CLASS 22-523 HOIST DRIVE WITH D.C. DYNAMIC BRAKING

SYSTEMS TESTS AND ADJUSTMENTS

A. INITIAL ADJUSTMENTS

1. Power OFF
   a. Open main disconnect, 1SW
   b. Master switch in OFF or all pendant buttons released.
   c. Hand operate relays and contactors to check freedom of movement.
   d. Check all connections for tightness.
2. Power ON
   a. Close main disconnect 1SW.
   b. Push RESET button. Master relay MR and main contactor M pick up and seal in.
   c. The drive is now ready for use.

B. RUNNING THE DRIVE

When starting the drive, make sure there is no load on the hook, and that the hook is well clear of the limit switch. Move the master switch to first point, or depress hoist pendant button to first point, and observe that the brake releases, and the drive moves at slow speed in the hoist direction. If drive moves in the lower direction, interchange main line motor leads T1 and T3.

In the lower direction, all speed points except the last are for dynamic lowering. Unloaded drive will not move. With load, lower speed is dependent on load and position of the master switch or pendant button. At maximum speed lower, the drive will drive down. If drive is heavily loaded, regeneration will occur to limit speed.

C. STOPPING THE DRIVE

If drive is operating in the hoist direction, moving the master switch to OFF, or releasing the HOIST pendant button will de-energize the directional contactor and set the brake.

If drive is operating in the lower direction, the master switch or lower pendant button should be moved to first point lower until the dynamic braking circuit has slowed the drive down before going to the OFF position. This will save wear on the brake.

D. UP LIMIT SWITCH

Run the empty hook into the Up Limit switch at low speed. Drive should de-energize. Return the master switch to OFF or release HOIST pendant button. The drive will not be energized in the hoist direction, but will power out of the overtravel if control is moved in the lower direction.

To be sure of enough mechanical clearance between the hook and bridge frame, continue to run the hook into the up limit switch at ever increasing speeds to maximum speed. This will show the maximum distance required to set the brake, and arrest hook motion safely.

E. DOWN LIMIT SWITCH (IF USED)

Operation of the down limit switch is the same as the up limit switch except in the opposite direction. The drive will not be energized if the control is moved in the lower direction, but will power out of the overtravel when control is moved in the hoist direction.

DESCRIPTION OF OPERATION

The hoist drive controller is a Class 22-523 magnetic, reversing, multi-point controller with DC dynamic braking.

The control description that follows is written with respect to the schematic diagram located in the drawing section of this manual.

A. STANDBY CONDITIONS

To place the equipment in a standby condition, ready for normal operation, a certain sequence of operations must be performed to properly energize the control. These operations are as follows, beginning with the assumption that the equipment is completely de-energized with the knife switch open, and master switches in the off position or all pendant buttons released.

Close main disconnect 1SW, and depress RESET button to pick up M and MR to apply 460 volt, 3 phase, 60 hertz excitation to the following circuits:

The primary of the control transformer.
The primary of the dynamic braking transformer.
The primary of the load brake transformer.

The closing of main contactor M causes a contact of M and MR to seal in M and another contact of MR seals in MR and supplies excitation to the rest of the control circuits.

M and MR will remain picked up throughout normal operation of the drive, but will drop out to shut down the control in the event of an overload of any motor or in the event of low voltage.

The drive may now be considered in a standby condition ready for operation.

B. HOISTING OPERATION

Moving the control to first point hoist energizes the directional contactor HH and brake contactor HB. Contacts of HH close to energize the motor in the hoist direction. Contacts of HB close to supply DC power to release the brake. As the control is moved higher speed hoist points, motor secondary resistance is shorted out by secondary contactors to increase motor speed. Timing relays are used to insure that secondary contactors are picked up in the proper sequence, and that the motor is allowed acceleration time between steps.

C. LOWERING OPERATION

Moving the control to first point lower energizes dynamic braking contactor HDB to apply DC current to the motor winding. Current relay HCR, control relay HLCR, and brake contactor HB pick up. Secondary contactors are also picked up to short out some secondary resistance.

Moving the control further towards full speed lower drops out secondary contactors to increase secondary resistance, and thus reduce the braking effect of the DC current.

