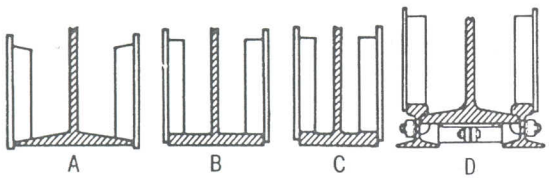
SECTION II
INSTALLATION

GENERAL

Prior to installing the hoist, carefully inspect if for possible shipping damage.

CAUTION

Before installing a trolley mounted hoist, make certain that the trolley wheel contour is correct for the type of beam the trolley will run on, and that the trolley wheel spacing is correct for the beam flange width (refer to the topic, "mounting", in this section). There are three basic wheel contours used on four types of beams as illustrated in Figure 2-1. These are the crown tapered wheel for standard I-beam, the flat crowned wheel for wide flanged I-beam, the flat crowned wheel for wide flanged I-beam and the flat tread wheel for either a patented monorail beam or a T-rail installation.



A – CROWN TAPERED WHEEL FOR STANDARD I-BEAM
B – FLAT CROWNED WHEEL FOR WIDE FLANGE I-BEAM
C – FLAT TREAD WHEEL FOR PATENTED MONORAIL BEAM
D – FLAT TREAD WHEEL FOR T-RAIL INSTALLATION

1089

Figure 2-1. Trolley Wheel Contours

MOUNTING

Balanced Design Hevi-Lift Hoists are either lug mounted standard headroom or low headroom units, or they are fixed mounted (base, ceiling, deck, wall). The lug mounted hoists are usually equipped with either a plain trolley, hand chain geared trolley, single speed motor trolley or a variable speed motor trolley. These are illustrated in Figures 2-2, 2-3, 2-4 and 2-5.

All four types of trolleys utilize spacers between the drum hanger and the truck sides to adjust for the width of the beam they operate on. For straight track standard I-beams and straight track wide flange I-beams, the distance between

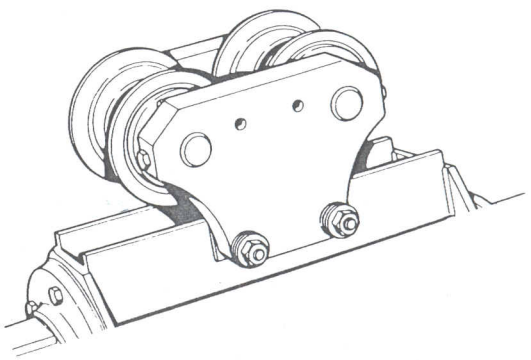


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Figure 2-2. Plain Trolley Mounting

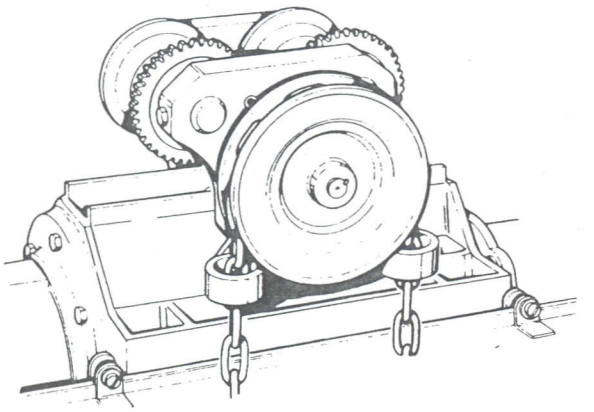

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Figure 2-3; Geared Trolley Mounting

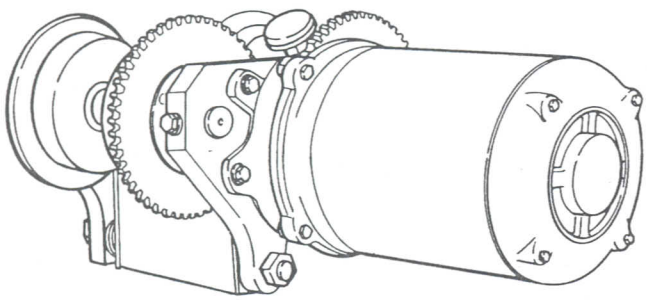

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Figure 2-4. Single Speed Motor Trolley

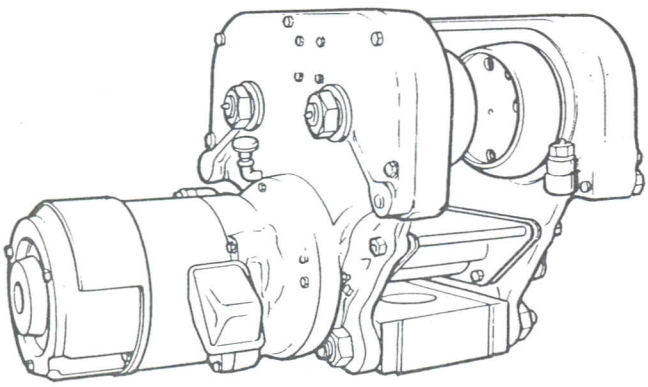

Figure 2-5. Variable Speed Motor Trolley

the wheel flanges should be approximately 1/4 to 3/8 inch more than the nominal beam flange width. For straight track patented monorail beams, the distance between the wheel flanges should be approximately 1/16 to 1/8 inch more than the nominal beam flange width. For straight track T-rail installations, the distance between wheel flanges should be approximately 1/4 to 3/8 inch more than the width between the outside edges of the T-rail. If additional spacers are required to adjust wheel flange spacing, punch washers may be used on all but motor driven trolleys. Special factory-built spacers are required for motor driven trolleys.

NOTE

When trolleys run on curved track beams, the distance between trolley wheel flanges must be slightly more than for straight track of the same nominal beam flange width. The increased spacing depends upon the radius of the curved track. Generally, the hoist is built for a particular application and the proper spacing is provided at the factory. If your application for the hoist changes, contact your regional sales or service office of Harnischfeger Corporation giving complete details of type of beam, curve radii and hoist serial number.

INITIAL LUBRICATION

Refer to the lubrication instructions in the MAINTENANCE section to lubricate the hoist prior to start up.

CAUTION

All Balanced Design Hevi-Lift hoists are shipped with the gear case filled to the proper level. If the hoist is equipped with a motor geared trolley, the trolley gear case is also filled with gear oil prior to shipment. However, to avoid the possibility of seriously damaging the hoist, these oil levels must be checked and gear oil added if necessary, prior to operating the hoist. Geared trolley wheels are not lubricated at the factory because abrasives will contaminate the grease during shipment and must be lubricated prior to start up.

ELECTRICAL CONNECTIONS

CAUTION

Be sure that the power supply is the same as indicated on the P&H nameplate. If the hoist is operated on incorrect voltage or frequency, serious damage to the motor and the control could result.

A wiring diagram for each hoist is secured to the inside of the control cabinet cover. Before energizing the hoist power supply, check that connections are made as indicated on the wiring diagrams furnished with the hoist. Also check all electrical connections (at contactors, terminal boards, etc.) for tightness.

NOTE

To properly connect and check a three phase power connection, refer to the INITIAL OPERATING CHECK portion of this section.

CONDUCTORS AND COLLECTORS

CONDUCTOR TYPES. Bare wire conductors, either round or figure 8 are most commonly used. However, flat bar, angle, T bar or insulated bar may be advantageous in some applications where corrosive, moist or dusty conditions are present.

CONDUCTOR INSTALLATION. Wire conductors require the use of end support and strain insulator at each end of the system (see Figure 2-6). Proper wire tension can be adjusted with the adjusting nuts located on the strain insulator threaded studs.

The required number of intermediate supports will vary with the type of conductor. A general guide to determine the number required is shown below.

Type of Conductor	Distance Between Supports (Feet)	
	Straight Section	Curved Section
Round copper wire, No. 4	40 - (Max. length overall)	Not used
"Figure 8" wire, No. 0	12	3
Flat bar	6	3
T-bar	8	3
Angle	8	3

The location of the conductors in relation to the I-beam will vary with type of trolley, lift, hoist size and type of conductor. Refer to the clearance drawing prepared for your particular hoist.

