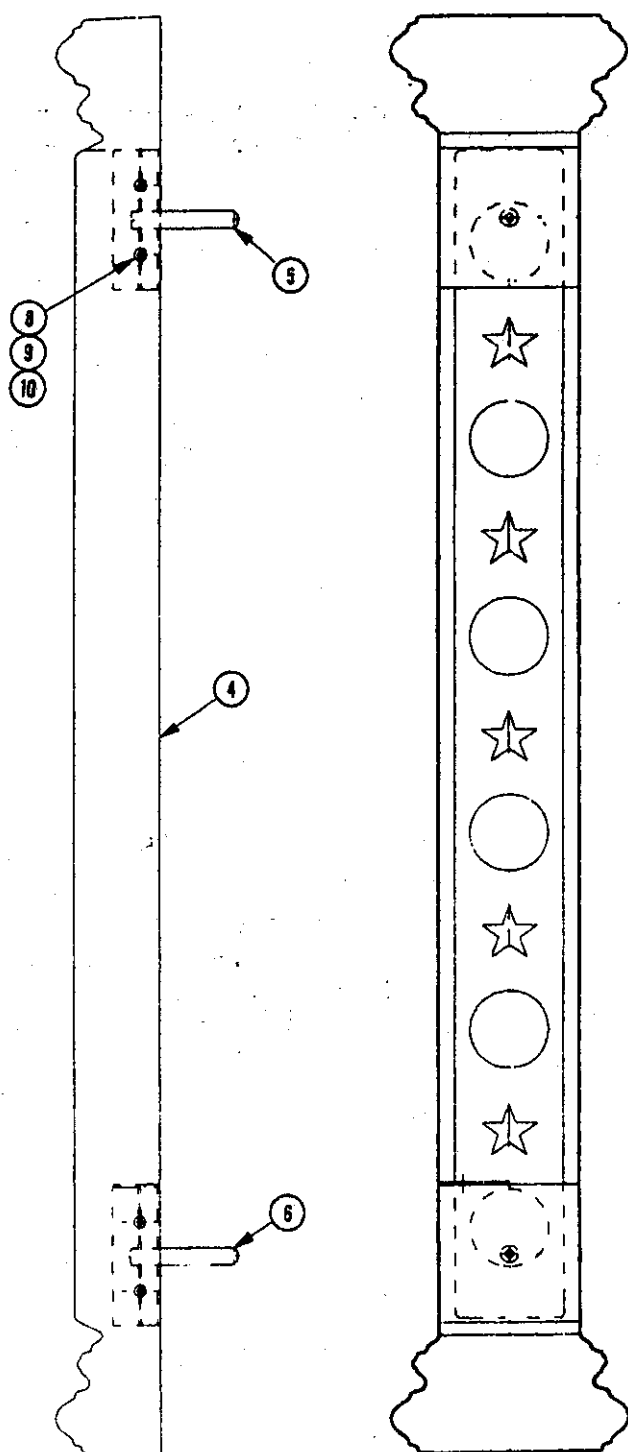


LOWER INNER PANELS

Index No.	Part Number	Drawing Number	Description	Qty Req'd
2	415-730-001	415-730-001	PANEL, LEXAN-INNER LOWER PANEL	1
3	415-731-001	415-731-001	FRAME WELDMENT-LOWER INNER PANEL W/O DOOR	1
4	415-731-002	415-731-002	FRAME WELDMENT-INNER LOWER PANEL W/DOOR	1
5	415-731-003	415-731-003	DOOR WELDMENT-LOWER INNER PANEL	1
6	23347701		HINGE 3" FULL SURFACE-ADJ SPRING	2
7	66149000		RIVET 3/16x3/8 ALUM/DOME (STL ST	A/R
8	66145100		RIVET 1/4x3/16 STEEL/DOME	8
10	415-741-002	415-741-002	MIRROR-LEXAN, INNER LOWER PANEL	1
11	27771500		TAPE FOAM MT-6 WHITE	1
12	23744000		ROSETTE ACRYLIC STAR LARGE	2
13	61114000		SCREW MS 6-32 X 3/4 RHP	2
14	68529100		WASHER SAE #6	2
15	64780300		LOCKNUT N/1 #6-32 ZP	2
17	415-776-001	415-776-001	MIRROR BEVELED GLASS 1/4"	1
19	415-776-002	415-776-002	PLATE-MIRROR	1
20	66144000		RIVET 3/16x3/8 ALUM/DOME	6
21	21677700		CLIP-BD METAL BENDABLE	6
22	66141000		RIVET 5/32x3/8 ALUM/DOME	6

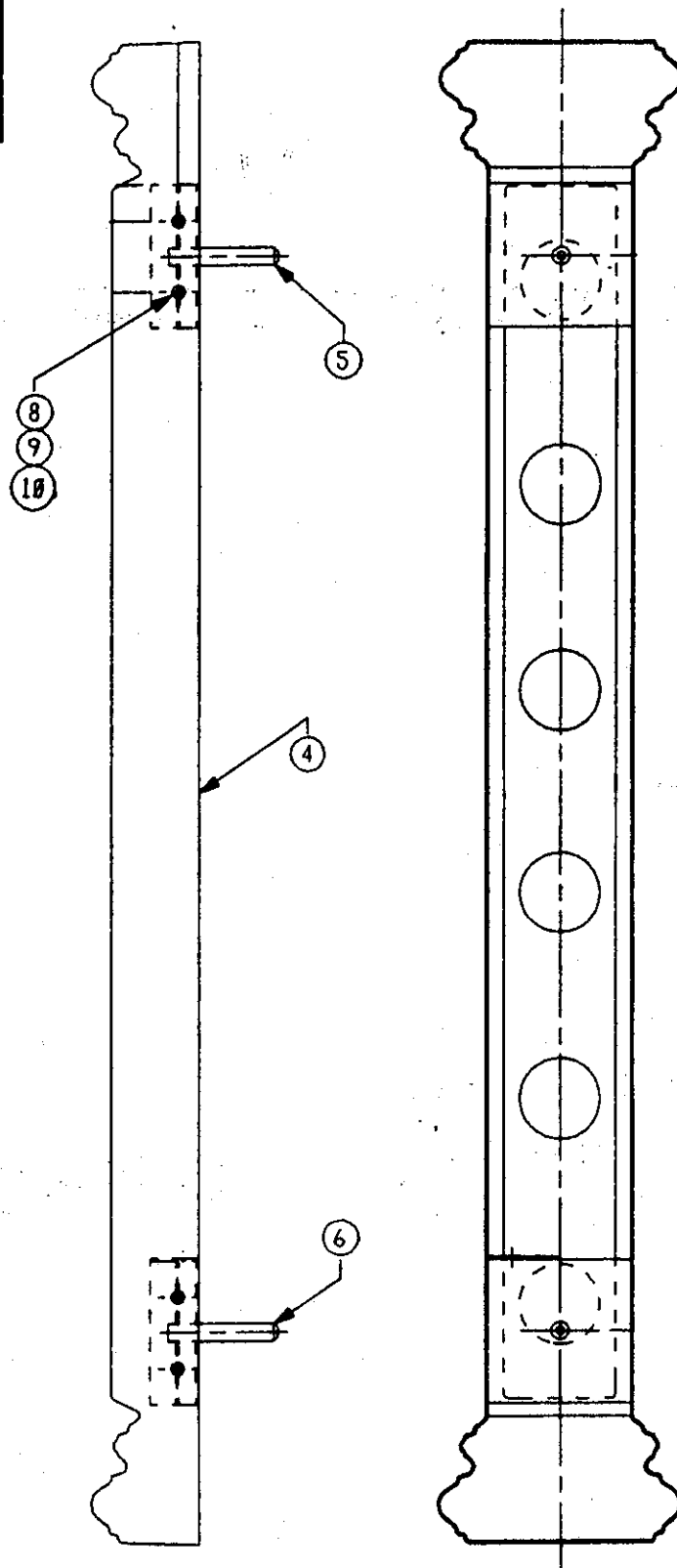
LOWER INNER PANELS

NOTE: When ordering formed Lexan® parts, specify cutouts for either Turbo® lights or medium base incandescent bulbs.



UPPER COLUMN ASSEMBLY

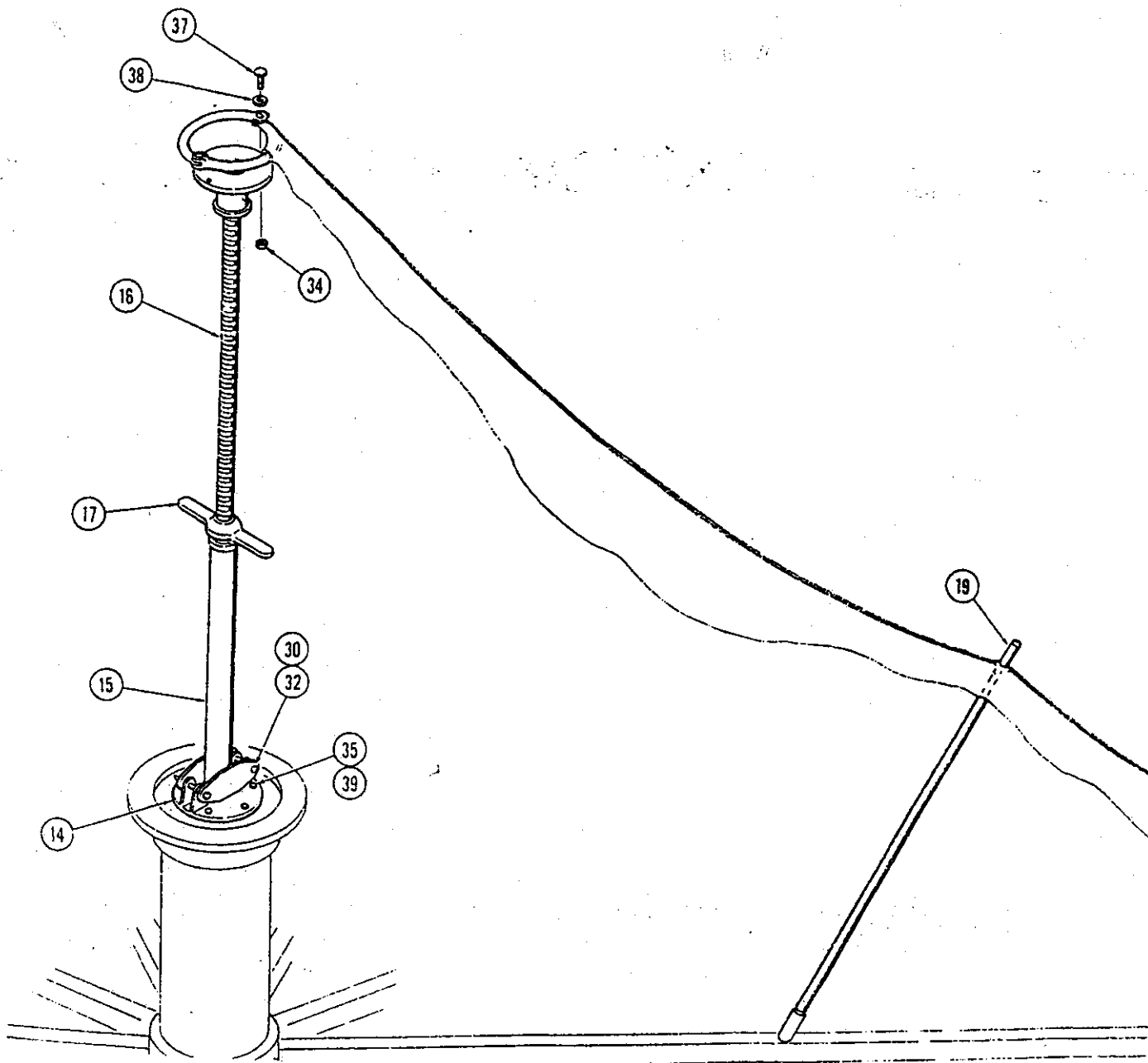
NOTE: When ordering formed Lexan® parts, specify cutouts for either Turbo® lights or medium base incandescent bulbs.



