

ARROW - MASTER
MOBILE HYDRAULIC HAMMER

MODEL 1350
Service Manual

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SERIAL NUMBER: _____

SOLD AND
SERVICED BY: _____



ARROW-MASTER, INCORPORATED

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Electrical System

ELECTRONIC CONTROL STATION

Electronic Control Station Replacement

1. Remove the screws securing the Electronic Control Station to the control panel.
2. Pull the Electronic Control Station back and out of the panel.
3. Unscrew the electrical connector from the back of the Electronic Control Station.
4. Reinstall the new Electronic Control Station by reversing the above procedure.
5. The old Electronic Control Station may be returned to Arrow for repair.

PROXIMITY SENSOR

The procedures for replacing and adjusting the proximity sensor are located in the "Adjustments" section.

Used on S/N 6300 - 6909

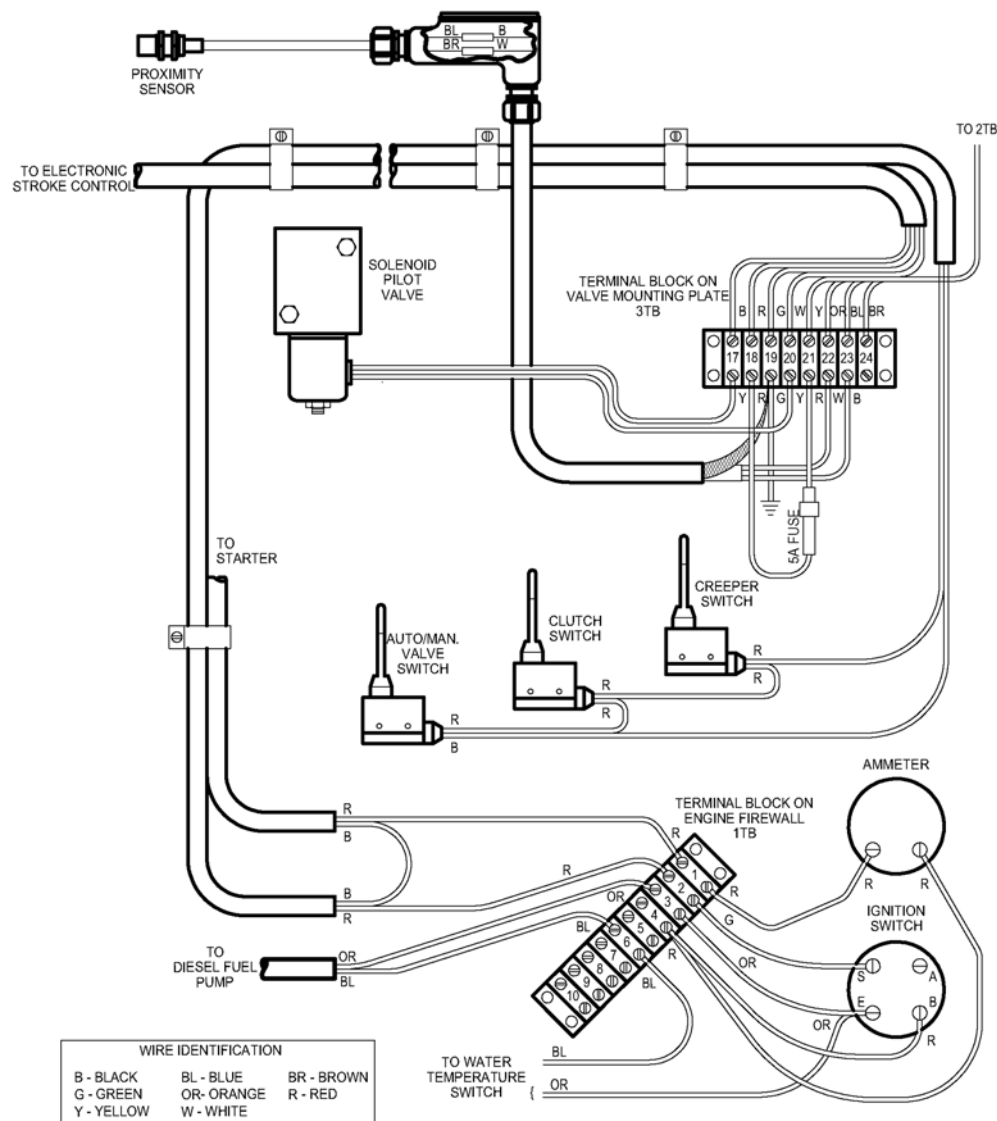
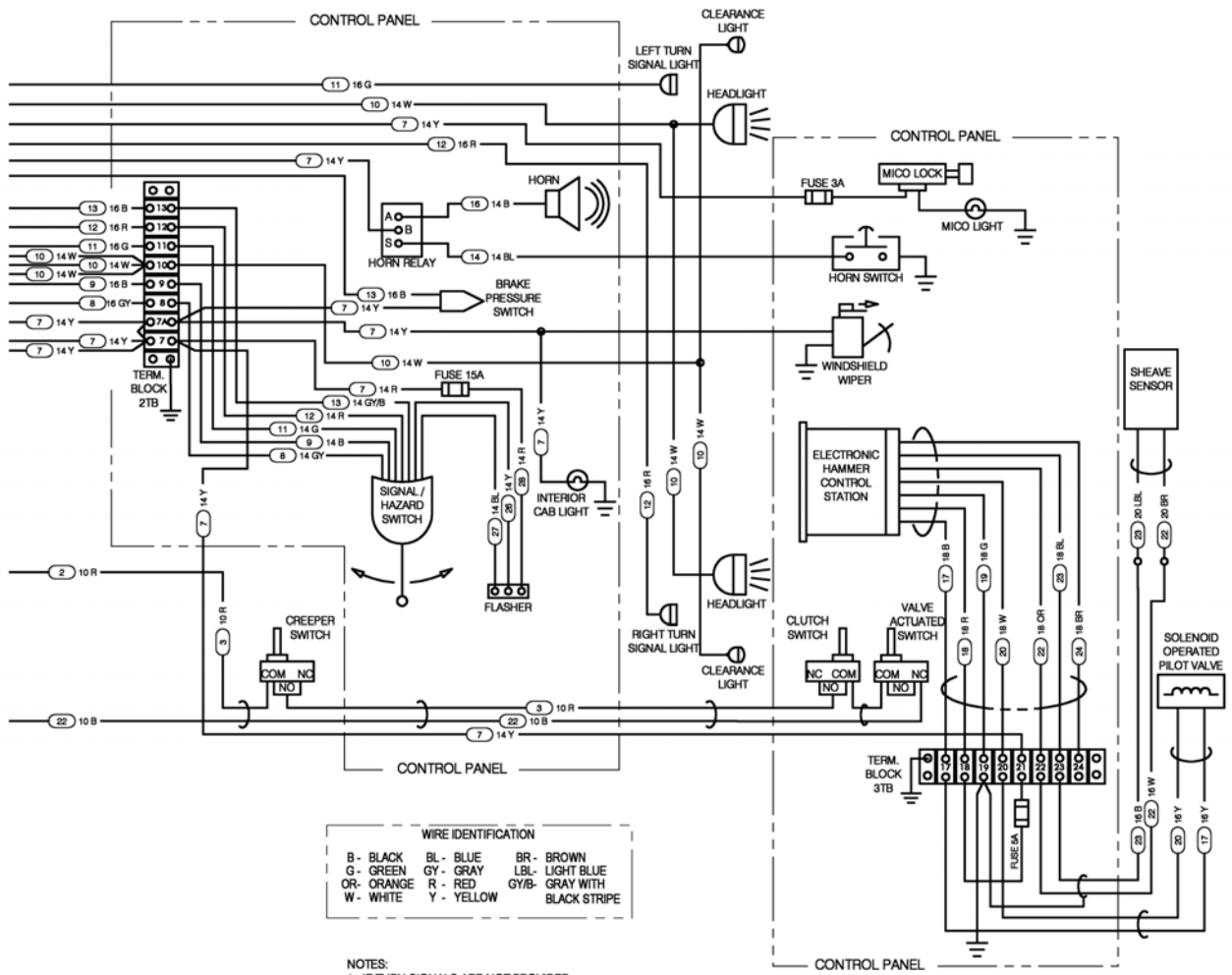