NOTE

Conductor contact surfaces should be cleaned and polished for most efficient operation.

COLLECTORS. For round or figure 8 wire conductors the standard spring wheel collector is used (Figure 2-7). The standard spring shoe collector is used with open steel current conductors of tee, angle or bar shaped section (Figure 2-8). The spring loaded arm holds the wheel or shoe firmly

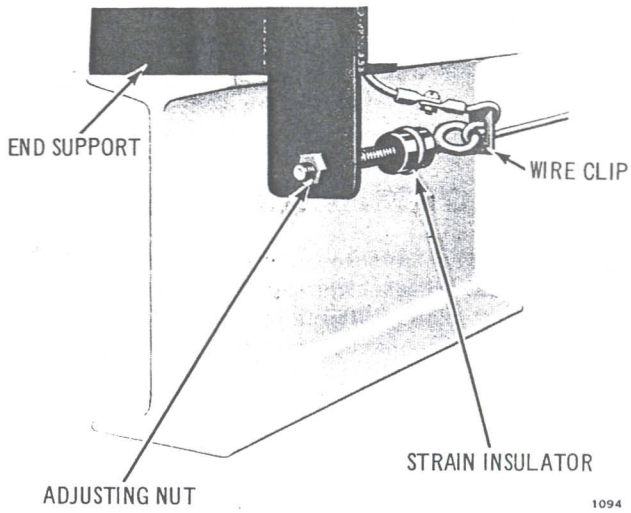

Figure 2-6. Wire Stretcher

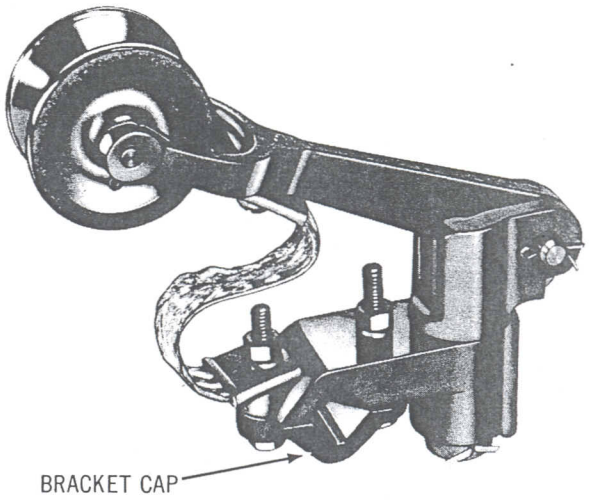

Figure 2-7. Spring Wheel Collector 1095

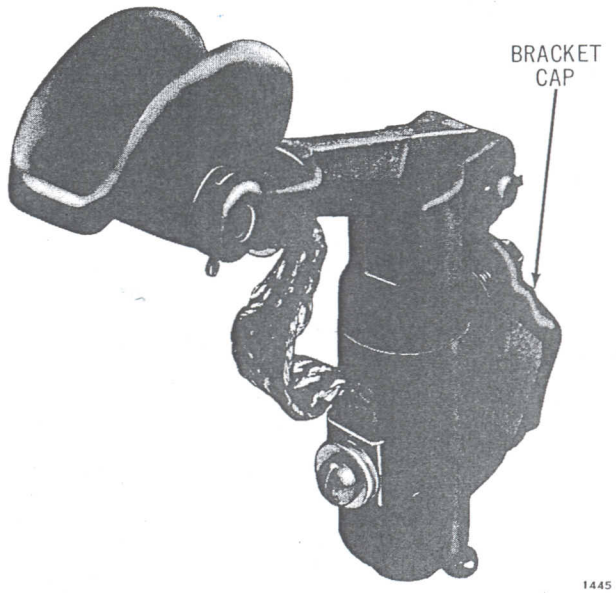

Figure 2-8. Spring Shoe Collector

against the conductor. Slide the collector assembly to a centralized position with respect to the conductor, taking into consideration the trolley wheel float. To adjust the collector, loosen the bracket cap and slide the collector to the proper position on the collector support bar.

INITIAL OPERATING CHECK

GENERAL. The P&H Balanced Design Hevi-Lift Hoist is tested under load and adjusted for proper operation prior to leaving the factory. Before the unit is placed in service, there are several items that must be checked to insure correct installation and avoid serious trouble.

CHECKING DIRECTION OF ROTATION. Since direction of rotation of three phase AC motors can be reversed by reversing any two of the three line wires, it is important that the motion travel is in correct relationship with the button being depressed.

CAUTION

Do not attempt to correct hook travel by changing reversing contactor coil connection or push button wiring. This can only be done at the main power source, load side of reversing contactor or individual motor junction box.

If travel relationship does not correspond to the push button being depressed, do not allow the bottom block to come into contact with the limit switch. Carefully check this as follows:

1. Temporarily connect the three phase power leads to the conductor system.

2. Carefully inch the RAISE or UP button and note the direction of bottom block travel.

3. If the bottom block travel is upward when the RAISE or UP button is depressed, proper phasing has been attained and the temporary connections may now be secured permanently.

4. If the bottom block travels downward when the RAISE or UP button is depressed, proper phasing has not been attained. To correct this, reverse any two of the power line leads at the power source. Again, do not attempt to correct a phase reversal by interchanging the reversing contactor or push button connections, because interchanging these connections will not provide upper limit switch protection.

To correct the direction of travel in DC operation, interchange the two armature leads.

If bottom block travel direction is correct, trolley travel direction should also be correct. However, trolley travel direction should be checked with the push button markings. If the direction is reversed, correct this by reversing any two of the three power lead connections at the trolley contactor only.

CHECKING OPERATION OF UPPER LIMIT SWITCH. With the hoist properly connected to the correct power supply, check the operation of the upper limit switch. Raise the bottom block without a load to within 6 inches of contact with the limit switch counterweight or paddle. Proceed with caution by inching or at slow speed raise the bottom block until the limit switch is tripped. This should open the hoisting circuit and set the motor brake stopping the hoist motion. With the hoist limit switch in the tripped position and control in either the raise or off position, manually operate the limit switch further in the raise position to establish the plugging circuit. Only maintain this position

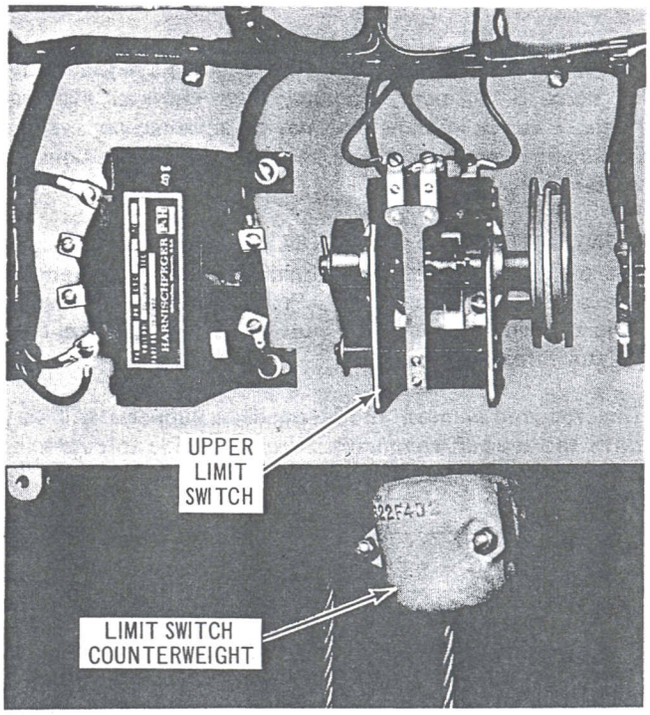

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Figure 2-9. Upper Limit Switch Counterweight

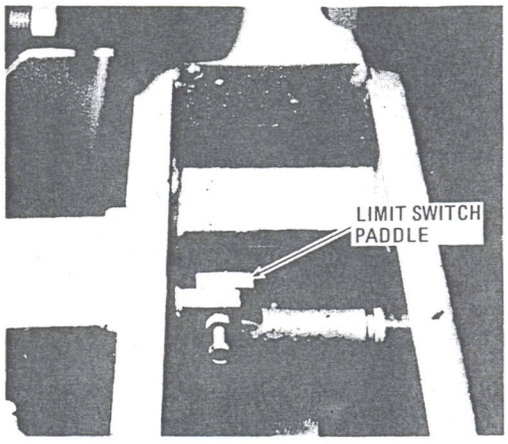

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Figure 2-10. Typical Upper Limit Switch Paddle

for a sufficient time to insure plugging and that bottom block lowers. If the limit switch does not operate in this manner, refer to the maintenance section of this manual for adjustment procedures.