LOWER COLUMN ASSEMBLY

Index number	Part number	Drawing number	Description	Quantity per assembly
5	31807500	403-766-001	COLUMN-LOWER, LEXAN 403-766-001	1.0
6	30210400	403-765-001	ANCHOR WELDT-LWR COL 403-765-001	1.0
7	30851515	403-765-002	BRACKET-LOWER COLUMN 403-765-002	1.0
8	30851516	403-765-004	BRACKET-PLUG, LWR COL 403-765-004	2.0
10	66149000		RIVET 3/16 AD66BS	16.0

LOWER COLUMN ASSEMBLY

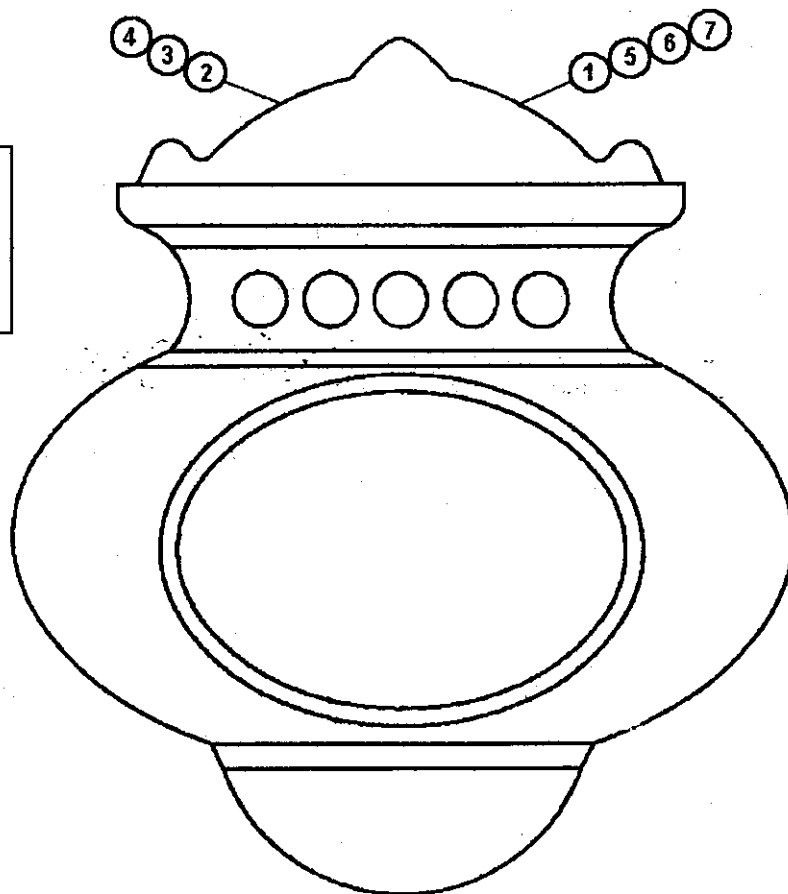


CENTER POLE INSTALLATION

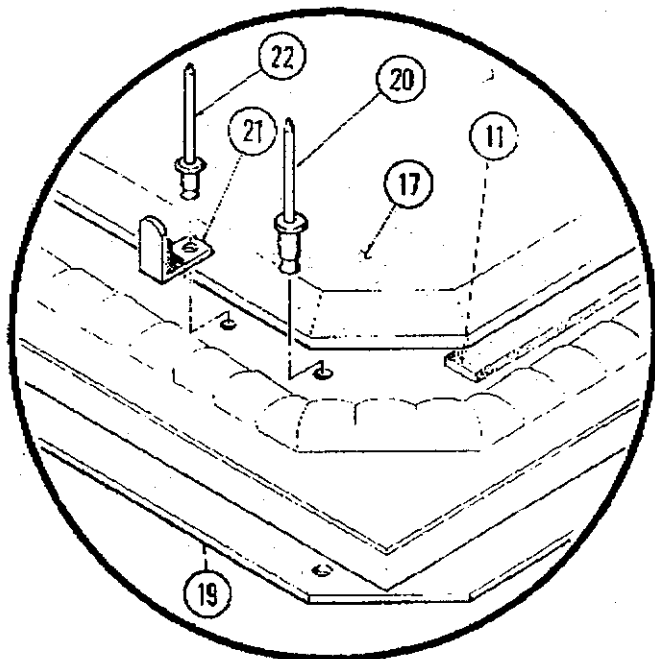
Index No.	Part Number	Drawing Number	Description	Qty Req'd
1	416-722-001	416-722-001	CORNICE-LEXAN	1
4	416-721-001	416-721-001	FRAME WELDMENT-CORNICE	1
5	416-723-001	416-723-001	BACKING-CORNICE	1
6	416-723-002	416-723-001	BACKING-CORNICE	1
7	66149000		RIVET 3/16x3/8 ALUM/DOME(STLST	30
8	66407200		SCREW #8X1/2 S/T PAN HD PH	28
10	416-XXX-001	416-XXX-001	LEXAN MIRROR, VICTORIAN	1
10	27771500		TAPE FOAM MT-6 WHITE	A/R
11	23744000		ROSETTE, ACRYLIC STAR	2
12	61114000		SCREW, RD HD PH, #6-32 X 3/4	2
13	68529100		FLAT WASHER #6	2
14	64780300		LOCK NUT, #6-32, N/I	2
15	415-777-002	415-777-002	BEVELED GLASS MIRROR	1
16	415-777-005	415-777-005	BACKING PLATE - MIRROR	1
17	66144000		RIVET, 3/16 AD66ABS	8
18	21677700		CLIP, BENDABLE	8
19	66141000		RIVET, 5/32 AD56ABS	8

CORNICES

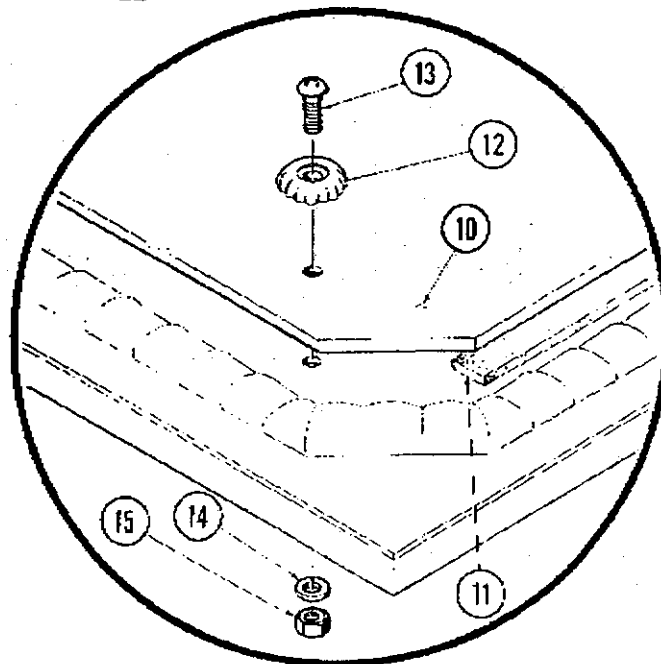
NOTE: When ordering formed Lexan® parts, specify cutouts for Turbo® lights, ASL® lights, or medium base incandescent bulbs.



BEVELED GLASS MIRROR INSTALLATION



LEXAN® MIRROR INSTALLATION



HEADSHIELDS

Index No.	Part Number	Drawing Number	Description	Qty Req'd
5			INNERCEILINGPANELASSY	12
6			OUTERCEILIINGPANELASSY	12
8	25181800		PINCLEVIS 1/4 X 1 1/2	24
9	65189800		HAIRPIN 1/16	24
10			OUTERCEILINGPANELASSY	12
11			INNERCEILINGPANELASSY	12

CEILING PANEL INSTALLATION

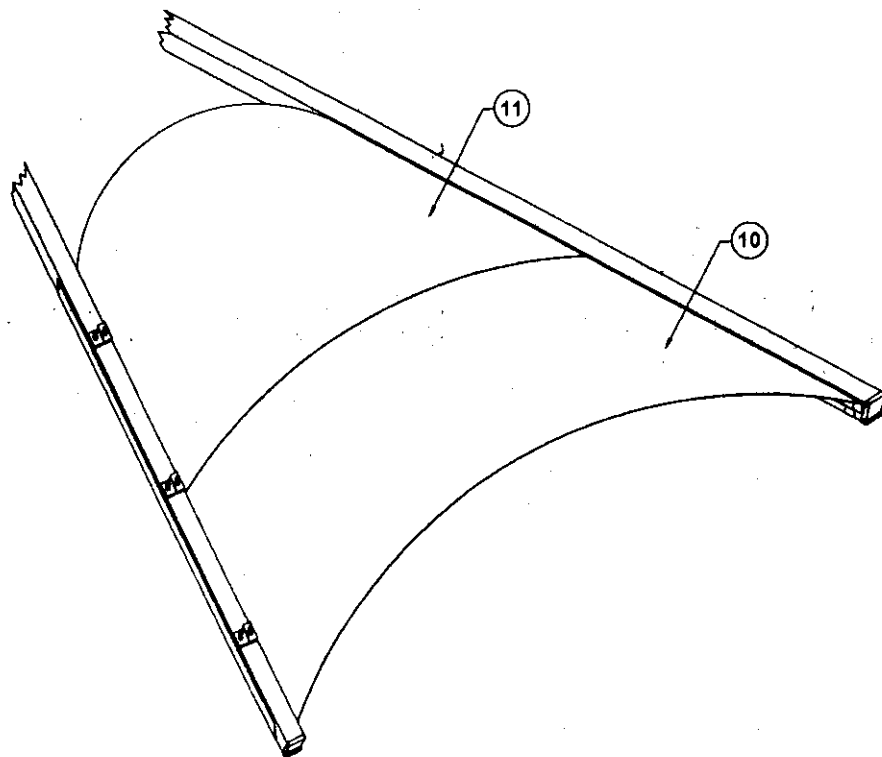
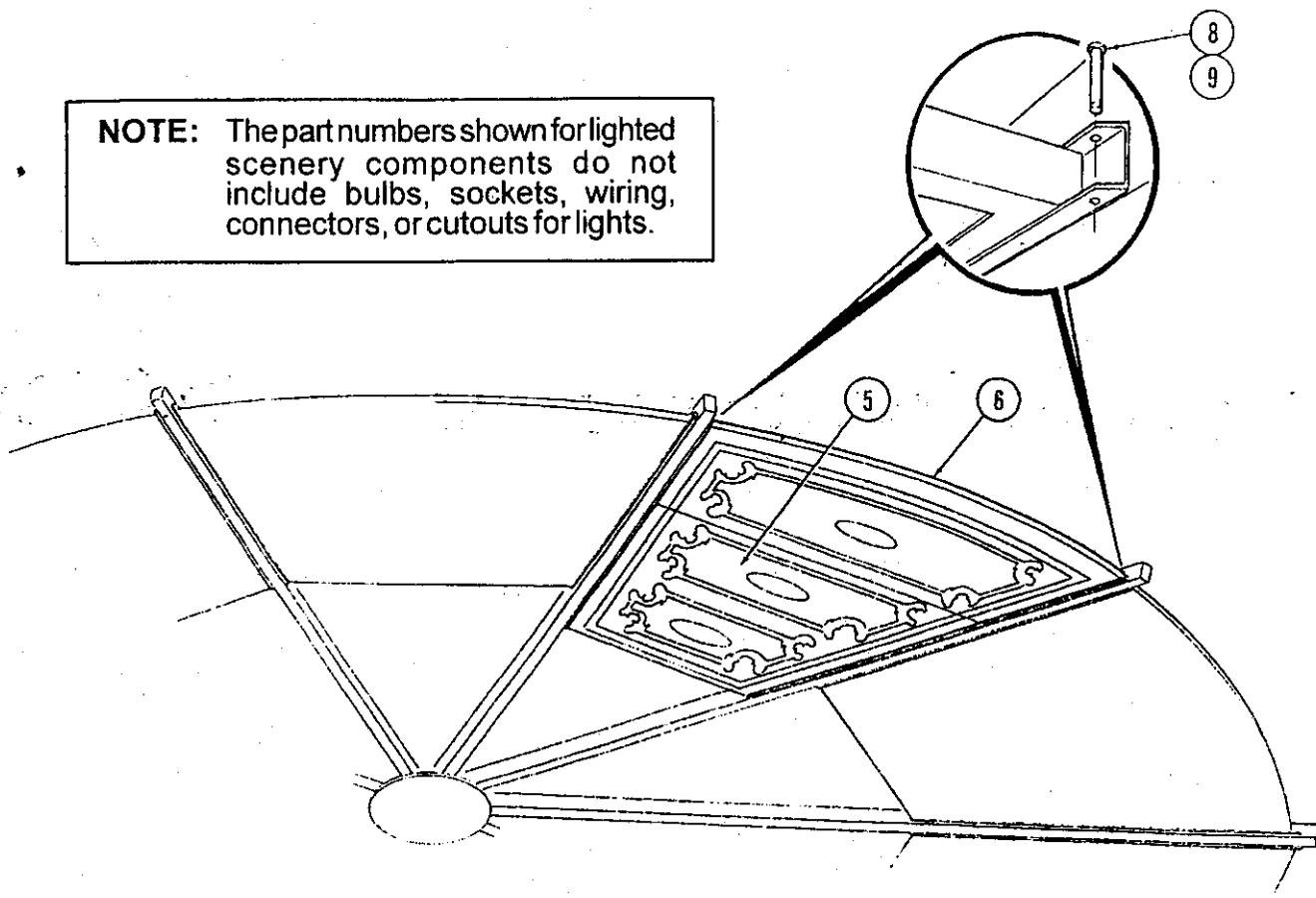
A line drawing of a roof cross-section. At the top is a decorative finial. Below it is a horizontal band with a row of circles. The roof slopes down on both sides, with a row of circles along the eave. A large circle is positioned in the center of the roof slope. At the bottom, there is a row of circles along the base of the roof structure. Numbered circles 1 through 8 are placed around the drawing with arrows pointing to specific components: 1 points to the eave on the right, 2 points to the central circle, 3 points to the horizontal band, 4 points to the eave on the left, 5 points to the top of the left slope, 6 points to the top of the right slope, 7 points to the top of the right slope, and 8 points to the top of the right slope.