Figure 11-1
Wiring Connections - Starter Interlock
and Electronic Control Station



**WIRING DIAGRAM
ELECTRONIC STROKE**

FRONT MOUNTED GAUGES

CADD6\GCD\HMMR\WS-WS-0134e.dwg

Trouble Shooting

Table 12-1
General Trouble Shooting

PROBLEM	POSSIBLE CAUSE	REMEDY
Engine will not crank.	<p>Interlock switch actuated.</p> <p>Defective interlock switch.</p> <p>Defective valve switch.</p> <p>Defective starter relay on firewall.</p> <p>Improper connection or blown fuse.</p>	<p>Check starting circuit interlock switches. (Automatic stroke control lever must be in the "man/start" position, creeper drive must be disengaged, and the clutch pedal must be depressed).</p> <p>Check and replace interlock switch.</p> <p>Check and replace valve switch.</p> <p>Check and replace starter relay.</p> <p>Check all connections. Check and replace blown fuse(s).</p> <p>Refer to Engine Manufacturer's Service Manual for additional information on engine starting problems and general service requirements.</p>
Noisy hydraulic system	<p>Low oil level.</p> <p>Cold oil.</p> <p>Improper oil.</p> <p>Contaminated oil.</p> <p>Valve left in operating position and oil is passing over relief valve.</p> <p>Air is entering the hydraulic system.</p> <p>Air can enter intake hoses at clamps or defective hoses between the oil reservoir and pump. Air entering the intake side of the pumps will make them very noisy. Air in the system can be detected by the milky appearance of the oil. Sometimes, oil will foam. Air can enter a pump intake without a visible oil leak.</p> <p>Defective or worn hydraulic pumps.</p>	<p>Add oil to correct level.</p> <p>Allow machine to idle until oil has warmed up sufficiently.</p> <p>Refer to Hydraulic Fluid - Recommendations in the Fuels, Fluids, & Lubricants section of the Operator's Manual.</p> <p>Replace with new oil and new filter cartridge. NEVER USE GASOLINE FOR SYSTEM CLEANING OR FLUSHING THE HYDRAULIC SYSTEM.</p> <p>Center control valve to neutral position.</p> <p>Tighten connectors.</p> <p>Replace pumps.</p>

Table 12-1
General Trouble Shooting - (cont'd.)

PROBLEM	POSSIBLE CAUSE	REMEDY
<p>Hydraulic creeper will not work.</p>	<p>Creeper engaging lever or linkage not in the correct position.</p> <p>Creeper interlock is not engaged.</p> <p>Creeper valve is not operating properly.</p> <p>Low or no hydraulic pressure.</p> <p>Creeper bypass valve is sticking.</p> <p>Defective hydraulic parking brake.</p> <p>Defective creeper motor.</p> <p>Defective internal mechanism.</p>	<p>Engage the creeper lever. Operate the creeper control to engage the gears. Check for missing pins, key, and spring.</p> <p>Engage the creeper interlock (transmission must be in neutral position).</p> <p>Check the creeper valve cam and linkage. Release the parking brake.</p> <p>Replace defective hoses. Check for proper oil level and fill as needed. Refer to the "Hydraulic Pressure Adjustment" section of this manual for adjustment procedures.</p> <p>Remove and disassemble. Check for broken or sticking parts.</p> <p>Repair or replace.</p> <p>Repair or replace.</p> <p>Remove and inspect the creeper motor. Repair or replace.</p>
<p>Side shift will not work.</p>	<p>Defective or worn side shift motor.</p>	<p>Replace defective motor. Refer to the following procedures to check for a worn or scored side shift motor.</p> <ol style="list-style-type: none"> a. Make certain the control valve pressure is correct and the oil temperature is normal. b. Set the engine speed control lever to the "FAST" position and push the side shift control lever forward until the carriage reaches the extreme right end travel (if the side shift will move). c. Remove the bottom hose from the side shift motor. This is a non-pressure hose when the control lever is pushed forward. Screw a pipe cap on the end of the removed hose, and install a length of clean, low-pressure drain hose in the bottom port of the motor. Place the other end of the hose in a clean, 5-gallon container. d. With the engine speed control lever in the "FAST" position, hold the side shift control lever forward. If the motor fills the 5-gallon container in less than one minute, the motor is defective and should be replaced. <p>NOTE: REPLACEMENT OF THE HYDRAULIC MOTOR IS RECOMMENDED INSTEAD OF ATTEMPTING TO MAKE FIELD REPAIRS.</p>