CHECKING OPERATION OF GEARED LIMIT SWITCH. If the hoist is equipped with a geared limit switch (Figure 2-11) to stop the bottom block at both the upper and lower limits of travel, check it for proper operation as follows:

1. Operate the hoist to raise the bottom block without a load until it is approximately two feet from the hoist drum.

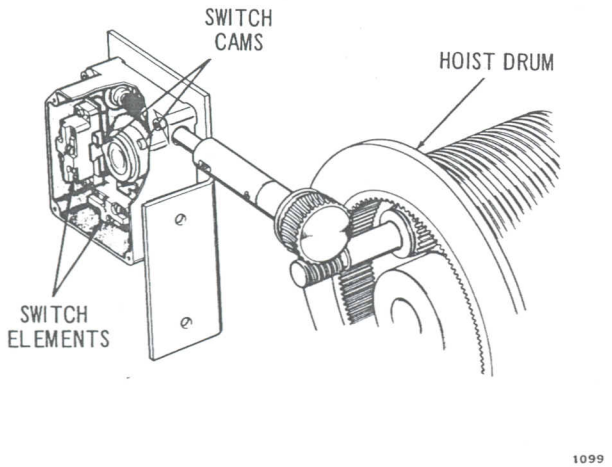

Figure 2-11. Geared Limit Switch

2. Operate the hoist by inching or slow speed until the bottom block raises high enough to actuate the geared limit switch which opens the RAISE circuit and applies the magnetic brake. The switch must actuate when the bottom block is a safe distance from the drum (approximately six inches).

3. If the geared limit switch is equipped with plugging contacts, disconnect one lead from the upper limit switch element and then slowly raise the hook block past the upper limit. The plugging contacts should close at a point just above the upper travel limit, and the hoist motor should automatically reverse direction to lower the hook block off the plugging contacts. Release the RAISE or UP button and reconnect the lead to the upper limit switch element.

4. Operate the hoist to lower the bottom block until the bottom block has reached the desired lower limit. The geared limit switch should now actuate to open the LOWER circuit and apply the motor brake.

CAUTION

A minimum of one full wrap of cable must remain on the drum when the hook block is at the lower limit.

5. If the geared limit switch does not operate properly, refer to the MAINTENANCE section of this manual for adjustment procedures.

CHECKING OPERATION OF ELECTRIC BRAKE. Operate the hoist in the lowering direction with no load on the hook. With the hoist lowering at full speed for a single or variable speed hoist, and slow speed for a two speed hoist, release the DOWN or LOWER push button. The downward movement will stop, except for the allowable drift. The hook will drift approximately one inch for every 10 FPM (Feet Per Minute) of hook travel speed. This distance should be measured from the time the push button is released to the time the hook comes to rest. As an example, a hoist with a rated speed of 20 FPM will drive approximately 2 inches, when operated at full speed. Test the raising direction in the same manner. It should be noted that when the hoist has a full load on the hook the drift will be less than 1 inch for each 10 FPM of hook speed.

If there is excessive drift, refer to the MAINTENANCE section of this manual.

WARNING

Never operate the hoist unless the brakes are operating properly.

CHECKING MECHANICAL LOAD BRAKE

Attach a near capacity load to the bottom block. Raise and lower the hoist several feet to determine if the mechanical load brake is operating correctly. The mechanical load brake will control the descent of the load in the lowering direction when the DOWN or LOWER push button is depressed. Also, it should prevent the load from continuing to lower, except for allowable drift, when the DOWN or LOWER push button is released.

SECTION III
COMPONENT DESCRIPTION

GENERAL

The operation and function of each sub-assembly in the Balanced Design Hevi-Lift Hoist is described in this section. The size and capacity of a unit will not vary the function of these components.

Some of the sub-assemblies listed are optional equipment and may not apply to your particular hoist.

HOIST DRIVE

The drum is driven by the hoist motor through a three reduction gear case, as illustrated in Figure 3-1. Normally, a mechanical load brake is included as part of the reduction. The exceptions to this are the use of either an electric load brake (Magnetorque), dc dynamic lowering control or countertorque control. The drum shaft is joined to the motor shaft and the motor pinion shaft in the gear case by

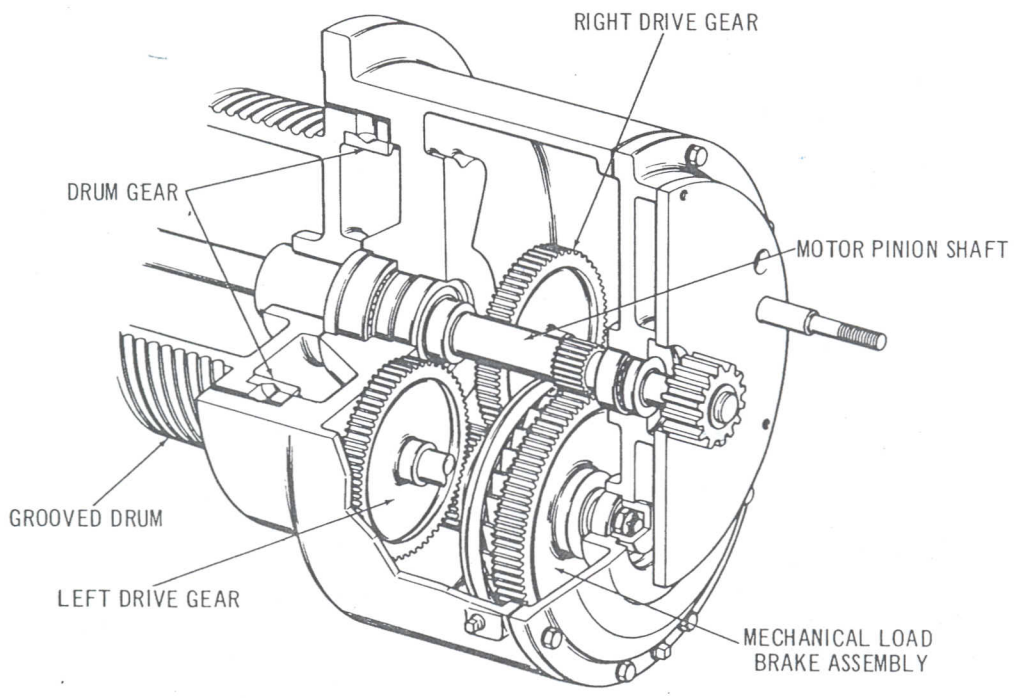

Figure 3-1. Balanced Design Hevi-Lift Hoist Drive

splined couplings. The motor pinion drives the drum pinion shaft assemblies through the mechanical load brake, or through the intermediate shaft assembly when a mechanical load brake is not used. The two drum pinions drive the drum gear, causing the drum to revolve.

MECHANICAL LOAD BRAKE

The functions of the mechanical load brake are to control the lowering speed of the load and to prevent the load from dropping due to failure of the electric motor. The mechanical load brake consists of an ACME (left hand) threaded shaft with a fixed flange, a motor gear with an ACME (left hand) threaded bore, a ratchet with friction linings riveted to each side, and a spring controlled pawl mounted in the gearcase. During the raising cycle, the motor gear is driven counterclockwise and the ACME thread causes the motor gear to compress the ratchet between itself and the fixed flange on the shaft. The spring loaded pawl is thrown away from the ratchet and therefore no braking action takes place. During the lowering cycle, the motor gear is driven clockwise. The load on the hook tends to keep the brake closed. The pawl engages the ratchet and forces the ratchet to slip between the motor gear and flange thereby creating the braking torque.