CORNICES

Index number	Part number	Drawing number	Description	Quantity per assembly
5			PANEL ASSY-INR LWR	7
6			PANEL ASSY-INR LWR	1
7			COLUMN A-LOWER 403-767-1	8
8		403-765-003	CLIP-RETAINER 403-765-003	8
11	37623000	404-732-001	SUPPORT WELDT 404-732-001	3
12	37623100	404-732-002	SUPPORT WELDT 404-732-002	4
13	30841900	404-733-001	BRACE WELDT 404-733-001	3
14	60768200		HHCS 3/8-16 X3 GR5	6
15	64750800		NUT HEX 3/8-16 FULL	6
16	68530800		WASHER WROT 3/8 STANDARD	12
17	35257000	OMG1065-038	PIN-SCENERY PANEL OMG1065-038	16
18	68537400		WASHER LOCK 3/8 SPRING MED	6
19	64750000		NUT HEX 1/4-20 FULL	8

LOWER INNER PANEL INSTALLATION

NOTE: The part numbers shown for lighted scenery components do not include bulbs, sockets, wiring, connectors, or cutouts for lights.

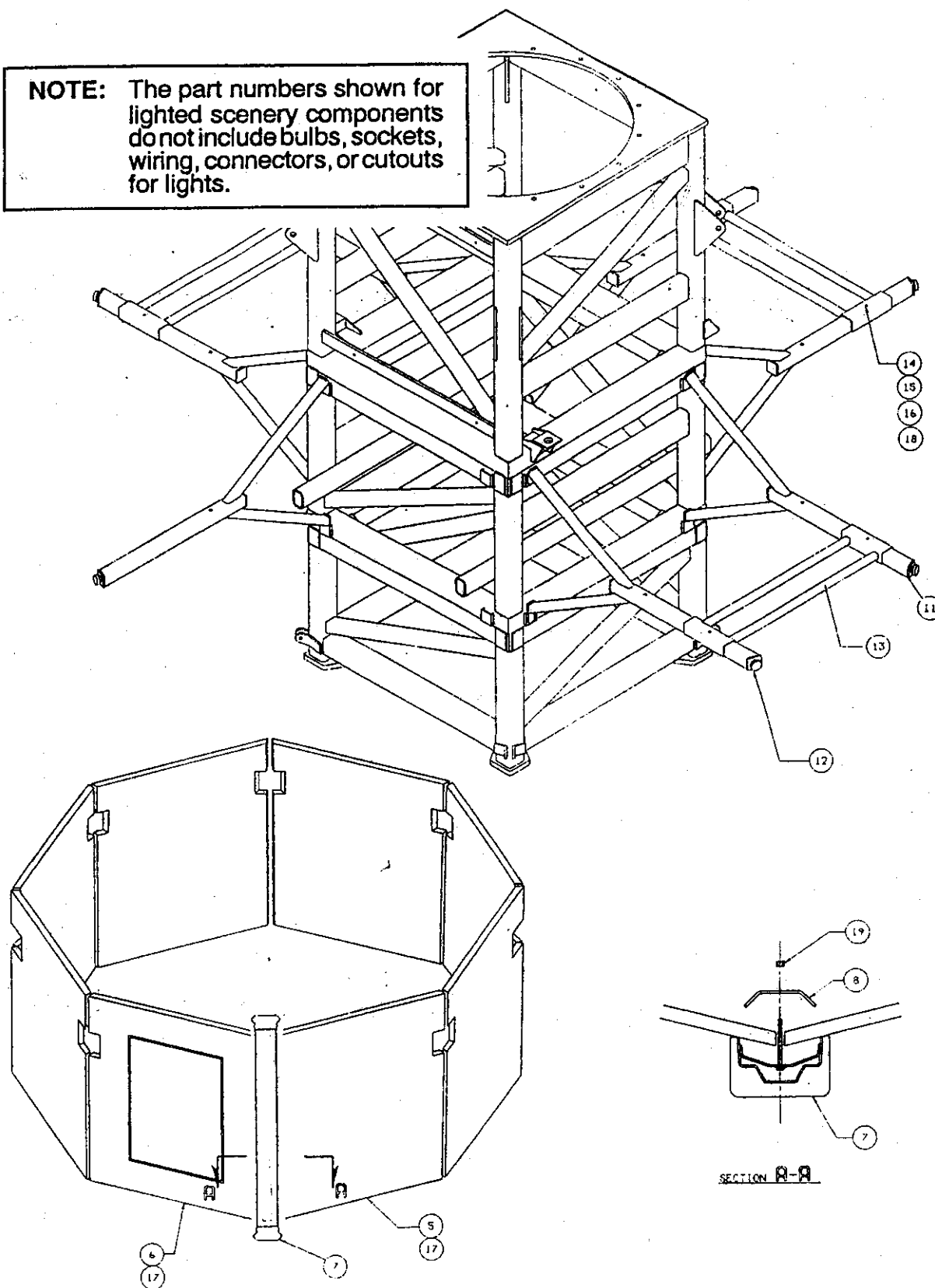


CEILING PANEL INSTALLATION

Index number	Part number	Drawing number	Description	Quantity per assembly
4			COLUMN ASSY 403-725-001	12.0
5			PANEL ASSY-UPPER INNER	12.0
7	25238300		PIN LYNCH 1/4	24.0
8	25181800		PIN 1/4X1-1/2 G/L1-5/16 HP1/16*	24.0
9	65189800		HAIRPIN 1/16	24.0

UPPER INNER PANEL INSTALLATION

NOTE: The part numbers shown for lighted scenery components do not include bulbs, sockets, wiring, connectors, or cutouts for lights.

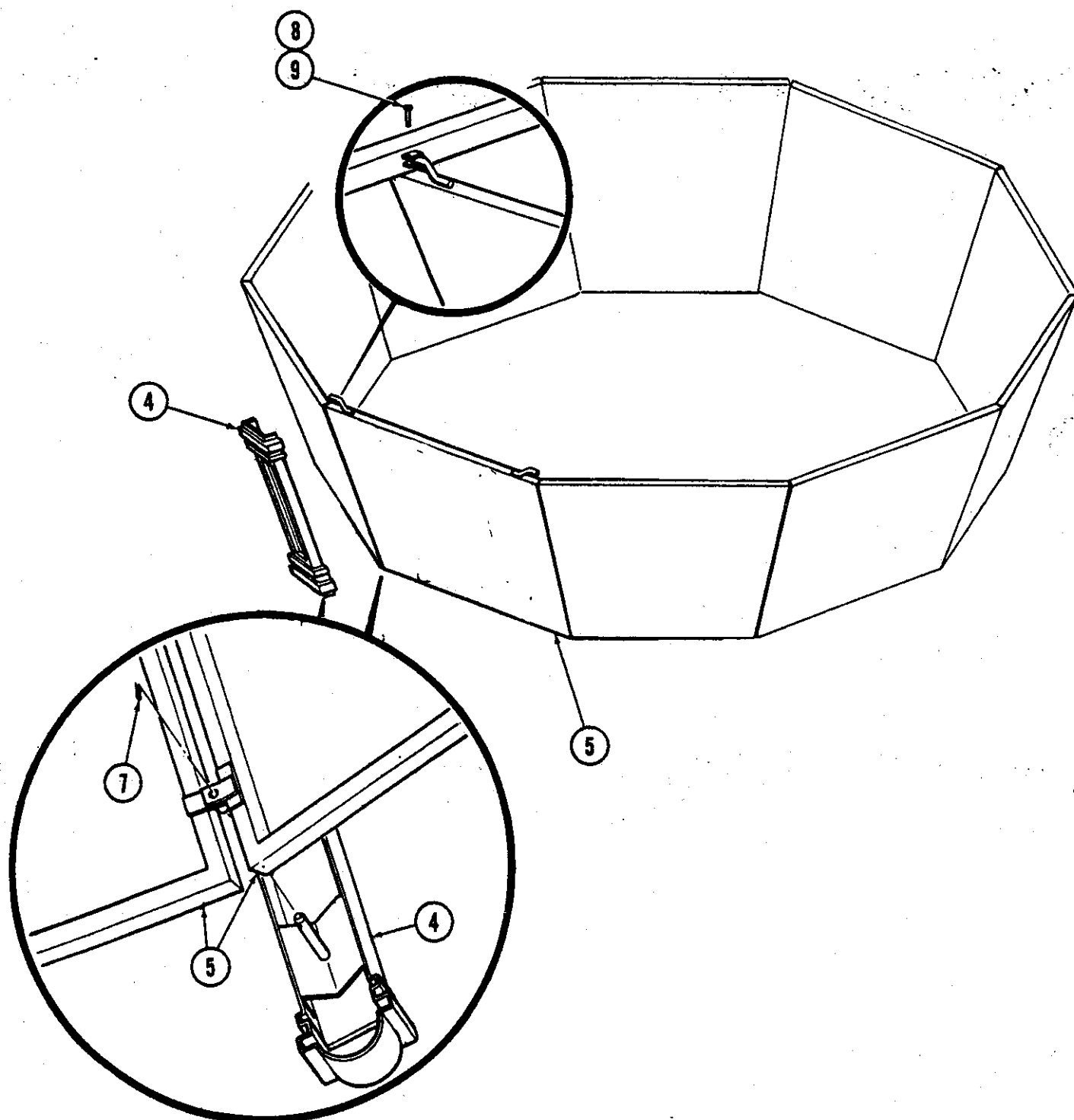


LOWER INNER PANEL INSTALLATION

Index	Part	Drawing		Qty
No.	Number	Number	Description	Req'd
5	34984030	404-470-003	INNER CEILING PANEL ASSY (Americana or Dentzel scenery)	12
6	34984031	404-470-004	OUTER CEILING PANEL ASSY (Americana or Dentzel scenery)	12
8	25181800		PIN CLEVIS 1/4 X 1 1/2	24
9	65189800		HAIRPIN 1/16	24
10	416-470-001	416-470-001	OUTER CEILING PANEL ASSY (Victorian scenery)	12
11	416-470-002	416-470-002	INNER CEILING PANEL ASSY (Victorian scenery)	12

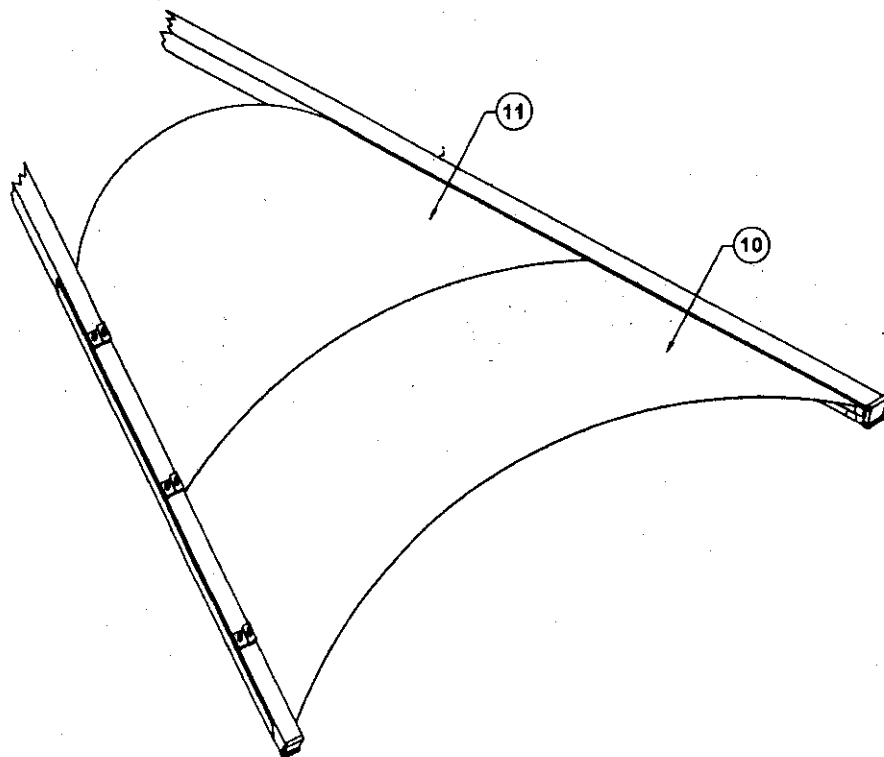
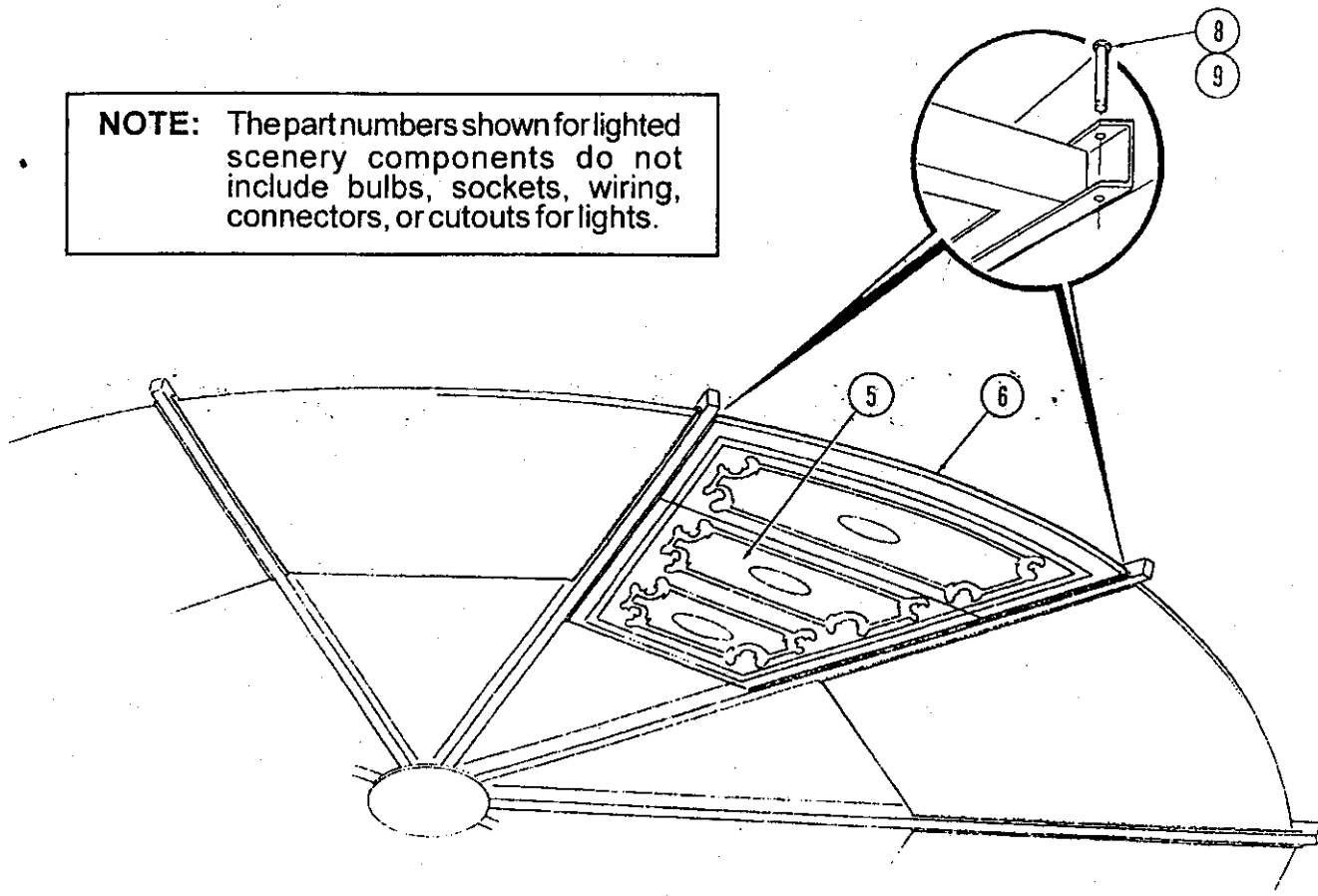
CEILING PANEL INSTALLATION