When last point lower is reached, HDB drops out removing the DC power from the motor, and directional contactor HL is energized. The motor will now drive in the lower direction. Secondary contactors are energized to reduce motor secondary resistance, and limit possible motor speed.

D. STOPPING THE DRIVE

If the drive is operating in the hoist direction, moving the master switch to OFF, or releasing the HOIST pendant button will de-energize the directional contactor and set the brake.

If the drive is operating in the lower direction, the control should be moved to first point lower, until the dynamic braking circuit has slowed the drive down before going to the OFF position. This will save wear on the brake.

E. LIMIT SWITCHING

If a limit switch is tripped, return the master switch to OFF, or release pendant button. The drive can be energized only in direction to back out of the overtravel.

F. PROTECTIVE FEATURES

The motor is protected from overload by relay HOL. If an overload occurs, a contact of this relay will open, de-energizing MR and M, and thus removing all power from the crane. The crane must be reset before the drive can be restarted.

In the event of undervoltage, MR and M again will be de-energized, and the crane must be reset before any drive can be restarted.

Control fuses protect control transformers from overloads. Fuses are also provided to protect the dynamic braking circuit from overloads.

TROUBLESHOOTING

A. MAIN CIRCUITS

If motor amperes are appreciably different from normal, check motor and resistor circuit wiring for completeness and agreement with schematic diagram.

B. CONTROL CIRCUITS

1. Main Line Contactor M

Main power RESET button depressed. M does not pick up.

Check for:

AC power available.

Crane disconnect switch 1SW open.

MR contact open.

Overload relay contact open.

STOP button contact open.

Fuse blown in M coil circuit.

115 volt control power from 1T not available.

2. Brakes

If the holding brake does not release, check for mechanical binding, coil excitation when the brake contactor is picked up, or circuit continuity.

If the DC dynamic brake is not working, check for blown fuse (3FU, 4FU, or 5FU), and for DC power at motor terminals when HDB is energized.

C. GENERAL

If the drive is malfunctioning from none of the above causes, the adjustment procedure outline in the Systems Test and Adjustment section should be followed in detail.

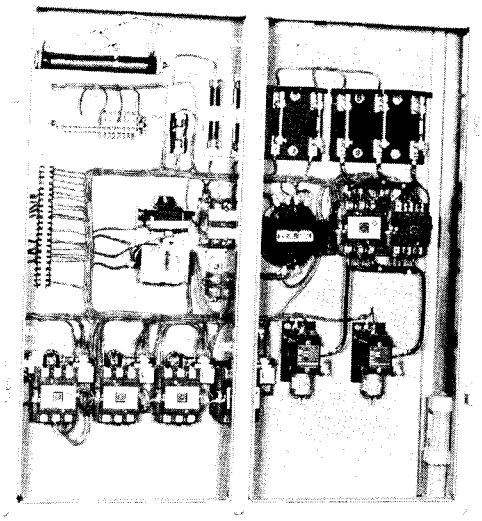
CLASS 22-526 TRAVEL DRIVE

SYSTEMS TESTS AND ADJUSTMENTS

A. INITIAL ADJUSTMENTS

1. Power OFF
   a. Open crane disconnect, removing all power from the crane.
   b. Hand operate relays and contactors to check for freedom of movement.
   c. Discard red spacers in dashpots of motor overload relays. Add red oil to 1/4 inch depth in dashpots. These overload relays are factory set, and do not need adjustment.
   d. Check all connections for tightness.

2. Power ON
   a. Close crane disconnect. Close any switches inside the control cabinet.
   b. Depress main power ON or RESET button to energize main contactor M.
   c. Main contactor M picks up and seals itself in. The drive is now ready for use.



B. RUNNING THE DRIVE

When starting the drive, be sure it is unloaded and well clear of any travel limits. Move the control to first point forward, and observe that the brake releases, and that the drive moves at slow speed in the forward direction. If the drive moves in the reverse direction, interchange main line motor leads T1 and T3.

For multi-motor drives, each motor should be checked independently for direction of rotation.

C. STOPPING THE DRIVE

Moving the control to the OFF position will de-energize the directional contactor, and remove power from the motor.