MOTOR BRAKE

Whenever the hoist motor is energized, the DC magnetic motor brake is energized to pull the armature against the brake compression spring and free the disc type brake linings (see Figure 3-3). When the hoist motor is de-energized, the motor brake is also de-energized and releases the armature, allowing the compression spring to exert force on the disc type brake linings, which in turn apply braking torque to the motor pinion shaft.

These brakes are designed for dc operation. When the hoist power supply is ac, a rectifier assembly is used to provide a dc power supply to the brake.

LIMIT SWITCHES

WEIGHT TYPE UPPER LIMIT SWITCH (Figure 3-4). When the bottom block is in a normal operating position (below the preset upper limit), the re-set weight winds up the spring, positions the limit switch sheave against a stop. The cams are clear of the contact fingers (position 1) so that the hoist circuit contacts (A) are closed and plugging contacts (B) are open. When the bottom block approaches

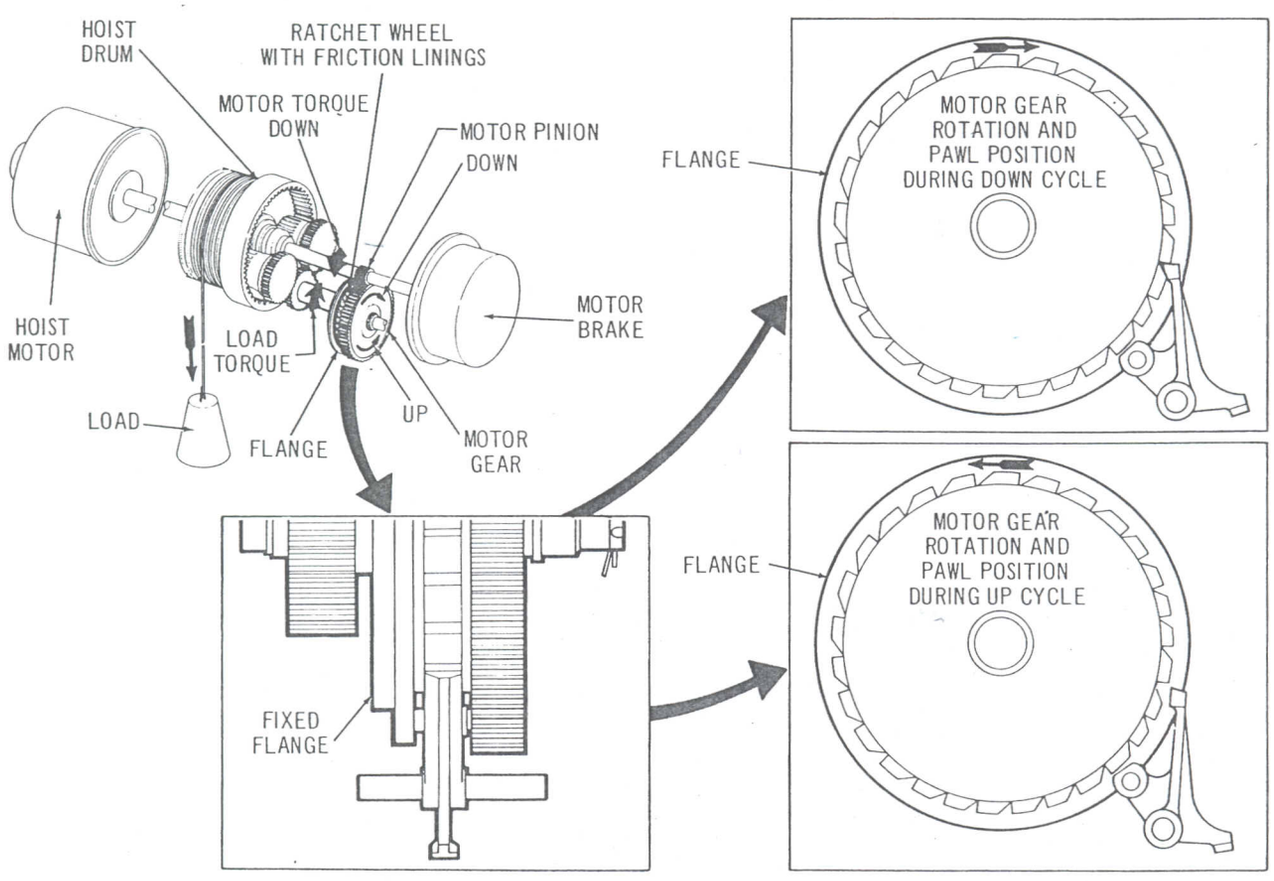

Figure 3-2. Principle of Mechanical Load Brake

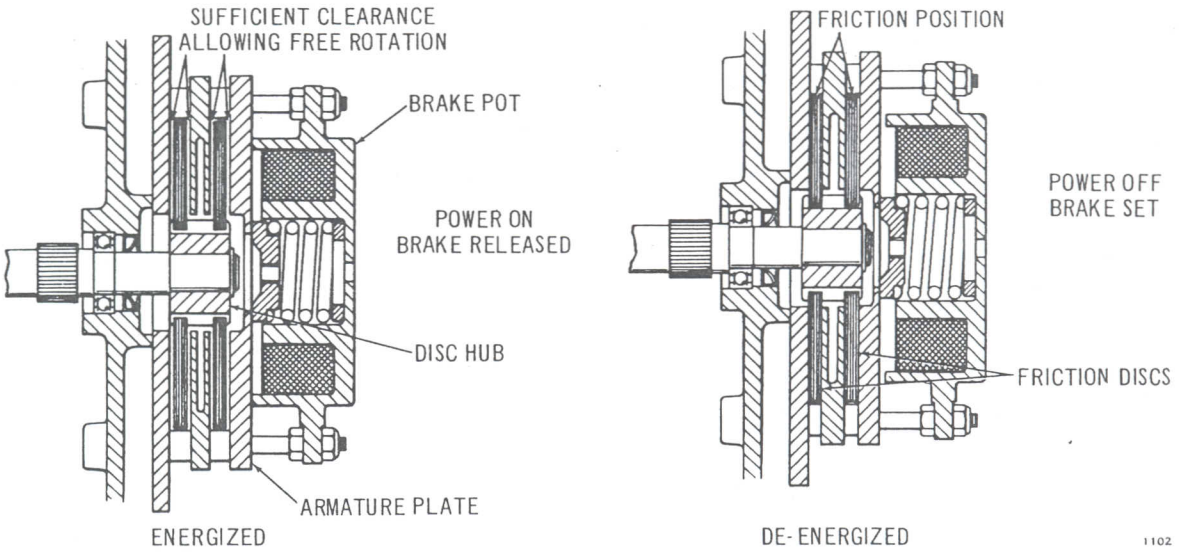

Figure 3-3. Magnetic Motor Brake

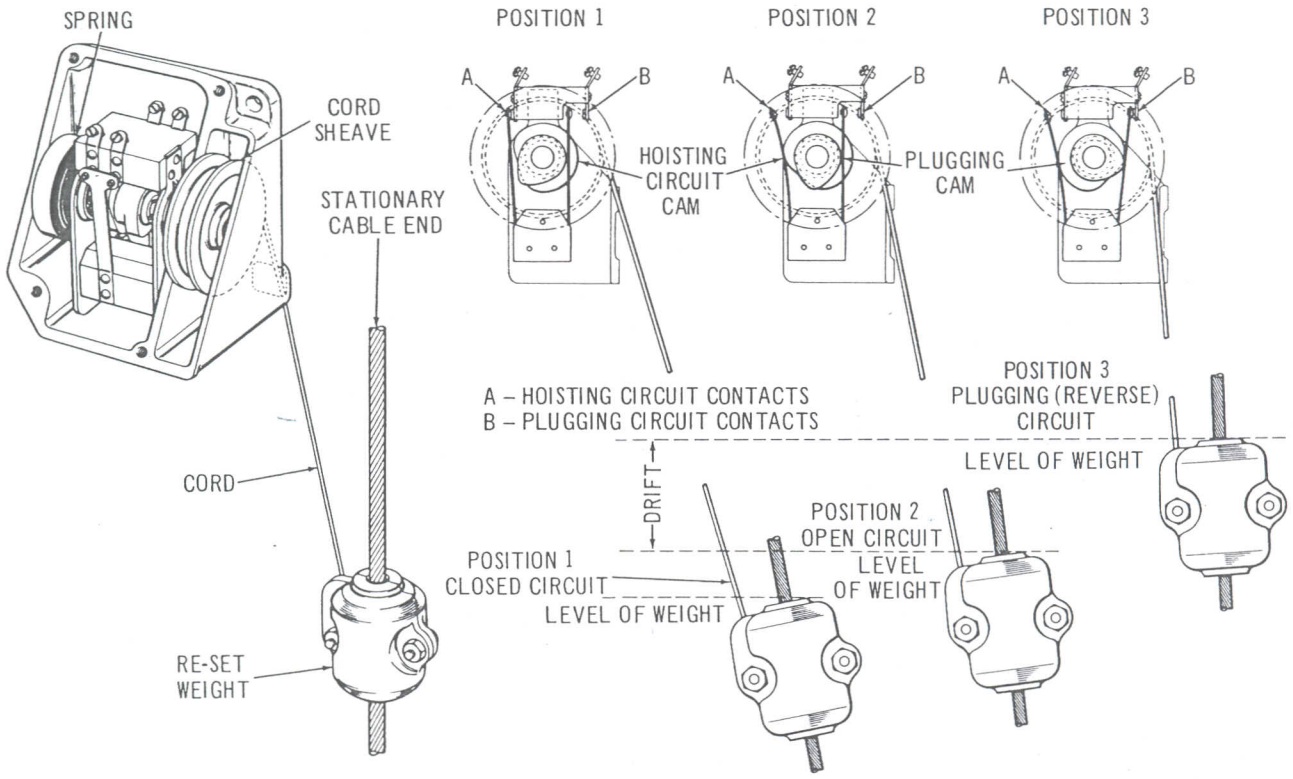

Figure 3-4. Weight Type Upper Limit Switch

its preset upper limit it contacts the re-set weight, raising it to permit spring tension to rotate the switch cams until the hoist circuit cam opens the hoisting circuit contacts (A) to stop the motor and apply the motor brake (position 2). If the bottom block drifts beyond this preset limit, the re-set weight continues to rise and the switch cams rotate still farther until the plugging cam closes the reverse circuit contacts (B) (position 3). This reverses the hoist motor and returns the bottom block to its upper limit position. Should the cord break, the spring will rotate the sheave and cams to a stop where both the hoist contacts (A) and plugging contacts (B) are open.

Under normal operation the hoist motion should stop when the hoisting contacts (A) open as in position 2. The plugging contacts (B) should only close (position 3) if the motor brake malfunctions, causing excessive drift. For brake adjustment see the MAINTENANCE section of this manual.

PADDLE TYPE UPPER LIMIT SWITCHES

PADDLE MOUNTED ON SHAFT. Switch construction is identical to that used for weight type limit switch but no spring or sheave are used. The paddle is mounted directly on the shaft which carries the two cams (Figure 3-5 upper). The weight of the paddle is sufficient to properly position the cams.

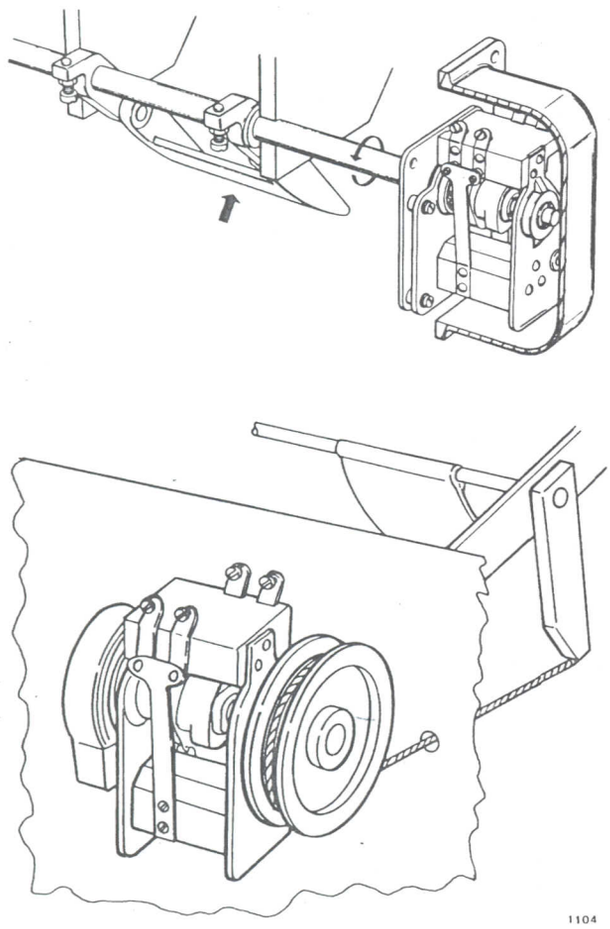

Figure 3-5. Paddle Type Upper Limit Switches