NOTE: The part numbers shown for lighted scenery components do not include bulbs, sockets, wiring, connectors, or cutouts for lights.



UPPER INNER PANEL INSTALLATION

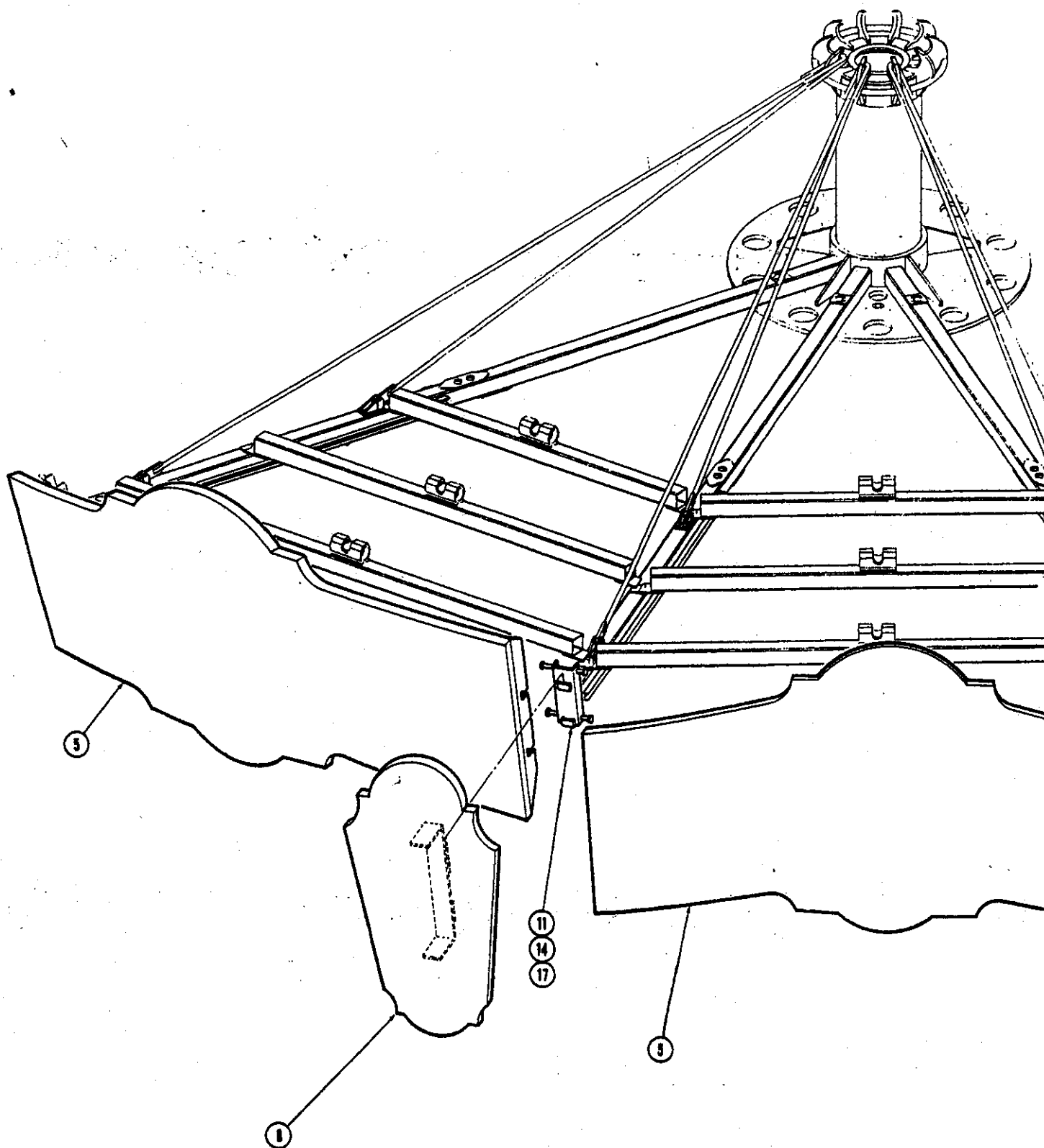
NOTE: The part numbers shown for lighted scenery components do not include bulbs, sockets, wiring, connectors, or cutouts for lights.



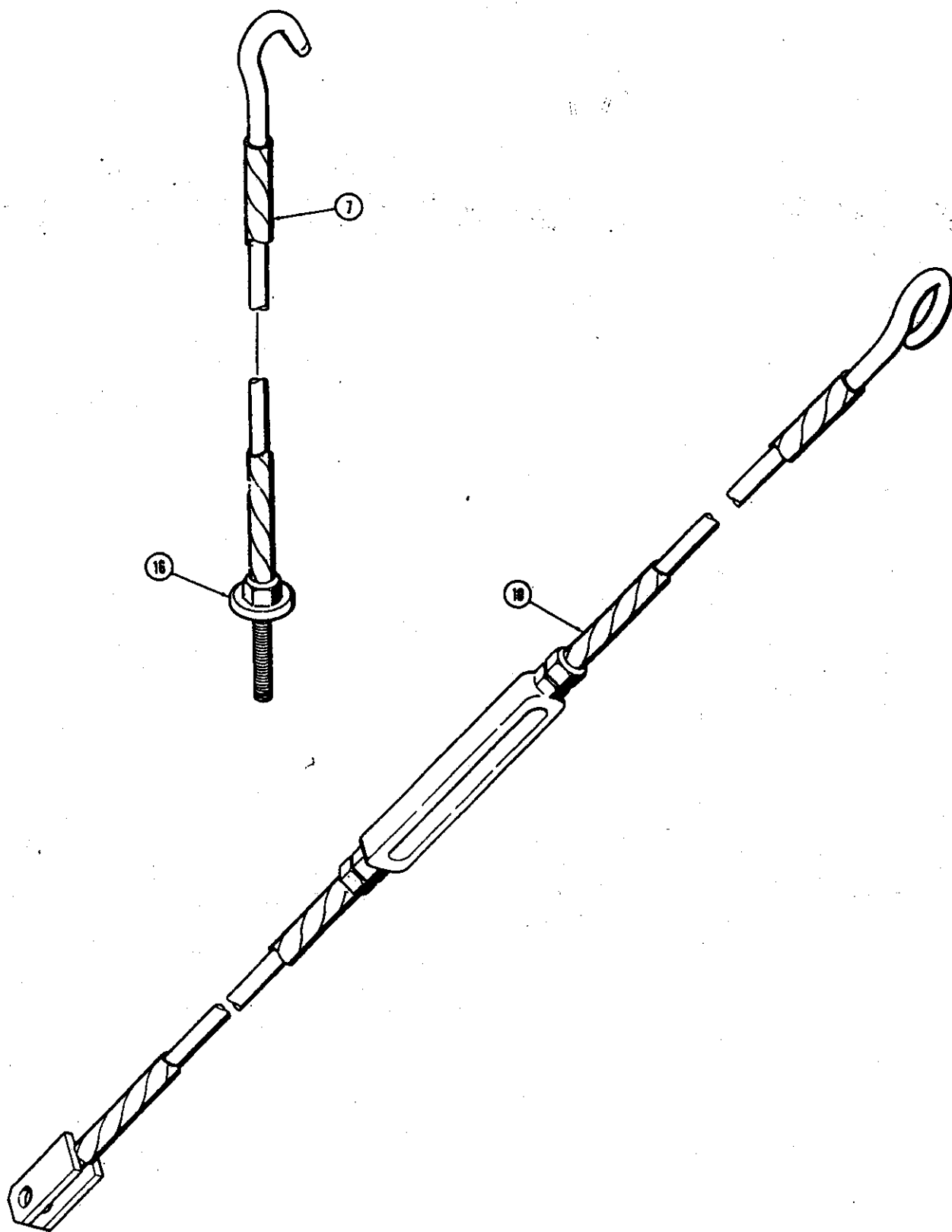
CEILING PANEL INSTALLATION

SCENERY





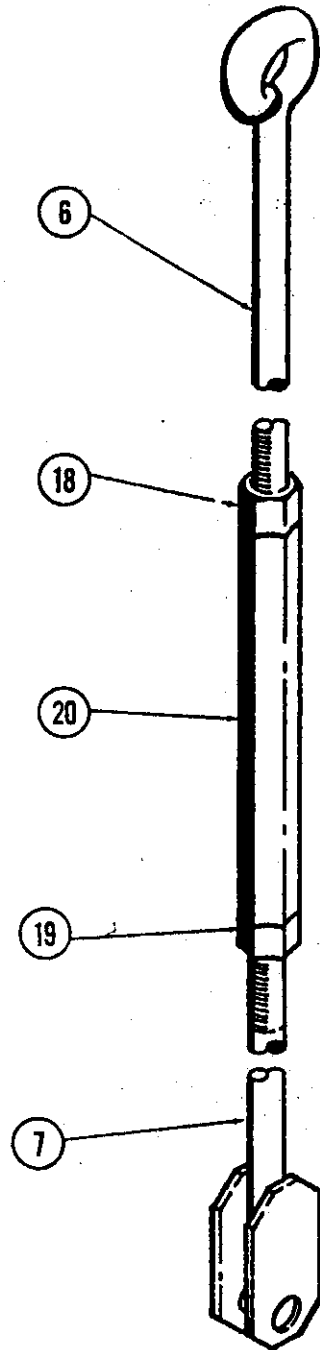
CORNICE AND HEADSHIELD INSTALLATION



PLATFORM HANGER SLEEVES - Spiral brass

Index number	Part number	Drawing number	Description	Quantity per assembly
8			FLOOR ASSY	1.0
9	35410805	404-847-001	PLATE ASSY-RAMP,HCP 404-847-001	1.0
10	32945814	404-854-001	FRAME ASSY-RAMP,HCP 404-854-001	1.0
11	36841214	404-855-012	SLEEVE-NYLON,LWR,RAMP 404-855-12	1.0
12	36841215	404-855-013	SLEEVE-NYLON,UPR,RAMP 404-855-13	1.0
13	35509991	404-855-010	PLUG-ALUM,RAMP ASSY 404-855-010	4.0
15	32037621	404-855-015	COVER-NYLON,RAMP ASSY 404-855-15	2.0
16	31025600	404-855-009	BUSHING-RAMP ASSY 404-855-009	1.0
17	34202600	404-855-008	LOCK-BRASS,RAMP ASSY 404-855-008	1.0
18	36859900	404-855-014	SLIDE-NYLON,RAMP ASSY 404-855-14	2.0
19	32829500	404-408-001	FLOOR ELEC INSTL-RAMP 404-408-1	1.0
20	30378570	404-855-007	BAR-RAMP ASSY 404-855-007	2.0
25	26193700		ROLLER BOLSTER INJECTION MOLDED*	2.0
26	31044300	1023015-001	BUSHING-BOL/ROLLER 1023015-001*	2.0
28				
29	36842500	00000368425	SLEEVE-HORSE 96" BRASS SPIRAL *	1.0
32	61226700		BOLT SHOULDER 1/2 X 1	2.0
33	68530800		WASHER WROT 3/8 STANDARD	2.0
34	64781600		LOCKNUT N/I 3/8-16 ZP	2.0
35	61115600		SCREW MS 10-24 X3/8 RHP	2.0
36	61161400		SCREW MS 1/4-20X1 1/4 BRS RHP	1.0
37	61119600		SCREW MS 1/4-20X1 RHP	3.0
38	60700400		BOLT HHCS 1/4-20 X1 GR5	10.0
39	68530000		WASHER WROT 1/4 STANDARD	10.0
40	64780800		LOCKNUT N/I 1/4-20 ZP	10.0
42	68531600		WASHER WROT 1/2 STANDARD	2.0
45	22197506		DECAL "CAUTION" WHEELCHAIR	1.0
46	24065712		DECAL - HANDICAPPED SYMBOL	1.0
47	22201501		DECAL PRIORITY SEATING-ADA	1.0