Table 12-1
General Trouble Shooting - (cont'd.)

PROBLEM	POSSIBLE CAUSE	REMEDY
<p>Side shift will not work - cont'd.</p>	<p>Seized motor.</p> <p>Cross-slide bearings too tight.</p> <p>Cross tubes bent or misaligned.</p> <p>Improper lubrication of the ways.</p> <p>Low or no hydraulic pressure.</p>	<p>It is possible for a motor to be seized and not show up as defective in the procedure above.</p> <p>If the side shift motor does not appear to rotate against the chain, remove the chain and attempt to rotate the motor by actuating the control lever. If it will not rotate, the motor bearings are probably seized and the motor must be replaced.</p> <p>Adjust cross-slide bearings according to the instructions in the "Adjustments" section of the Operator's Manual.</p> <p>Repair or replace.</p> <p>Clean ways with a suitable solvent and lubricate.</p> <p>Replace defective hoses.</p> <p>Repair or replace control valve</p> <p>Check for proper oil level and fill as needed. Refer to the "Hydraulic Pressure Adjustment" section of this manual for adjustment procedures.</p>
<p>Lead cannot be raised to working position.</p>	<p>Hammer weight not in proper position to raise lead.</p> <p>Low or no hydraulic pressure.</p>	<p>Weight should be carried in locked position. At this point, the hydraulic system can easily raise the lead. If the lead are accidentally laid down with the hammer weight at the top of the lead, the weight can be slid forward by allowing a small amount of slack in the cable and stopping the machine abruptly while moving slowly forward.</p> <p>CAUTION: DO NOT ALLOW AN EXCESSIVE AMOUNT OF SLACK IN THE CABLE.</p> <p>Replace defective hoses. Check for proper oil level and fill as needed. Refer to the "Hydraulic Pressure Adjustment" section of this manual for adjustment procedures.</p>
<p>Rapid and erratic layback action of the lead.</p>	<p>Air in the hydraulic lines.</p>	<p>If the oil has been drained for any reason, and no oil is present in either side of the cylinder, the operator should carefully actuate the layback cylinder a small amount in each direction until the air has been expelled. An orifice fitting must be installed on the cylinder to maintain a safe control speed. The layback safety latch must be raised manually to lay the lead down.</p> <p>NOTE: THIS SAFETY LATCH IS FOR THE OPERATOR'S PROTECTION AND SHOULD NEVER BE MADE INOPERATIVE.</p>

Table 12-1
General Trouble Shooting - (cont'd.)