PADDLE MOUNTED ON DRUM HANGER. The spring tension on the sheave is reversed from that on the weight type limit switch. As the bottom block engages the paddle in an upward direction, (Figure 3-5 lower), the cord rotates the sheave which in turn rotates the switch cams until the hoist circuit cam opens the hoisting circuit contacts. If the bottom block drifts beyond this preset limit, the switch cams rotate still farther until the plugging cam closes the plugging circuit contacts. This reverses the hoist motor and returns the bottom block to its upper limit position.

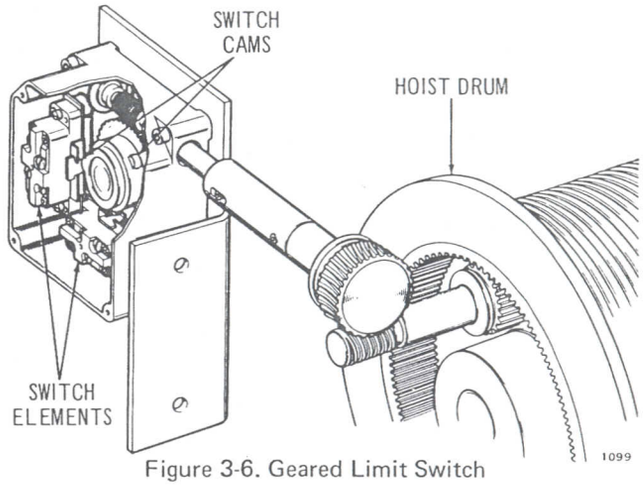

Figure 3-6. Geared Limit Switch

GEARED LIMIT SWITCH. The adjustable geared limit switch opens the RAISE circuit when the bottom block reaches a preset upper limit and opens the LOWER circuit when the bottom block reaches a preset lower limit. The geared limit switch is driven by the drum gear (see Figure 3-6) and actuates after a predetermined number of drum revolutions.

LOAD LIMIT DEVICE (OPTIONAL EQUIPMENT). The load limit device is preset at the factory to open the hoisting circuit when a lift exceeding rated capacity is attempted. If it is not operating properly, contact the P&H Regional Office nearest you.

CONTROL

PUSH BUTTON STATION. Normally, hoist control is actuated through the use of a weather-proof push button station suspended from the control cabinet. The number of push button elements in the station is determined by the number of motions to be controlled from the push button station.

Three types of push button elements are used, depending on the type of control. For single speed control only one speed can be obtained in either direction.

For two speed control, a three contact element is used. By partially depressing the button, motion, direction and slow speed will operate. By completely depressing the button, slow speed drops out and high speed will operate.

For the five step variable speed control, a five step element button is used. Contact with the directional and five speed points is made by progressively depressing the button in increments of approximately one-eigth inch. As the button is depressed additional contact segments are engaged. These contacts actuate contactors which in turn vary the resistance in the motor circuit. As the button is depressed contactors are closed, shorting resistance out of the motor circuit and increasing the motor speed.

Also, with variable speed push button control, timers can be added to the circuitry to provide timed acceleration. When required we normally recommend timers for the last two steps of acceleration (optional).