HANDICAPPED PLATFORM INSTALLATION

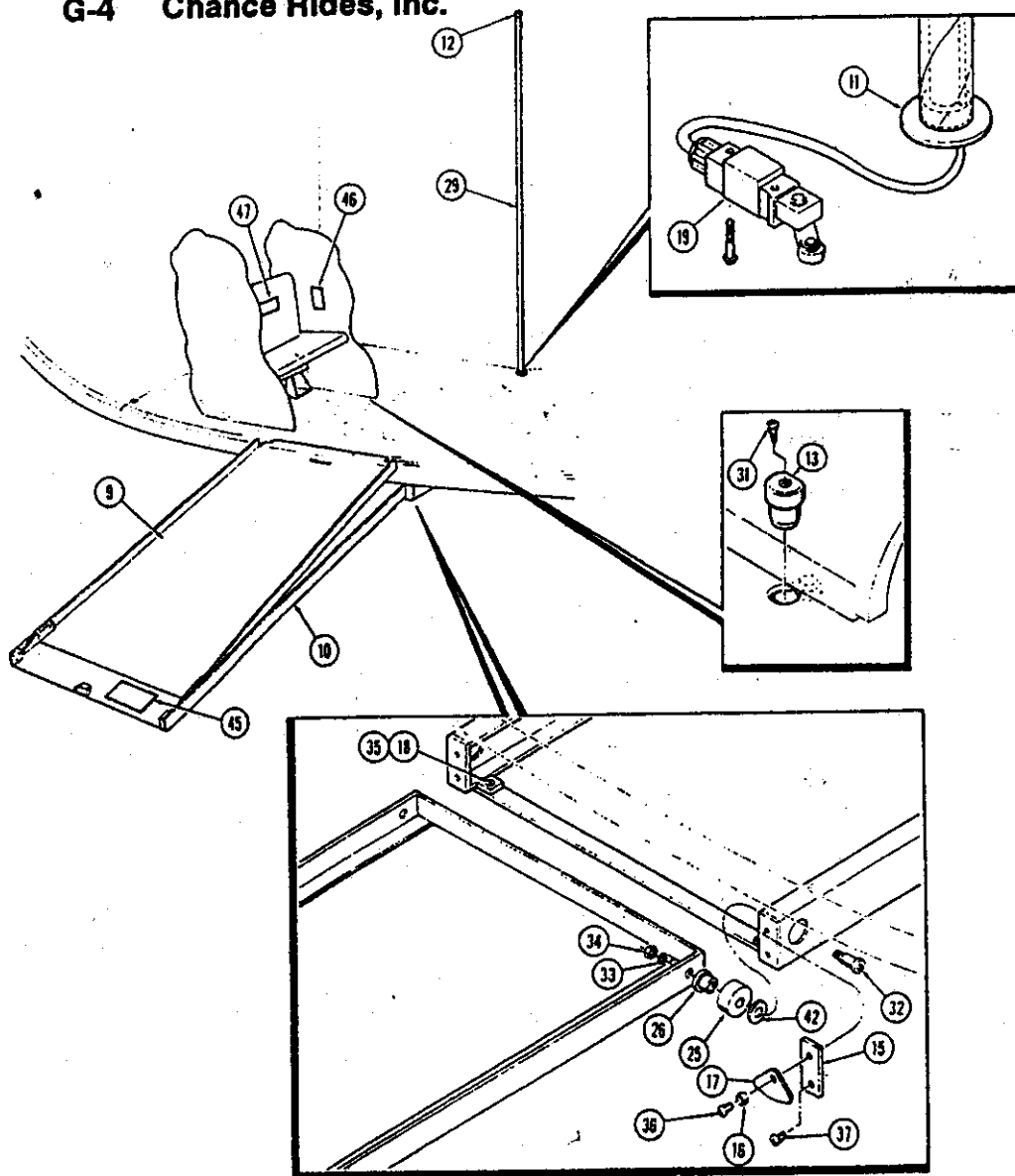


SWAY ROD ASSEMBLY

Index number	Part number	Drawing number	Description	Quantity per assembly
6			PLATFORM ASSY-	As required
7			PLATFORM ASSY	As required
13	37619700	OMG-550-001	SUPPORT ASSY-PLATFORM OMG-550-1	12.0
16	33276408	403-224-001	HANGER-FLOOR SWAY ROD 403-224-1	4.0
19	70349700	404-218-001	SWAY ROD ASSY 404-218-001	4.0
22	34759000	OMG1006-005	NUT-P/FORM HNGR ROD OMG1006-005*	24.0
24	61191600		SCREW SHSS 1/4-20 X3/16	24.0
25	35252209	403-825-001	PIN-5/8 DIA X 2.25LG 403-825-001	4.0
26	25181900		PIN 5/8X1-1/2 G/L1-1/4 HP1/8*	4.0
28	65190000		HAIRPIN 1/8	8.0

PLATFORM INSTALLATION

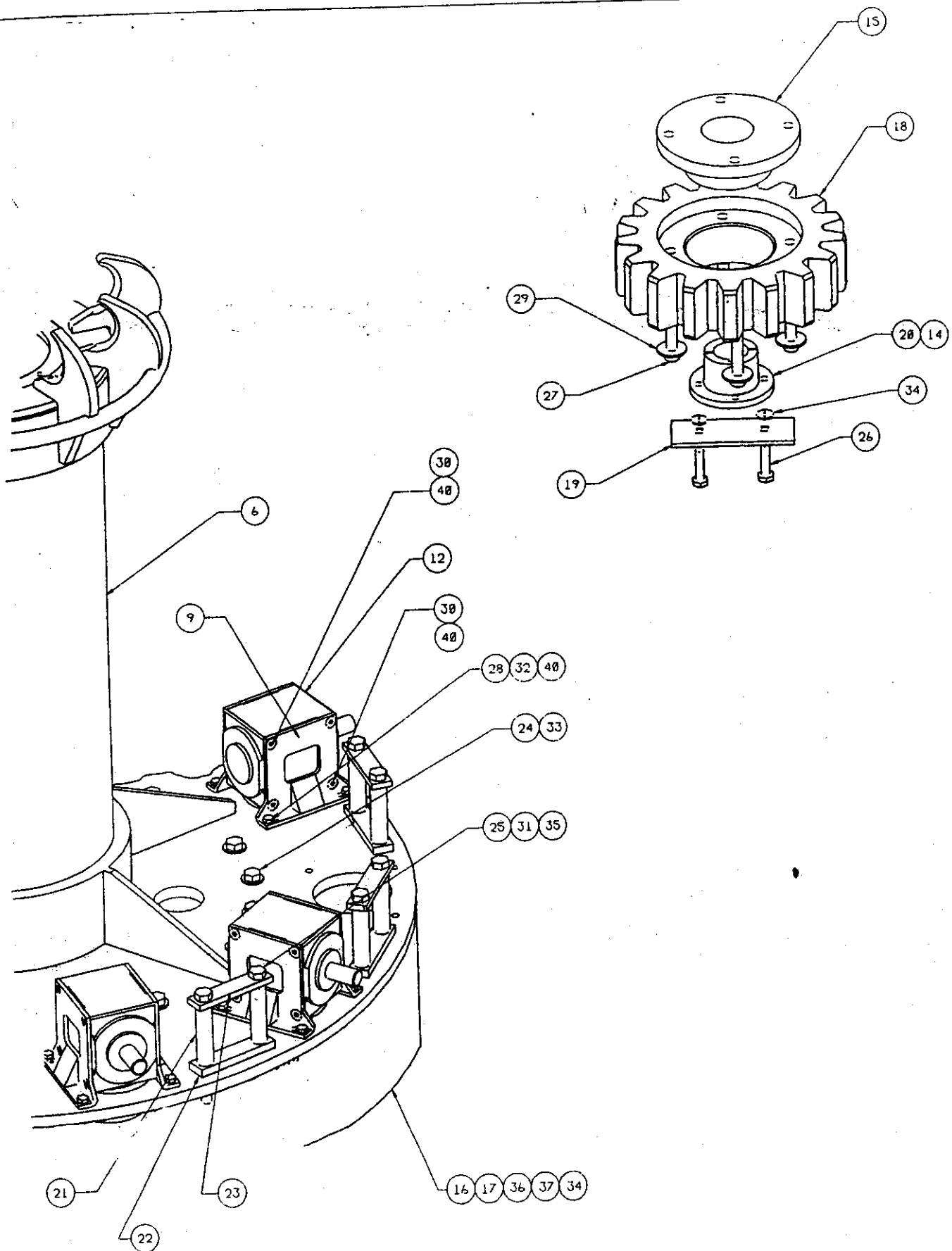
G-4 Chance Rides, Inc.