PROBLEM	POSSIBLE CAUSE	REMEDY
Lead will not tilt.	<p>Lead center pin is stuck.</p> <p>Low or no hydraulic pressure.</p>	<p>Disassemble the lead from the cross-slide carriage and repair.</p> <p>Dress off pin, if necessary.</p> <p>Check and replace center pin bushings if worn.</p> <p>Lubricate.</p> <p>Replace defective hoses.</p> <p>Repair or replace defective valve</p> <p>Check for proper oil level and fill as needed. Refer to the "Hydraulic Pressure Adjustment" section of this manual for adjustment procedures.</p>
Tilt cylinder will not hold.	<p>The control valve is not centering to the hold position.</p> <p>Worn or defective cylinder.</p>	<p>Spring-assembly bolt (refer to the Parts Manual) is loose - check and tighten the bolt.</p> <p>Repair or replace. To check for a leaky cylinder use the following procedure:</p> <ol style="list-style-type: none"> a. Tilt the top of the lead to the right and disconnect the lower hose from the tilt cylinder. b. Cap the hose and apply pressure VERY SLOWLY to tilt the lead to the right, by metering the valve as slowly as possible. If oil does not discharge from the cylinder-rod end port, the cylinder is OK. Both hoses must be connected to reposition the lead. <p>Tilt the lead to the left, reversing the previous step, to test the cylinder in the opposite direction. Testing the cylinder in both directions insures that the piston-rod nut is secure. With a loose piston-rod nut, it is possible to seal in one direction, while leaking in the opposite direction. Also, a cylinder barrel can be defective at one end of the stroke and be perfect at the other end. Testing in this manner checks both ends of the cylinder barrel.</p>

Table 12-1
General Trouble Shooting - (cont'd.)

PROBLEM	POSSIBLE CAUSE	REMEDY
<p>Layback cylinder will not hold.</p>	<p>The control valve is not centering to the hold position.</p> <p>Worn or defective cylinder.</p>	<p>Spring-assembly bolt (refer to the Parts Manual) is loose - check and tighten the bolt.</p> <p>Repair or replace. To check for a leaky cylinder use the following procedure:</p> <ol style="list-style-type: none"> a. Push forward on the layback control lever until the lead is as far forward as possible. b. Disconnect the hose from the anchor end of the cylinder cap. c. Apply pressure VERY SLOWLY by moving the layback control lever slowly forward. If the cylinder is defective, oil will discharge out of the anchor-end cylinder port. Both hoses must be connected to reposition the lead. d. Reconnect the hose to the anchor end of the cylinder. Lay the lead down on the lead support by pulling back on the layback control lever. e. To test the other end of the cylinder, remove and cap the hose at the rod end of the cylinder. f. Apply pressure VERY SLOWLY by pulling back on the layback control lever. If oil discharges from the cylinder rod-end port, the cylinder is defective. Remove and repair the defective cylinder. Inspect bore finishes, replace rings and seals. If the cylinder barrel is rough, replace the barrel.
<p>Premature cable breakage.</p>	<p>Not using proper cable.</p> <p>Cable is too dry.</p> <p>Cable is improperly threaded.</p> <p>Defective sheave bearings.</p> <p>Hammer relief pressure is too high.</p> <p>Worn cable sheaves.</p> <p>Stopping the hammer weight on the downstroke with the hydraulic control.</p>	<p>Install proper cable.</p> <p>Lubricate the cable sparingly with standard cable lubricant.</p> <p>Rethread the cable. See the Adjustments section of the Operator's Manual.</p> <p>Replace the sheave bearings.</p> <p>Reset the pressure in the hammer lift circuit. See Hydraulic Pressure Adjustment section.</p> <p>Replace cable sheaves.</p> <p>Avoid stopping the weight whenever possible, this stresses the cable. Allow the tool to strike the ground. Avoid allowing the hammer weight to fall through the end of the cylinder travel.</p>

Table 12-1
General Trouble Shooting - (cont'd.)