The wiring between the push button station and the controls is a rubber or plastic covered multiconductor control cable. The push button station is suspended from the control cabinet by a chain which removes the strain from the control cable. Individual wires in the control cable are color coded.

CONTROL PANELS. The control panel is mounted directly on the hoist frame, except when otherwise specified. Figures 3-7, 3-8 and 3-9 illustrate typical control panels for ac operation of hoist and trolley motions.

REVERSING CONTACTOR. The reversing contactor completes the power supply to the motor only when directional control circuits are completed through use of the push button station. The contactor incorporates a mechanical interlock to prevent more than one directional control circuit from being operated at the same time. Individual reversing contactors are used for the hoist motion and trolley motion.

Thermal overload protection on the reversing contactor protects the motor. These thermal overloads are manual reset, except when the automatic reset type are specified and used.

Four pole reversing contactors are used up to 10 HP at 230 volts and up to 20 HP at 460 volts. For larger motors, three pole contactors are used, in which case a separate relay is used to energize the brake coil.

ACCELERATING CONTACTORS. As the six contact points in the push button are engaged, circuits through the reversing and accelerating contactor are actuated accordingly. Each circuit through the accelerating contactors shorts out additional resistance from the motor circuit and increases the motor speed.

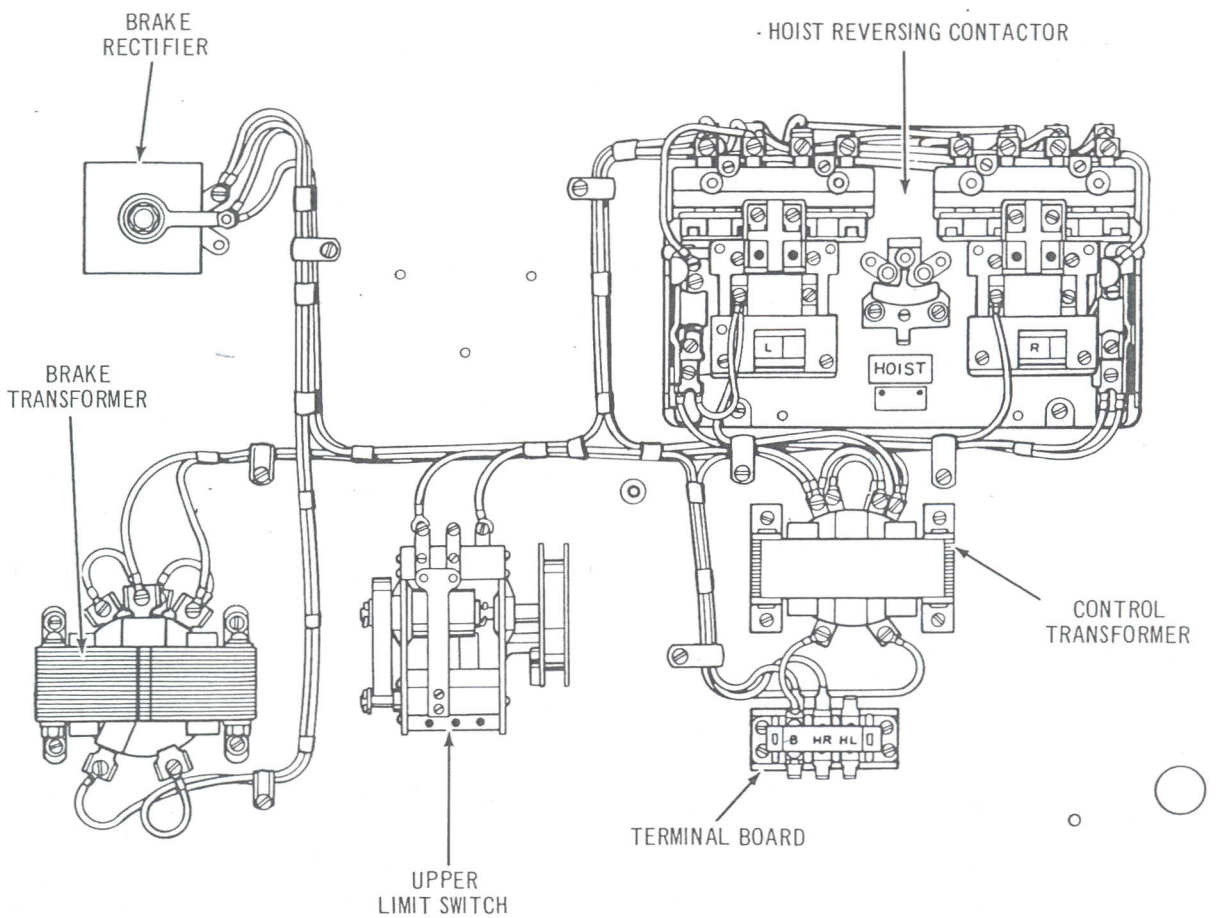

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Figure 3-7. Typical AC Single Speed Hoist Control Only