HANDICAPPED PLATFORM INSTALLATION

HUB AND DRIVE





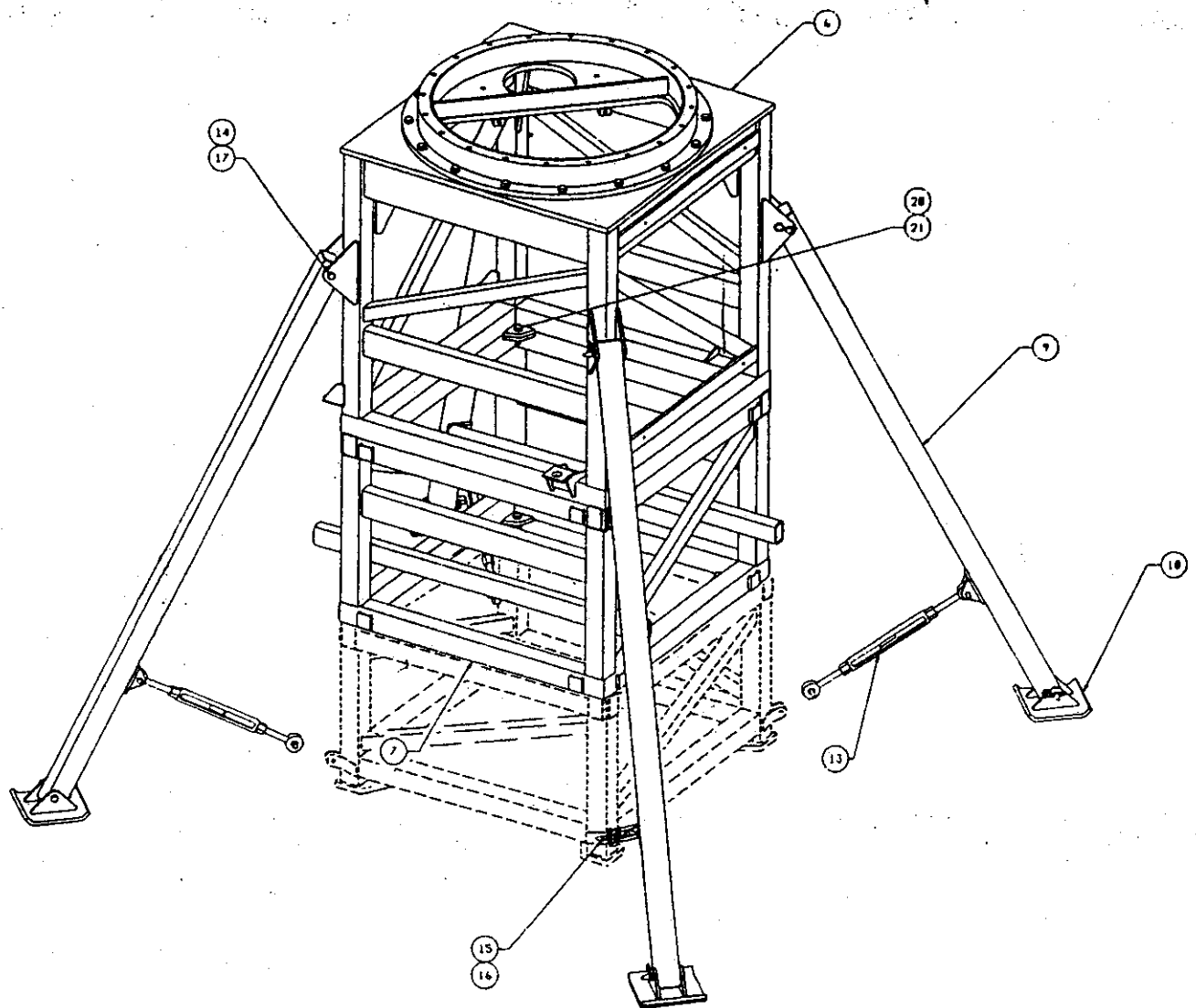
CENTER HUB INSTALLATION

Index number	Part number	Drawing number	Description	Quantity per assembly
6	25616300		TOWER ASSY 403-504-001	1.0
	36109400	403-336-001	PUTTY STEEL PLASTIC "A" (KIT)	2.0
	38018500	403-557-001	RING-BEARING, MACHINED 403-336-	1.0
	60910400		TOWER WELDT-TOP 403-557-001	1.0
	68538200		BOLT HHCS 5/8-11 X1 1/2 GR5	16.0
7			WASHER LOCK 5/8 SPRING MED	16.0
9	38232414	403-526-001	TOWER WELDT-CENTER 403-558-001	1.0
10	34947300	403-525-001	TUBE WELDT-OUTRIGGER 403-526-001	4.0
13	28294602		PAD WELDT-OUTRIGGER 403-525-001	4.0
14	35230000	CSN10A05-07	TURNBUCKLE 3/4 X 12 EYE-EYE	4.0
15	35228700	CSN10A03-02	PIN-TPR 3/4X4"G/L CSN10A05-07*	8.0
16	65190000		PIN-TPR 1/2X2"G/L CSN10A03-02*	8.0
17	65190400		HAIRPIN 1/8	8.0
20	60910800		HAIRPIN 3/16	8.0
21	64752400		BOLT HHCS 5/8-11 X2 GR5	8.0
			NUT HEX 5/8-11 FULL	8.0

TOWER INSTALLATION

TOWER





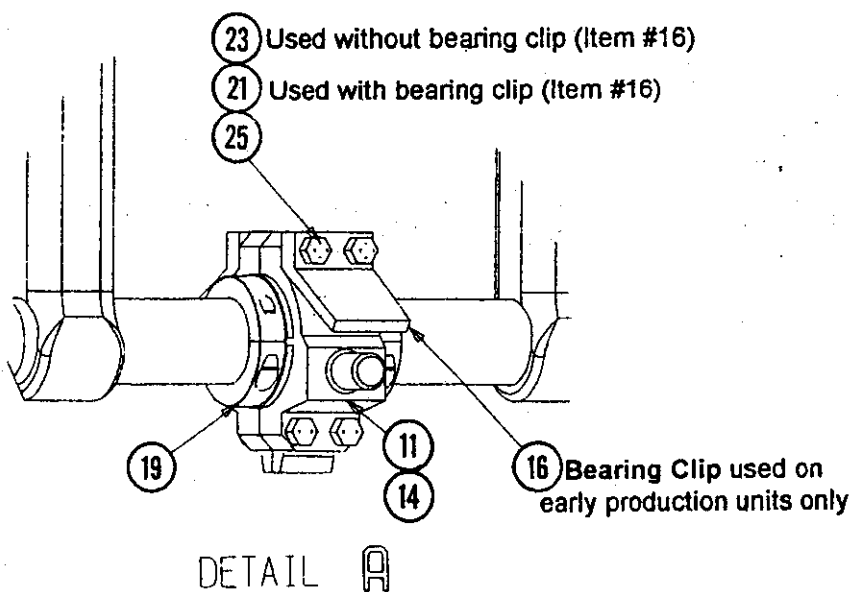
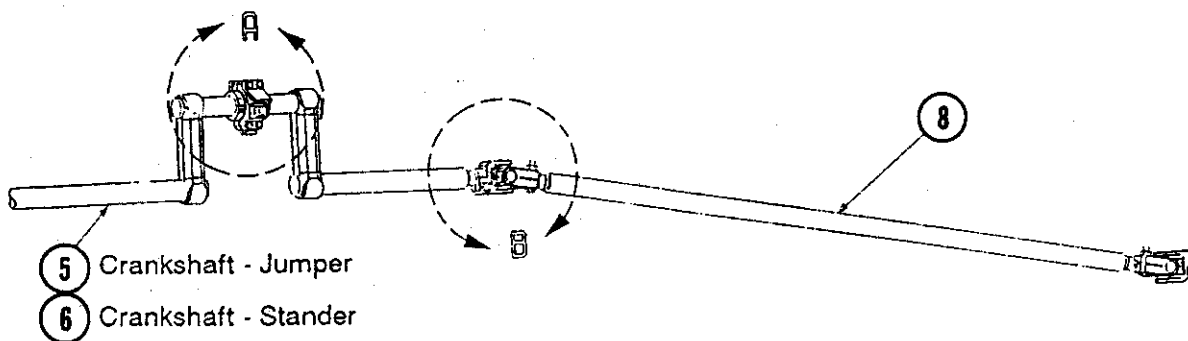
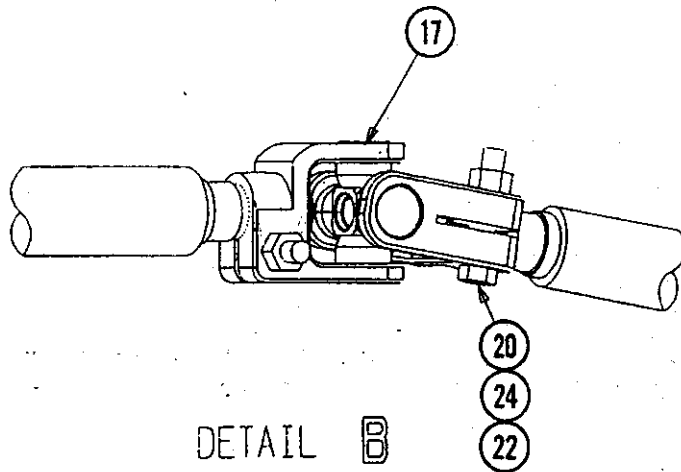
TOWER INSTALLATION

Index number	Part number	Drawing number	Description	Quantity per assembly
5	32088000	404-222-001	CRANKSHAFT WELDT 404-222-001	1
6	32088100	404-222-002	CRANKSHAFT WELDT-STNDR 404-222-2	1
8	32349500	404-221-001	DRIVE SHAFT WELDT 404-221-001	1
11	20460200		BRG HANGER HALF-28' MGR *	6
14	30441900		BEARING-HANGER 403-236-1	3
17	28364602		U-JOINT ASSY (R/W)	2
19	21759500		COLLAR SHAFT 2-PC 1 7/16"	6
20	60822000		HHCS 7/16-20X2 GR8	3
21	60701600		HHCS 1/4-20 X2 1/2 GR5 **	12
22	68553200		WASHER FLAT 7/16 HRD	3
23	60701200		HHCS 1/4-20 X2 GR5 **	12
24	64804900		NUT FLEXLOC 7/16-20 FULL *	3
25	64780800		LOCKNUT N/I 1/4-20 ZP	12

CRANKSHAFT ASSEMBLIES

Index number	Part number	Drawing number	Description	Quantity per assembly
6	37191100	404-215-001	SPREADER WELDT-SHORT 404-215-1*	1.0
7	37191200	404-215-002	SPREADER WELDT-LONG 404-215-002*	1.0
8	37191300	404-215-003	SPREADER WELDT-INTMED 404-215-3*	1.0
10	37620700	403-223-001	SUPPORT-CRANK BEARING 403-223-1	1.0
11	30441800	403-223-004	BEARING-CRANK, NYLON 403-223-004	1.0
14	60846800		BOLT HHCS 1/2-13 X7 1/2 GR5	2.0
15	64782400		LOCKNUT N/I 1/2-13 ZP	2.0
16	68531600		WASHER WROT 1/2 STANDARD	4.0
18	31231400	403-223-005	CAP-CRANK BEARING 403-223-005	1.0

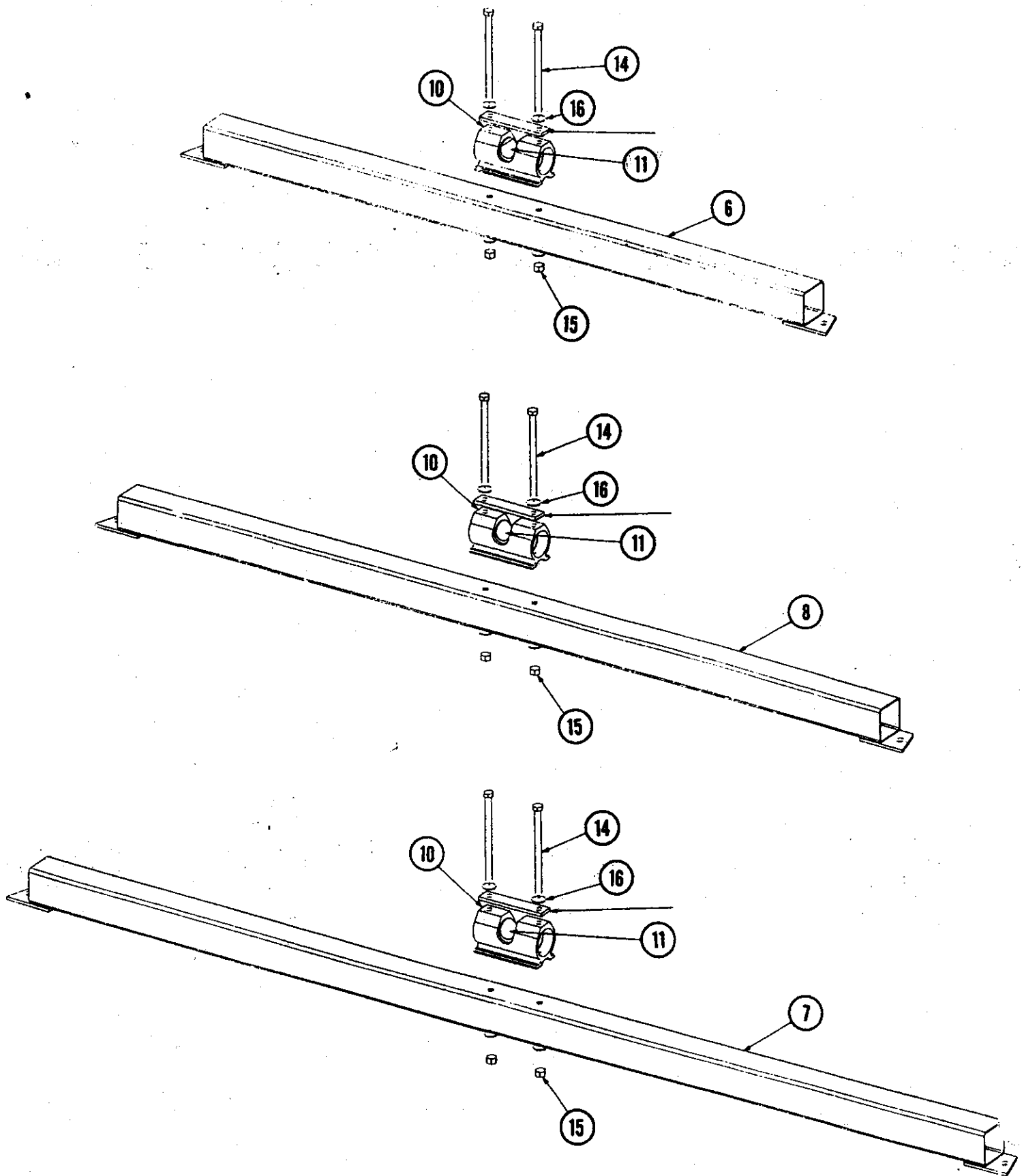
SPREADER BAR ASSEMBLIES



CRANKSHAFT ASSEMBLIES

Index number	Part number	Drawing number	Description	Quantity per assembly
6			SWEEP WELDT	6.0
7			SWEEP WELDT	4.0
8			SWEEP WELDT	2.0
12	71052800	404-210-001	SPREADER ASSY-SHORT	As required
13	71052801	404-210-002	SPREADER ASSY-LONG	As required
14	71052802	404-210-003	SPREADER ASSY-INTMED	As required
15	37191100	404-215-001	SPREADER WELDT-SHORT 404-215-1*	As required
16	37191200	404-215-002	SPREADER WELDT-LONG 404-215-002*	As required
17	37191300	404-215-003	SPREADER WELDT-INTMED 404-215-3*	As required
19	36169800	404-230-001	ROD WELDT-SWEEP HNGR 404-230-1*	12.0
20	36170300	404-230-002	ROD WELDT-SWEEP HNGR 404-230-2*	12.0
21	36170600	404-230-003	ROD WELDT-SWEEP HNGR 404-230-3*	12.0
27	35169800	CSN10A05-15	PIN-TPR 3/4"X3-5/16"CSN10A05-15*	36.0
30	65190000		HAIRPIN 1/8	72.0
31	65190400		HAIRPIN 3/16	36.0