If there is no brake, the drive will coast to a stop.

If there is a time delayed brake, the drive will coast until the timer times out, and the brake sets.

If there is an instantaneous brake, the brake will set, and brake the drive to a stop as soon as the control is moved to the OFF position.

If instantaneous brakes are not used, the drive can be stopped by plugging. If the drive is moving forward, the control can be moved to reverse until the motion is nearly stopped, and then moved to OFF. This will stop the drive much faster than coasting to a stop.

D. LIMIT SWITCHES (IF USED)

Run the drive into the forward limit switch at low speed. Drive will de-energize. Return the control to OFF. The drive will not be energized if the control is moved in the forward direction, but will power out of the overtravel if the control is moved in the reverse direction. To be sure of enough mechanical clearance, continue to run the drive into the forward limit switch at ever increasing speeds to maximum speed. This will show the maximum distance required to stop the motion safely.

The reverse limit switch should be set up in the same manner as the forward limit switch.

DESCRIPTION OF OPERATION

The travel drive controller is a Class 22-526 magnetic, reversing, plugging, multi-point controller.

The control description that follows is written with respect to the schematic diagram located in the drawing section of this manual.

A. STANDBY CONDITIONS

To place the equipment in a standby condition ready for normal operation, a certain sequence of operations must be performed to properly energize the control. These operations are as follows, beginning with the assumption that the equipment is completely de-energized with crane disconnect open, master switch in OFF or all pendant buttons released.

Close crane disconnect. Check to be sure all switches inside control cabinet are closed. Depress main power ON or RESET button to close main line contactor M. The closing of main line contactor M applies excitation to the individual crane drive controls.

Main line contactor M will remain picked up throughout normal operation of the drive, but will

drop out to shut down all controls in the event of low voltage or motor overload.

The drive may now be considered in a standby condition, ready for operation.

B. RUNNING THE DRIVE

Moving the control to first point forward energizes the forward directional contactor, and the drive starts with maximum secondary resistance in the circuit. As control is moved further forward, secondary contactors are energized to decrease secondary resistance, and thus increase the speed of the drive. When last point forward is reached, secondary resistance is reduced to the minimum, and the drive is running at maximum speed. Timers are provided to insure that acceleration time is allowed between speed points.

Reverse operation is the same as forward operation except that the reverse directional contactor is energized, and the drive runs in the reverse direction.

C. STOPPING THE DRIVE

Drives with no brakes are normally stopped by plugging the drive. If the drive is running forward, the control can be moved to reverse to decelerate the drive, until it is nearly stopped. Then the control is moved to OFF. If the control is moved directly to OFF, the drive will coast to a stop.

Drives with time delayed brakes may be plugged as described above. If the control is moved immediately to OFF, the drive will coast until the timer has timed out, and the brake sets.

Drives with instantaneous brakes will brake to a stop, if the control is moved to OFF. Wear on the brake can be saved by slowing the drive at first point before going to OFF.

D. LIMIT SWITCHES (IF USED)

If a limit switch is tripped, return the master switch to OFF, or release pendant button. The drive can be energized only in a direction to back out of the overtravel.

E. PROTECTIVE FEATURES

Motor overload protection is provided by the overload relays. In the event of an overload, the overload relay contact opens, and drops out main line contactor M, removing all power from the crane and setting all brakes.

Control transformers are protected from any overload by fuses.

TROUBLESHOOTING

A. MAIN CIRCUITS

If motor amperes are appreciably different from normal, check motor and resistor circuit wiring for completeness and agreement with the schematic diagram.

B. CONTROL CIRCUITS

1. Main Line contactor M

   Main power ON or RESET button depressed. M does not pick up.

   Check for:

   AC power available.

   Crane disconnect open

   Overload relay contact open.

   Fuse blown in M coil circuit.

   115 volt control power not available.

2. Brakes (if used)

   If the brake does not release, check for mechanical binding, coil excitation when the brake contactor is picked up, or circuit continuity.

C. GENERAL

If the drive is malfunctioning from none of the above causes, the adjustment procedure outlined in the Systems Tests and Adjustments section should be followed in detail.