PROBLEM	POSSIBLE CAUSE	REMEDY
<p>On down stroke the valve does not reverse and raise the hammer weight.</p>	<p>Defective pilot valve. Broken spring on pilot valve. Downstroke trip finger is not actuating the lever on the pilot valve (mechanical stroke and cable adjust models). Stroke length set to short.</p>	<p>Replace pilot valve. Replace spring. Reset trip finger or adjust cable length. Adjust stroke length.</p>
<p>Hammer weight drifts down.</p>	<p>Damaged or defective hammer control valve handle linkage. Hammer control valve spool is binding. Check valve and seat are worn and leaking. Broken or weak hammer control valve spool return spring. Leaking seals in hammer lift cylinder. Worn hammer control valve spool.</p>	<p>Repair or replace handle linkage. Inspect and clean the hammer control valve. Excessively tightened mounting hardware can deflect the valve body enough to bind the spool. Loosen the mounting hardware and retighten. Torque to 25 ft/lbs. Replace check valve and seat. Replace spring. To test for leaking seals, raise the cylinder to maximum stroke with the hammer weight at the top of the lead. Allow the hammer lift control valve to remain in the center position until the hammer weight reaches the ground. Disconnect the line from the top of the hammer lift cylinder (rod end). Slowly raise the hammer weight. If oil discharges from the disconnected cylinder port, the seals may need to be replaced. If the cylinder barrel surface is rough or grooved, the cylinder and base should be replaced. Replace the hammer control valve. NOTE: Some leakage is normal and necessary for every type hydraulic valve and should not be cause for alarm.</p>

Table 12-1
General Trouble Shooting - (cont'd.)

PROBLEM	POSSIBLE CAUSE	REMEDY
When raising the weight, the weight settles before starting upward.	Worn or defective check valve. Defective relief valve seat.	Repair or replace entire check valve. Seal or replace.
Hammer weight sticks in the UP position.	Broken spring on pilot valve. Defective pilot valve. Upstroke trip finger is not actuating the lever on the pilot valve (mechanical stroke and cable adjust models).	Replace spring. Replace pilot valve. Reset trip finger position or adjust cable length.
Erratic Strokes. Premature reversals both up and down.	Loose electrical connection. Defective valve switch.	Check and tighten loose connections. Replace valve switch.
Excessive stroke (hammer weight hits the cross member on the lead).	Improper cable length. Stroke length set too high (mechanical stroke and cable adjust models). Engine speed set to high.	Adjust cable length. Reset trip finger position or adjust cable length. Reset engine speed.
Weight fails to raise after the tool strikes the ground.	Trip fingers improperly set (mechanical stroke and cable adjust models). Stroke length set too short (mechanical stroke and cable adjust models).	Reset trip fingers. Adjust stroke length.

ELECTRONIC STROKE CONTROL TROUBLE SHOOTING

Refer to Table 12-2

General

A correctly operating stroke-control system is evidenced by a repetitive stroke length, independent of terrain. Having set the stroke length, there should be no further requirement to change it. The hammer should be able to operate as long as necessary, without making further adjustments. It should be clearly understood that the stroke-length adjustment knob sets the total stroke length, not the height to which the hammer rises on the lead. The controller references stroke length from the striking point of the tool. Obviously, if the tool is striking 3 feet below the road level, the high point on the lead will be 3 feet lower than if the tool is striking at road level.

Sensor Problems

If the hammer is operating within the stroke capability, there should be no cable "snatching". Cable "snatching" usually indicates a problem with the proximity sensor or its associated cable. If the cable is "snatched" infrequently, the proximity sensor is probably set too far from the sheave. Setting the sensor 1/32" closer to the sheave will probably cure the problem. If the cable is "snatched" frequently, or if the hammer weight has a tendency to crawl up the lead on short strokes, the sensor or its associated cable is faulty. The system has no ground reference without a sensor, so the timer free-runs. In other words, the controller doesn't know where the hammer weight is. The sensor and its cable can be checked most conveniently at the sensor itself. Following are a List of Checks:

- Mark the adjustment on the threads of sensor for convenient replacement, and remove the sensor.
- Check the end of the sensor for damage. If the sheave hits or rubs the end of the sensor, it's probably ruined and must be replaced.
- Check the sheave for excessive side play - (1/32" maximum side play.)

Replacing the Sensor

Pay attention to wire colors - the sensor won't work if the lead are reversed. Set the sensor at the proper spacing. The end of the sensor should clear the sheave by 1/8 inch. Refer to the "Adjustments" section of this manual.

Voltage Check

If the sensor appears to be physically sound, make the following electrical checks before replacing the sensor.
Note: Do not disconnect the sensor lead.