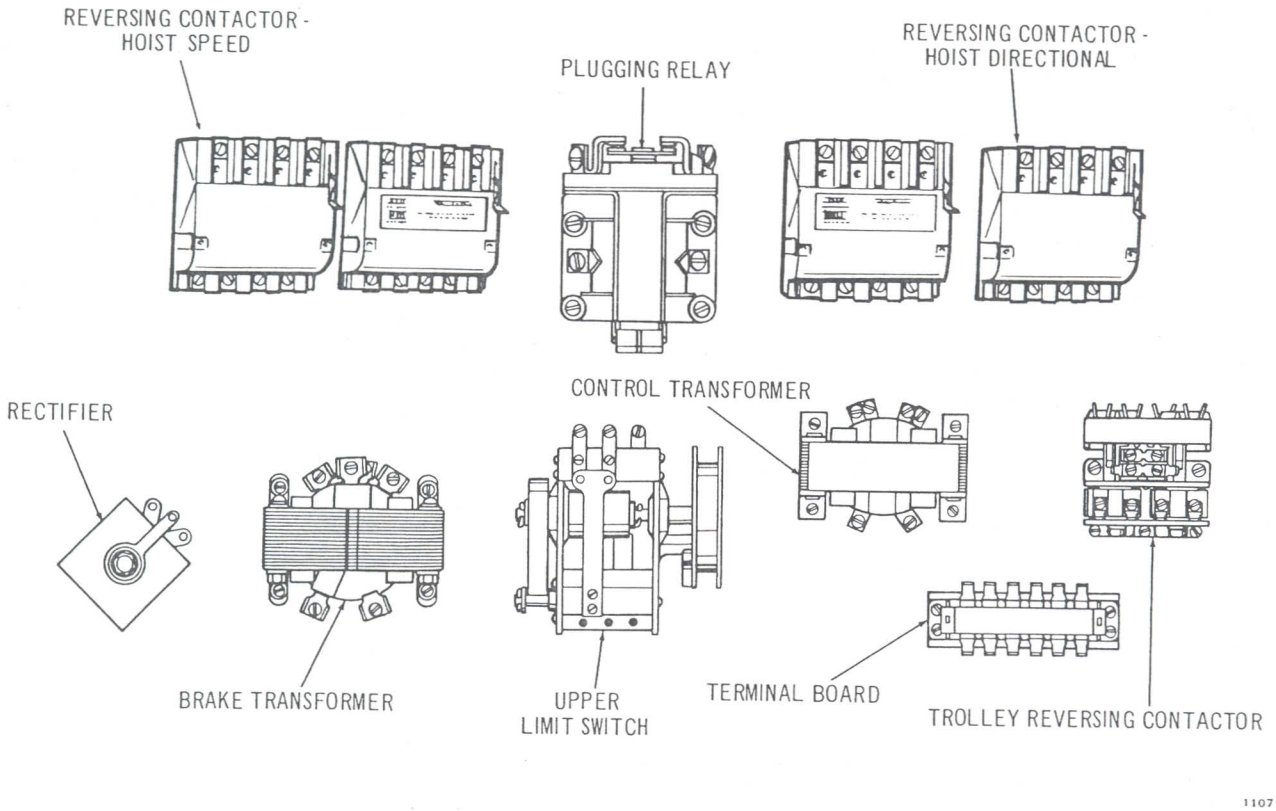

Figure 3-8. Typical AC Two Speed Hoist and Single Speed Trolley Control

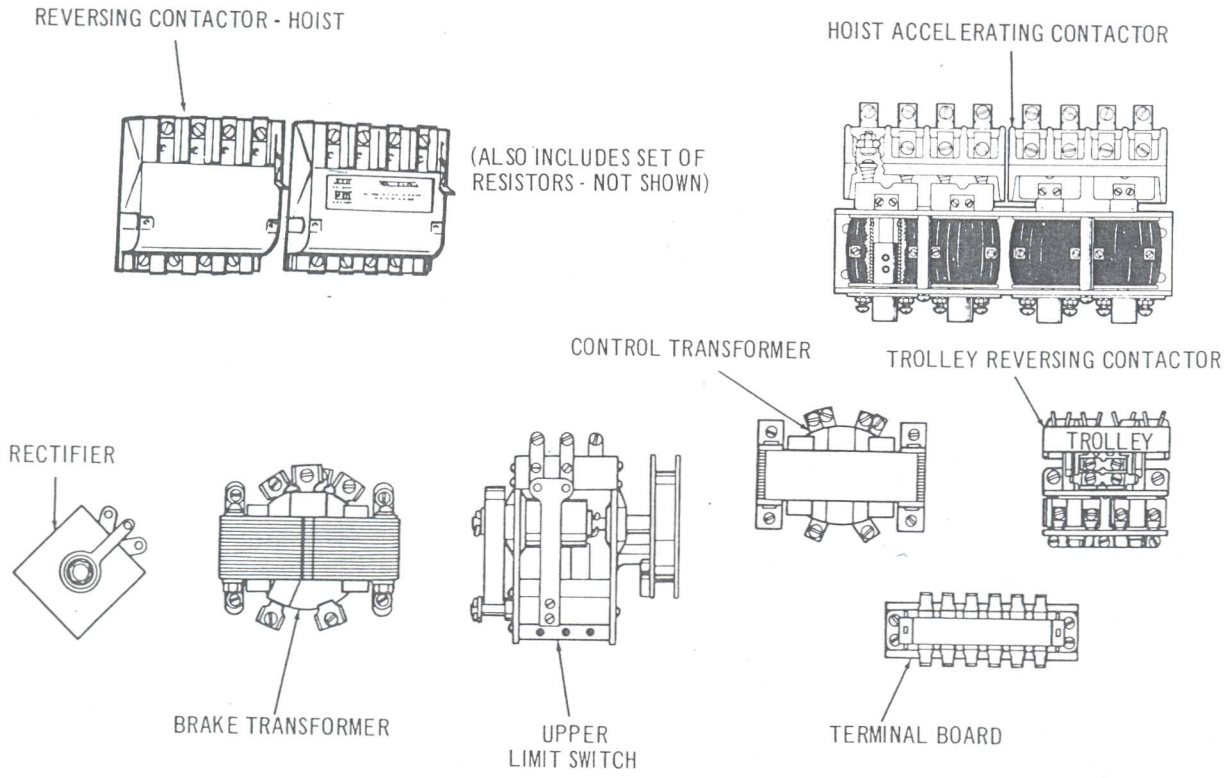

Figure 3-9. Typical AC Variable Speed Hoist and Single Speed Trolley Control Panel

When control requirements do not exceed NEMA size 1 contactor (approximately 30 amps), a four gang single unit contactor is used. For NEMA size 2 and larger contactors, four individual contactors are used to control the motor speed.

TRANSFORMERS. The control circuit transformer is connected to two of the three power supply terminals on 3 phase units. A control may be provided with either one or two transformers, depending upon a customer's requirements. Standard control voltages are 24 and 110 volts.

RECTIFIER. The magnetic brake is designed to operate on direct current. A rectifier is used in all ac control circuits to rectify the current to DC for proper operation of the magnetic brake coil.

PLUGGING RELAY. A plugging relay is used in every two speed hoist control. At the time the weight or paddle operated upper limit switch is engaged, the plugging relay energizes only the low speed windings of the motor and prevents plugging (reversal) in high speed.

SECTION IV
SAFE OPERATING PRACTICES

GENERAL

Most accidents involving hoists are the result of violating a safety rule in operation or of improper maintenance.

The purpose of this section is to assist users of P&H electric wire rope hoists in establishing safety rules for hoist operators and in setting up a proper preventive maintenance program.

NOTE

The Harnischfeger Corporation recognizes that most companies who use hoists have a safety program in force in their plants. In the event that some conflict exists between a rule set forth in this publication and a similar rule already set by an individual company, the more stringent of the two should take precedence.

Reference should also be made to ANSI B30.16, published by the American Society of Mechanical Engineers, and to HMI-100 (74), published by the Hoist Manufacturer's Institute. These documents contain additional information on safety.

OPERATOR QUALIFICATIONS

AUTHORIZED OPERATING PERSONNEL. Only the following personnel should be permitted to operate a hoist:

1. Appointed operators.

2. Maintenance and test personnel, when required to do so in the performance of their duties.

3. Inspectors.

OPERATOR TESTING. Every employer should require that all persons who will be authorized to operate a hoist first pass an examination which accurately measures practical knowledge of electrical wire rope hoists.

PHYSICAL AND MENTAL CONDITION. An operator must meet the following physical and mental qualifications:

1. An operator must possess good hearing ability and vision (corrected or uncorrected.) Good depth perception is also required where load spotting must be accomplished at some distance from the operator.

2. An operator must not be afflicted with any known health condition which could cause a sudden inability to react quickly.

3. An operator who is taking medication prescribed by a doctor should be made to present written assurance from his doctor that the medication will not affect the operator's ability to operate the hoist in a safe manner.

4. An operator who is known, or suspected, to be under the influence of alcohol or drugs must not be allowed to operate a hoist under any circumstances.

SAFE OPERATING PRACTICES

GENERAL. The following are general requirements for safe hoist operation:

1. It is the operator's responsibility to fully acquaint himself with the hoist before attempting to operate it. Know the hoist's rated capacity, its type of control system (single-speed or variable-speed) and the function of all operating controls.

2. Verify that all required periodic lubrication and other periodic maintenance have been accomplished before beginning operation at the start of a shift.

3. If any adjustments or repairs are necessary or if any damage is known, or suspected, the operator must report same to his supervisor or other duly appointed person. The next operator must also be informed upon changing shifts, if the known deficiency has not been corrected.

4. A hoist must not be operated if there is an "out of order" sign, or similar warning sign, hung on the control pendant or main disconnect switch. A sign of this type should be removed only by the person who originally placed the sign, or some other designated person.

5. All operating controls shall be tested at the beginning of each shift. If any malfunction appears, it shall be corrected before actual operations are begun.

6. Before starting up the hoist, make certain that all personnel are clear of the area.

7. Keep your hands clear of the hook block and other moving parts when starting up the hoist.

SAFE LOAD HANDLING. Observe the following while actually handling loads:

1. No hoist shall be loaded beyond its rated capacity, except when conducting properly authorized and supervised load tests.

2. The load shall be attached to the hook block by means of a sling or other approved device. Under no circumstances shall the hoist rope be wrapped around the load.

3. The sling, or other approved lifting device, must be fully seated in the saddle of the hook before beginning a lift.

4. Check the hoist rope to make sure that it is not kinked or twisted, or that multiple part ropes are not twisted about each other. Also check to insure that the hoist rope is properly seated on the drum and in the sheaves.

5. With the load lifted only a few inches, check to make sure that the load is properly balanced. If an unbalance exists, lower the load and reconnect the sling to achieve the proper balance.

6. Always inch the hoist into engagement with the load and, after checking for proper load balance, raise the load steadily to the desired height. Avoid unnecessary or sudden stops and starts when raising a load.

7. The hook block must be centered over the load (hoist rope vertical) when the lift begins.

NOTE

An exception can be made to rule 7 only with approval from a person appointed to authorize off-center lifts. Assurance must be given by this person that the hoist, its trolley, or its mounting structure will not be overstressed in making the lift. In general, P&H electric wire rope hoists are not designed for off-center lifts.