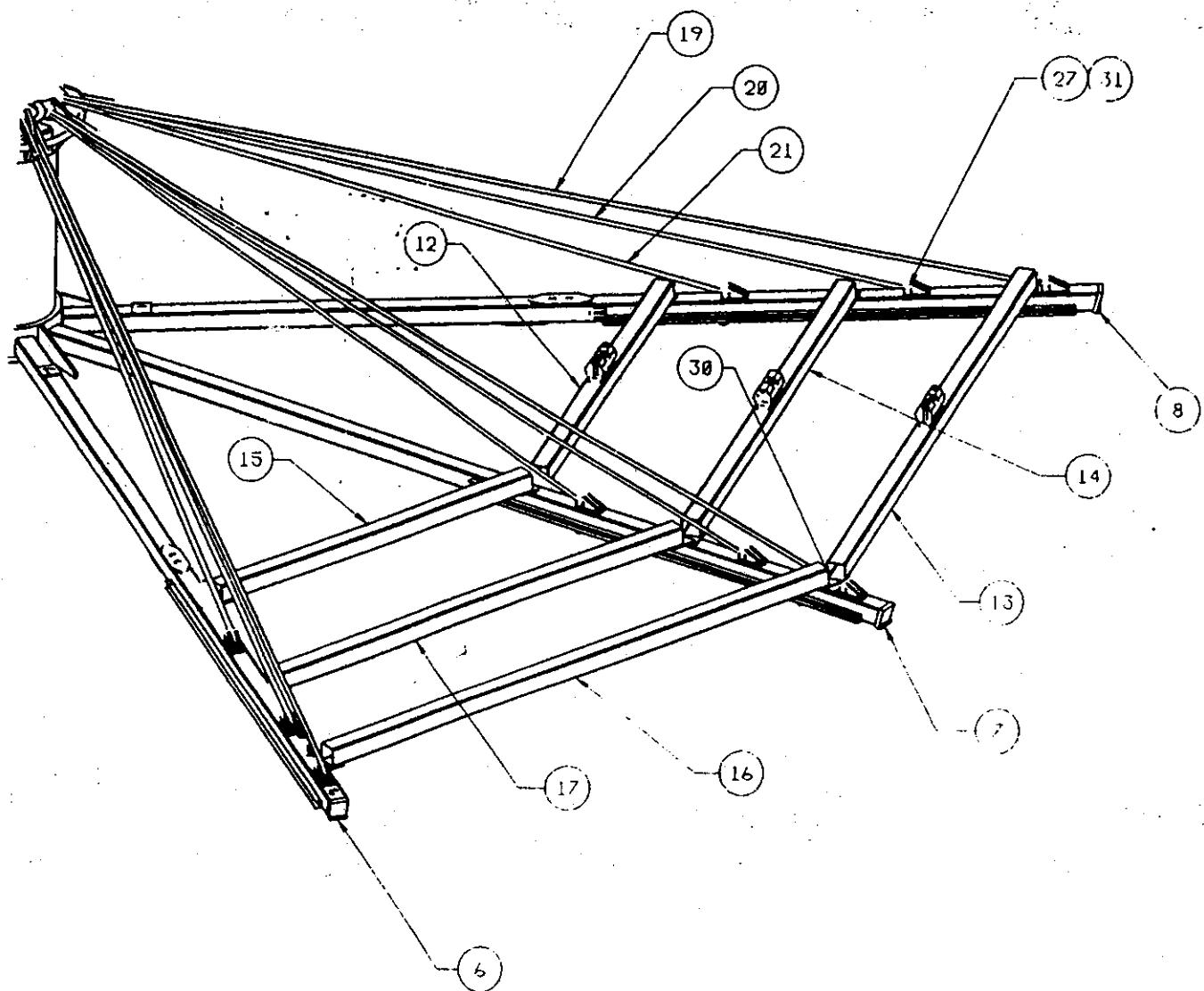
SWEEP AND SPREADER BAR INSTALLATION



SPREADER BAR ASSEMBLIES

SWEEPS AND SPREADERS





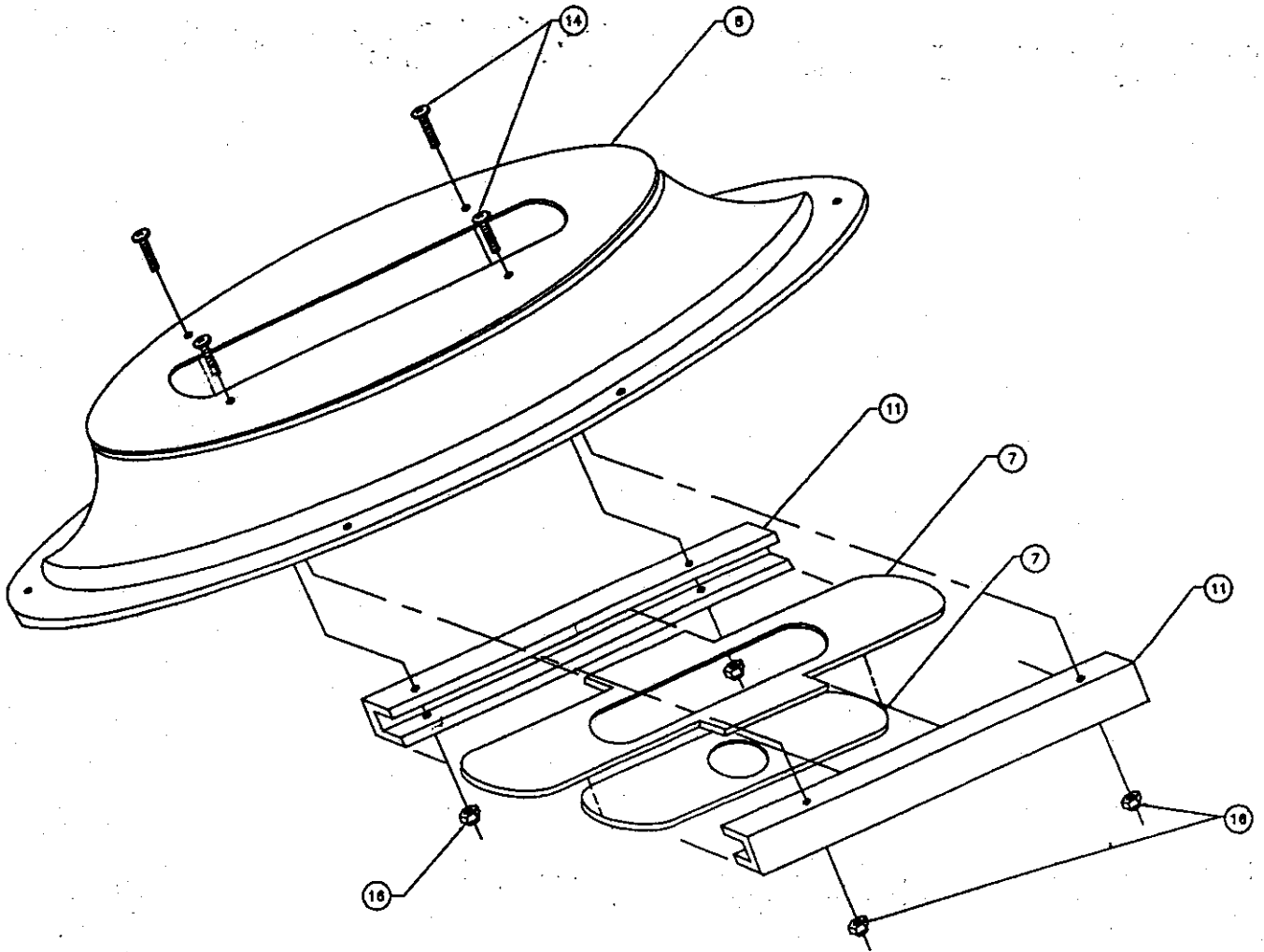
SWEEP AND SPREADER BAR INSTALLATION

Index number	Part number	Drawing number	Description	Quantity per assembly
6	409-135-001	409-135-001	HORSE DRIVE COVER - Specify colo	1
7	409-136-001		SET-HORSE COVER SLIDES	1
11	409-138-001	409-138-001	TRACK - COVER	2
14	61116200		SCREW MS 10-24 X1 RH P **	4
15	64780500		LOCKNUT N/I 10-24 ZP **	4

HORSE DRIVE COVER ASSEMBLY

Index number	Part number	Drawing number	Description	Quantity per assembly
4			PEDESTAL-HORSE, MACH	1.0
5	30442000	403-127-001	BEARING-PEDESTAL 403-127-001	1.0
6	32762800	403-129-001	FLANGE-PEDESTAL 403-129-001	1.0
7	36109300	403-130-001	RING-PEDESTAL 403-130-001	1.0
8	35252210	403-128-001	PIN-HORSE PEDESTAL 403-128-001	1.0
9	26694400		SHIM HORSE PEDESTAL .005-28' MGR.	1.0
10	68537400		WASHER LOCK 3/8 SPRING MED	6.0
11	68551400		WASHER LOCK 1/4 HI-COLLAR	4.0
13	61080700		BOLT SHCS 1/4-20 X1 1/2	4.0
14	60767000		BOLT HHCS 3/8-16 X1 1/2 GR5	6.0
15	64751600		NUT HEX 1/2-13 FULL	1.0
16	27220702		SPRING	1.0
19	23896101		KNOB F/HORSE PEDESTAL	1.0
20	26433801		SCREW THUMB 1/2-13 X 3 15/16	1.0