1. Check the blue sensor wire with respect to ground. Move the sensor to and from metal. There should be a definite meter movement from approximately 0.8 volts when away from the metal, to less than 0.1 volts when the sensor is very near, or touching metal.
2. If the sensor doesn't react as described above, open the blue sensor lead from the black cable lead and make a continuity check of the black lead with respect to ground. The black lead should measure 100 ohms with respect to ground. If it reads 0 ohms, the black lead is shorted somewhere. If it reads open, the black lead is open somewhere in the cable. If the cable lead are ok according to the above checks, the sensor is bad.
3. If a cable problem is indicated, remove the cowling over the controls for access to the terminal strip. Locate wire numbers 23 and 24 (refer to the Electrical Diagram, Figure 11-2). Remove the white and black cable lead going up to the sensor. Check for a short to ground on either lead going to the sensor. Both lead should read open with respect to ground. Check wire 23, or the terminal block. It should read 8 volts \pm 0.2 volts. Check the continuity of wire 24 going back to the timer. It should read 100 ohms. An open in the sensor cable can be checked out by connecting the white and black wires together at the sensor end and reading continuity at the terminal strip end.

Table 12-2
Electronic Stroke Control Trouble Shooting

PROBLEM	POSSIBLE CAUSE	REMEDY
<p>Electronic Control Station power lamp does not turn ON (power lamp does not light).</p>	<p>Power switch turned "OFF".</p> <p>Power lamp is defective.</p> <p>Loose electrical connection, broken wire, or blown fuse.</p> <p>Defective valve switch.</p> <p>Defective Electronic Control Station.</p>	<p>Turn power switch to "ON".</p> <p>Check and replace bulb.</p> <p>Check all connections. Check and replace fuse.</p> <p>Eliminate switch. Consult factory for rewiring procedure.</p> <p>Replace Electronic Control Station.</p>
<p>Erratic stroke at all settings of the Electronic Control Station.</p>	<p>Defective or improperly adjusted sheave sensor.</p> <p>Disconnected or defective sensor cable</p> <p>Excessive side play of the lead sheave.</p> <p>Lead sheave not properly installed.</p> <p>Defective or improperly adjusted safety switch on the automatic valve.</p> <p>Loose electrical connection.</p> <p>Defective or improper wiring connection.</p> <p>Defective Electronic Control Station.</p>	<p>Check the sensor lead and connections. Replace defective sheave sensor. Check adjustment and make sure sensor is positioned 1/8" from the sheave spokes.</p> <p>Check all cable connections. Test sensor cable for broken wires and replace if necessary.</p> <p>Shim the lead sheave as necessary to reduce sideplay. Badly worn lead sheaves must be replaced.</p> <p>Check and make sure the casting letters on the lead sheave are positioned on the side opposite to the sheave sensor. Remove the lead sheave and reinstall properly.</p> <p>Eliminate switch. Consult factory for rewiring procedure.</p> <p>Check and tighten loose connections.</p> <p>Consult factory for rewiring procedure.</p> <p>Replace Electronic Control Station.</p>
<p>Pressure settings correct. Servo on the hammer valve is not shifting properly.</p>	<p>Defective solenoid valve</p> <p>Solenoid valve filter is plugged.</p>	<p>Replace solenoid valve</p> <p>Replace solenoid valve filter.</p>
<p>Hammer weight sticks in the UP position. Solenoid valve has power.</p>	<p>Defective solenoid valve.</p> <p>Solenoid-valve spool sticking.</p>	<p>Replace defective solenoid valve.</p> <p>Disassemble and clean solenoid valve.</p>
<p>Weight does not immediately raise after the tool strikes the ground (excessive dwell time).</p>	<p>Defective Electronic Control Station.</p>	<p>Replace Electronic Control Station.</p>

Table 12-2
Electronic Stroke Control Trouble Shooting - (cont'd.)