8. At all times, avoid carrying loads over people.

9. Use extreme care to avoid contacting any obstruction with a moving load.

10. Never leave a load suspended in the air unattended. The operator must remain at the controls ready to take action in the event of holding brake failure.

11. The upper limit switch is intended solely as a safety device. It must not be used as a normal operating control. Unnecessary actuation of the upper limit switch shall be avoided.

12. A load or the hook block shall not be lowered below the point where less than two full wraps of wire rope remain on the drum, unless a lower limit device is provided. If a lower limit device is provided, the load or hook block shall not be lowered below the point where less than one full wrap of wire rope remains on the drum.

MOTOR BRAKE TEST FOR NEAR CAPACITY LOADS. Each time that a capacity or near capacity load is to be lifted, the motor brake shall be tested for its ability to hold the load suspended. Make this test with the load lifted just a few inches off the floor, or other support. If the motor brake fails to hold, do not attempt to handle the load until the brake has been adjusted or repaired, as applicable.

HANDLING PERSONNEL. Personnel shall not be allowed to ride the hook or the load under any circumstances. Nor shall a P&H electric wire rope hoist be applied to manlift cage or passenger elevator service. These hoists are not designed to safely handle personnel, and no attempt should be made to modify them in any way for the purpose of adapting them to a personnel handling application.

INSPECTION

GENERAL. Regular, periodic inspection is essential to continued safe performance of a hoist. Careful inspection on a regular basis will reveal potentially dangerous conditions while still in the early stages, allowing corrective action to be taken before the condition becomes dangerous.

Any deficiency revealed through inspection shall be reported to an appointed person. A determination must be made as to whether a deficiency constitutes a safety hazard before resuming operation of the hoist.

RECORDS AND REPORTS. Some form of inspection record shall be maintained for each hoist, listing all points requiring periodic inspection. A written report should be made monthly on the condition of the critical parts of each hoist. These reports should be dated, signed by the person who performed the inspection, and kept on file where they are readily available to authorized personnel.

DAILY INSPECTION. Hoists in regular service shall be inspected daily, or at the start of each shift, for damage, wear, operating malfunctions and other defects. This inspection shall include, but not be necessary limited to, the following items:

1. All operating controls for proper function.

2. Upper and lower limit switches (as applicable) for proper operation and adjustment.

3. All running wire ropes for twists, kinks, distortion, excessive wear and improper dead-ending.

NOTE

A more thorough inspection procedure for running wire ropes is described in Section V of this manual.

4. Check the hook for the following:

a. Deformation.

b. Chemical damage (if hook is exposed to corrosive chemicals or atmosphere).

c. Throat opening in excessive of 15 percent of normal.

d. A twist of more than 10 degrees from the plane of an unbent hook.

NOTE

Without exception, an excessively bent or twisted hook must be replaced. An excessive throat opening and/or a severely bent hook indicates that the hoist has been abused or overloaded. In this case, all other load bearing components of the hoist must be carefully examined on a daily basis until there is assurance that no damage has occurred to those components.

PERIODIC INSPECTION. Periodic inspection refers to those inspections which are performed at intervals ranging from one month to one year. Guidelines for establishing intervals under varying operating conditions are contained in Section V (Maintenance). Periodic inspection shall include, but not necessarily be limited to, the following:

1. Wire rope used in hoisting loads shall be thoroughly examined for all conditions that could impair its ability to safely perform its rated work. Refer to the topic "Maintenance of Wire Rope" in Section V of this manual for details.

2. Check the hoist drum and all running sheaves for cracks, excessive wear, misalignment and other defects.

3. Check the motor brake for worn discs, misadjustment or other defects.

4. Check the entire hoist unit and trolley for loose bolts or rivets.

5. Check the contactors in the control panel for excessively pitted or worn contacts, loose electrical connections, weak springs and defective wiring. Check the limit switches and controller pushbuttons in the same manner.

6. Check the hook to insure that it is properly secured in its block. Also check the hook safety latch (if so equipped) for damage or restricted movement.

7. Check parts such as gears, shafts, pins and bearings for corrosion, wear, cracks or distortion.

8. At least annually, inspect the hook for cracks using dye penetrants, magnetic particle or other suitable crack detecting method.

HOISTS NOT IN REGULAR USE. A hoist that has been idle for a period of time must be checked out as follows, before returned to service:

1. A hoist which has been idle for at least one month but less than six months shall be inspected in the manner described under the topic, "Daily Inspection", above, by or under the direction of a designated person. Also refer to item "3" below.

2. A hoist which has been idle for a period of six months or longer shall be given a complete inspection in the manner described under "Daily Inspection" and "Periodic Inspection", above. Also refer to item "3", following.

3. All wire rope that remained on the hoist during an idle period of one month or more shall be given a thorough inspection before placing the rope in service. This inspection shall be for all types of deterioration, as described in the "Maintenance of Wire Rope" topic in Section V of this manual, by an appointed person whose approval is required for further use of the rope. A written, dated and signed report on the condition of the rope shall be filed.

MAINTENANCE

GENERAL. A good preventive maintenance program includes regular lubrication, periodic adjustments and the immediate correcting of defects revealed through daily and

periodic inspection. Preventive maintenance combined with careful inspection at regular intervals not only contributes greatly to safe hoist operation, but also will extend the useful service life of the hoist.

The preventive maintenance program set up by the hoist user should be based on the recommendations made in Section V of this manual. Detailed records of maintenance performed should be kept for each hoist.

SAFETY PRECAUTIONS. Observe the following safety precautions when performing maintenance of any type:

1. Open and lock the main disconnect switch in the electrical line feeding the hoist.

2. Install "out of order" signs or similar warning signs on both the main disconnect switch on the pendant pushbutton station.

3. The warning signs shall be removed only by the person who installed them, or by some other designated person.

4. Upon completion of the required maintenance, the hoist shall not be operated until all guards have been reinstalled, and until limit switches and load limit devices have been reactivated.

LUBRICATION. Lubrication requirements are spelled out in Section V of this manual. The recommended intervals and product specifications must be adhered to.

CAUTION

The hoist must not be running while lubricants are being applied.

ADJUSTMENTS. Observe the following in making adjustments.

1. Replace all critical parts which are cracked, broken, bent or distorted, or which in any way could result in an unsafe condition, as revealed through daily and periodic inspection.

2. Replacement parts should be obtained from the Harnischfeger Corporation.

3. Defective electrical contacts should be replaced only in complete sets.

4. Keep pendant control stations clean and the function labels legible.

5. Damaged or missing warning labels shall be immediately replaced.

TESTING

GENERAL. Prior to returning an altered or repaired hoist, or a hoist that has not been used for preceding 12 months, to service, the following operation and load tests shall be performed.

OPERATIONAL TESTS. Perform the following to verify proper operation of a hoist:

1. After applying electrical power to the hoist, lower and raise the hook block a number of times to insure the accuracy of the control markings and to check the general condition of the hoist.

2. Check the operation of the motor brake. A properly functioning motor brake will stop an empty hook within a distance equal to one inch/10FPM of rated hoist speed, following release of the control button.

3. Test the operation and settings of the upper limit switch and lower limit switch (if so equipped). If practical, the initial actuation in the test should be by hand. Following actuation by hand, or if hand actuation is impractical, actuate the limit switches by operating the hoist at the slowest possible speed. Hook block drift at the upper limit shall leave the hook block safely below the rope drum or any other part of the hoist, even at maximum speed. The lower limit switch shall actuate and cause the hook block to stop at a point which allows at least one full wrap of wire rope to remain on the drum. Inoperative limit switches must be readjusted, repaired or replaced, as applicable, before resuming normal hoist operation.

4. All anchorages and/or suspensions, the trolley, the trolley beam and other supporting components shall be approved by an appointed person.

LOAD TEST. The load test shall be made with a load equal to 125 percent of the hoist's rated capacity, unless a hoist is equipped with an overload device. A hoist equipped with an overload device shall be tested with a 100 percent load. A test of the overload device itself shall follow the load test.

All load tests shall be performed by, or under the direction of, an appointed person.