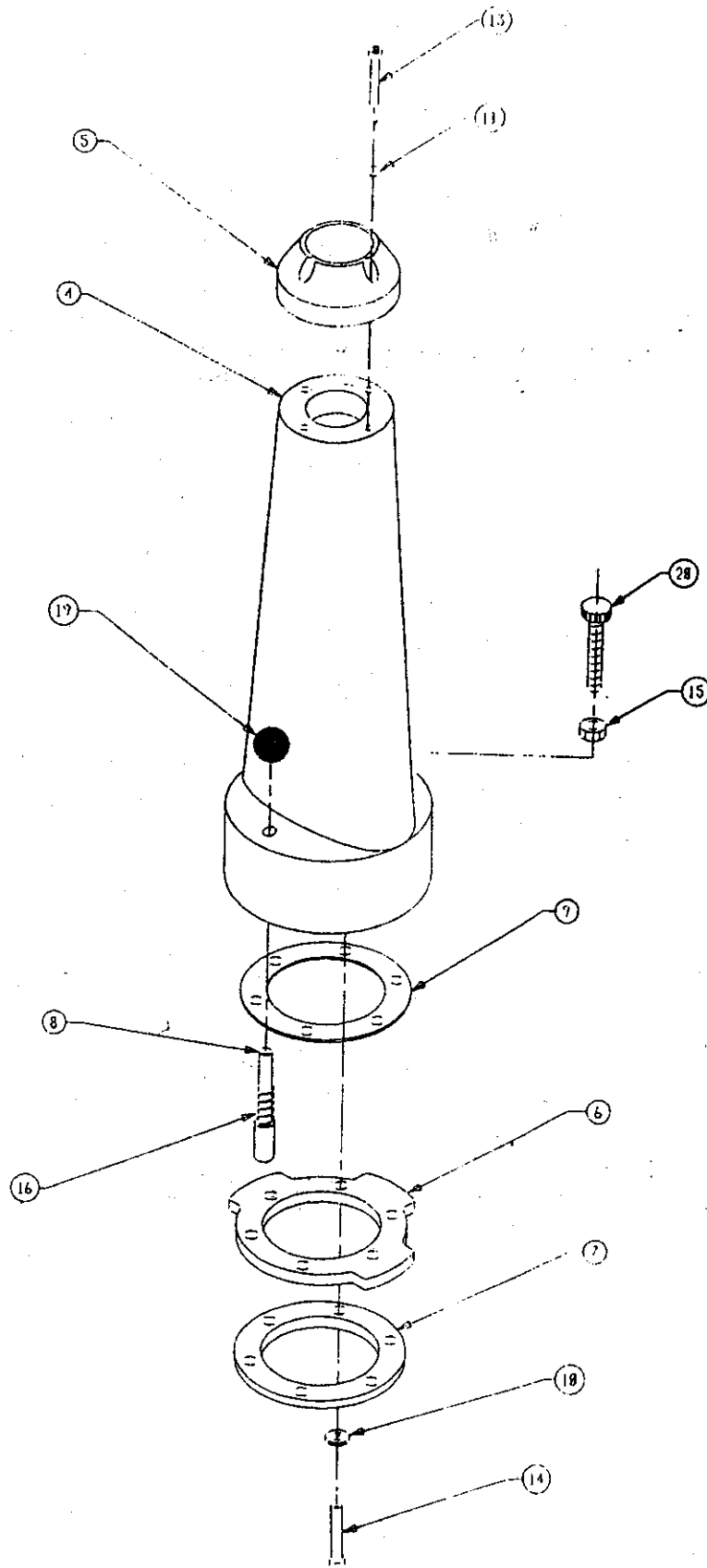
HORSE PEDESTAL ASSEMBLY



HORSE DRIVE COVER ASSEMBLY

Index number	Part number	Drawing number	Description	Quantity per assembly
5	30228700	404-111-001	ANGLE WELDT-CHARIOT 404-111-001	2.0
6	34984039	404-119-001	PANEL-SIDE,F/BOARD,HCP DENTZEL	2.0
7	34984038	404-118-001	PANEL-SIDE,LEXAN,HCP DENTZEL	1.0
8	35358516	389-117-001	PLATE WELDT-ANCHOR 389-117-001*	1.0
9	35358517	389-117-002	PLATE WELDT-ANCHOR 389-117-002*	1.0
10	37487200	389-117-006	SUPPORT-SIDE 389-117-006*	1.0
11	37487300	389-117-007	SUPPORT-SIDE 389-117-007*	1.0
12	37487400	389-117-008	SUPPORT-SEAT 389-117-008*	2.0
13	36495000			1.0
	33342300	404-116-006	HINGE-CHARIOT SEAT 404-116-006	1.0
	36494400	404-117-001	SEAT-CHARIOT,LOWER 404-117-001	1.0
	36494500	404-117-002	SEAT-CHARIOT,UPPER 404-117-002	1.0
	66423000		SCREW #8X3/4 FH WOOD	14.0
20	64830101		NUT-T 1/4-20 1" FLANGE	12.0
21	61144400		SCREW MS 1/4-20X1 1/2 TRS PH	8.0
22	64780800		LOCKNUT N/I 1/4-20 ZP	8.0
23	42219100		TRIM COUNTER EDGING POL N/HOLE	1.0
24	66430701		SCREW #4X3/4 OV HD PH Z/P	1.0
25	68537000		WASHER LOCK 1/4 SPRING MED	12.0
27	60700200		BOLT HHCS 1/4-20 X3/4 GR5	4.0
28	61221900		BOLT CARRIAGE 1/4-20 X 1 1/4	8.0
29	61111600		BOLT SHCS 1/4-20 X3/4 FH	8.0
30	64799600		NUT ACORN 1/4-20 CHROME	8.0

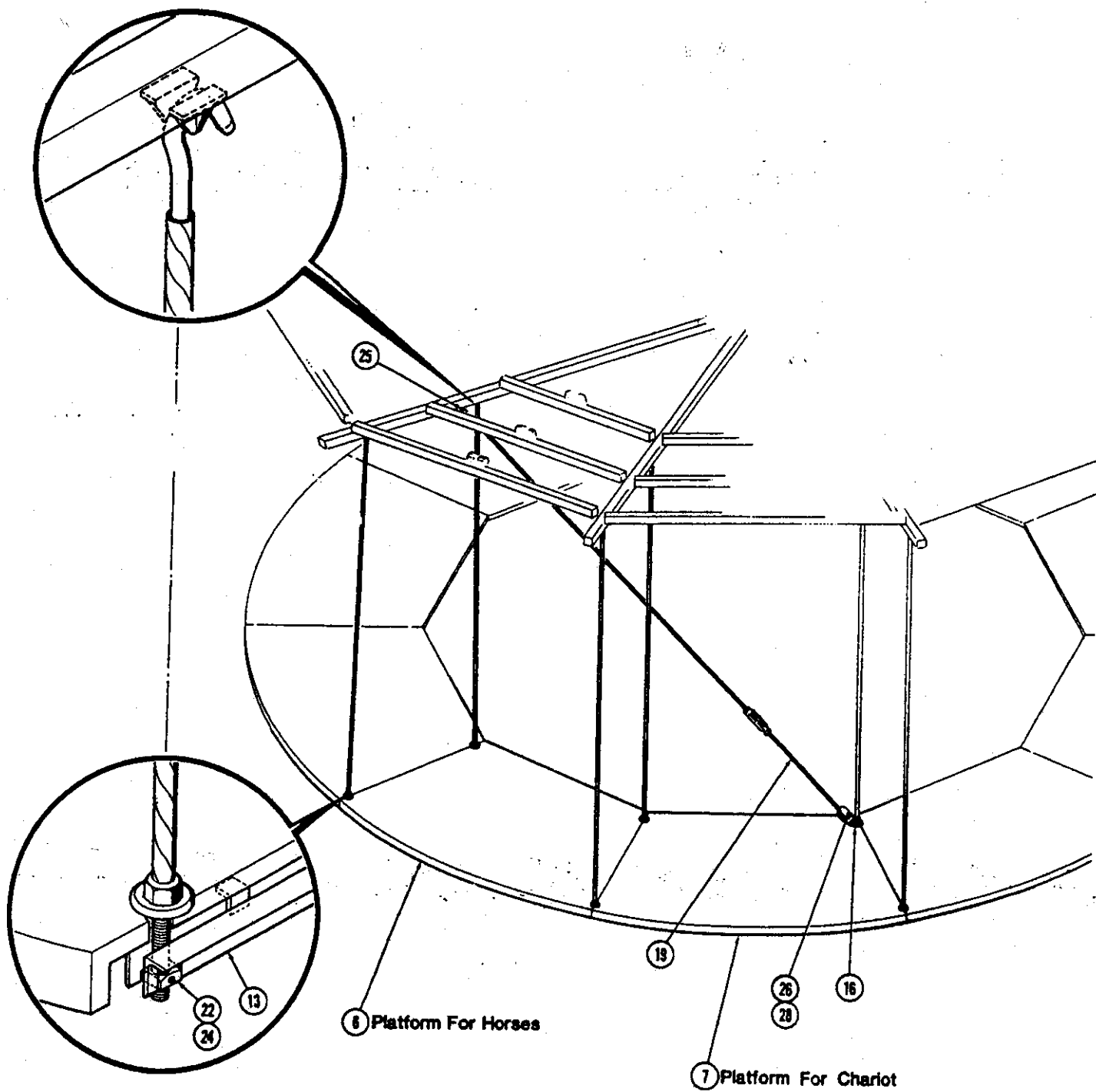
HANDICAPPED CHARIOT ASSEMBLY



HORSE PEDESTAL ASSEMBLY

PLATFORMS

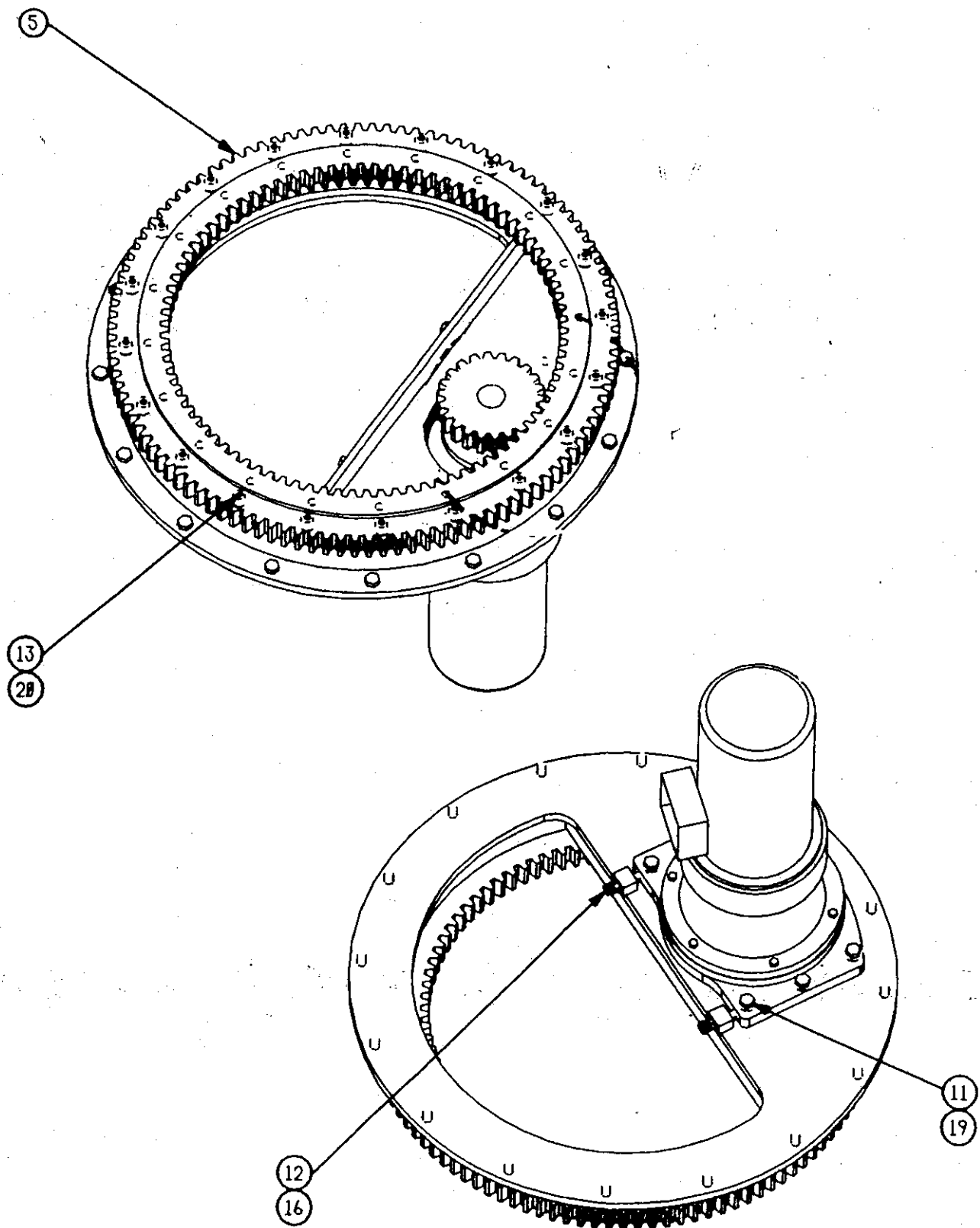




PLATFORM INSTALLATION

Index number	Part number	Drawing number	Description	Quantity per assembly
6			DRIVEPLATE/CTRPOLE 404-319-1	1
9	32874000	403-263-001	FOOT-MOUNT, MOD 403-263-001	24
12			GEARBOX	12
	23009701		INPUT SHAFT SEAL	1
	23018601		GEARBOX 1.5:1 (INTE	1
	26437400		SEAL 1.000SH X 1.499B X .250W	1
14	33843900	403-381-001	KEY-1/4"SQ X 1-1/4"LG 403-381-1	12
15	34517027	403-262-001	MOUNT-GEAR 403-262-001*	12
16	32037623	403-375-001	COVER-GEAR, FEMALE 403-375-001*	1
17	32037624	403-375-002	COVER-GEAR, MALE 403-375-002*	1
18	23024900		GEAR CRANKSHAFT-28' MGR *	12
19	33837500	403-341-001	KEEPER-KEYWAY 403-341-001	12
20	21044800		BUSHING 1 BORE H	12
21	38232409	403-326-003	TUBE-SWEEP GUIDE 403-326-003	24
22	30378546	403-326-002	BAR-SWEEP GUIDE 403-326-2	12
23	30378545	403-326-001	BAR-SWEEP GUIDE 403-326-1	12
24	60932200		HHCS 5/8-11 X3 1/4 GR8	24
25	60914800		HHCS 5/8-11 X7 GR5 *	24
26	60700400		HHCS 1/4-20 X1 GR5	24
27	60750200		HHCS 5/16-18X2 GR5 **	48
28	61090101		SHCS 3/8-16x1 3/4 BUTTON HD	48
29	68553400		WASHER FLAT 5/16 HRD	48
30	61089201		SHCS 3/8-16 X 1 BUTTON HD	96
31	64783200		LOCKNUT N/I 5/8-11 ZP *	24
32	64804600		NUT FLEXLOC 3/8-16 FULL	48
33	68552900		WASHER FLAT 5/8 HRD A325 PLAIN	24
34	68530200		WASHER - SAE 1/4	60
35	68532600		WASHER SAE 5/8 *	24
36	60700200		HHCS 1/4-20 X3/4 GR5 **	6
37	64780800		LOCKNUT N/I 1/4-20 ZP	6
40	68553100		WASHER FLAT 3/8 H.T.	144

CENTER HUB INSTALLATION



MAIN DRIVE INSTALLATION

Index number	Part number	Drawing number	Description	Quantity per assembly
5	20495202		BEARING GEARED (AVON)	1.0
11	60911000		BOLT HHCS 5/8-11 X2 1/4 GR5	6.0
12	20745800		BOLT HHCS 1/2-13 X3 1/4 GR5	2.0
13	61105300		BOLT SHCS 5/8-11 X3	20.0
16	64751600		NUT HEX 1/2-13 FULL	2.0
19	68538200		WASHER LOCK 5/8 SPRING MED	6.0
20	38557800	403-380-001	WASHER-HARDENED, M/DR 403-380-001	20.0

MAIN DRIVE INSTALLATION