PROBLEM	POSSIBLE CAUSE	REMEDY
Excessive stroke (hammer weight hits the cross member on the lead).	Improper cable length. Stroke length set too high. Engine speed set to high. Defective Electronic Control Station.	Adjust cable length. Stroke is approximately 8' at maximum setting on the stroke control dial. If a very long tool is used, there may not be enough stroke available. Set the stroke control dial to a lower value. Reset engine speed. Replace Electronic Control Station.
Weight fails to raise after the tool strikes the ground.	Improper connection or defective Electronic Control Station. Sheave sensor out of adjustment. Defective sensor or sensor cable. Stroke length set too short.	Check cable for proper connection. Replace defective Electronic Control Station. Adjust sensor. See "Adjustments" section. Check and replace sensor and/or cable. Adjust stroke length.
Hammer reverses before the downstroke is completed.	Sheave sensor out of adjustment. Defective sensor or sensor cable. Improper connection or defective Electronic Control Station.	Adjust sensor. See "Adjustments" section. Check and replace sensor and/or cable. Check cable for proper connection. Replace defective Electronic Control Station.
Short Strokes.	Defective Electronic Control Station.	Replace Electronic Control Station.
Hammer not getting full stroke. Pressure settings correct.	Engine rpm too low.	Increase engine rpm with the engine speed control hand throttle.

Additional notes:

1. Low pilot pressure is usually indicated by premature reversals during side shift operation. If the pilot pressure is low, the side shift operation lowers it below critical levels, causing the hammer valve to shift prematurely.
2. The pilot valve spool can stick, or the seals on the spool can fail. If the Electronic Control Station is supplying the voltage to the solenoid valve (as measured across the solenoid coil), but the hammer weight is not reversing, a bad pilot valve is indicated. If, with the engine turned "OFF" and the Electronic Control Station cycling, a clicking sound is heard from the pilot valve, the solenoid is operating but the spool is defective.

Solenoid Valve

The most common failure of a pilot valve is a sticky spool, usually caused by dirt in the system. If the spool sticks, the hammer valve receives no pilot signal. As a result, the hammer goes either to the top of the lead and stays, or goes to the bottom of the lead and won't lift. If this condition occurs, turn on the Electronic Control Station and allow it to free run (engine off). Observe the up/down lamps to assure the Electronic Control Station is cycling. Audible checks should be heard each time the timer switches from up to down and visa versa. If the checks are not heard, the valve spool is sticking and should be either repaired or replaced.

Note that in-line filters should be found with every solenoid pilot valve.

Valve Switch

On older Arrow hammers, the automatic valve has a power-shutoff switch mounted on the valve body. The switch can get out of adjustment, causing intermittent power loss to the Electronic Control Station. The result is an abrupt stop of the hammer weight. That action will be accompanied by blinking of the power on lamp on the Electronic Control Station. The switch can get so far out of adjustment that it cuts the power completely, in which case, the entire electronic stroke control system will be dead. Check the switch out, if it is suspect. Adjust the switch so that it properly follows the manual control-valve handle.

Electronic Control Station

The Electronic Control Station can fail in a way that can cause all of the above malfunctions. The easiest way to check the Electronic Control Station is to replace the suspected unit with a known good one. If the problem is corrected, the suspected unit is bad. Return it to the factory for repair. If replacement of the Electronic Control Station is not possible, check out the following features:

- **Power lamp (red)** - The red lamp should be on when the unit is turned on. If the lift lamp (yellow) is blinking properly with the free-running timer, and the power lamp is not lit, the power lamp is probably burned out and should be replaced.
Note that a burned out bulb does not affect the operation of the unit.
- **Lift lamp (yellow)** - Switching of this lamp (blinking on and off) should be accompanied by the clicking sound of the solenoid pilot valve as it is actuated. If the lift lamp does not blink while the solenoid pilot valve is cycling, the bulb is probably burned out.
Note that a burned out bulb does not affect the operation of the unit.
- **Valve Driver Transistor Switch** - If the solenoid pilot valve doesn't click, but the lights blink in synch with the free-running timer, the valve driver transistor may be bad. Check the voltage at the solenoid pilot valve and at terminal 20 on the terminal board. The voltage should swing between 12 volts and approximately 0 volts in synch with the lift lamp. If the voltage cycles as described, the solenoid valve coil may be burned out - check the coil for continuity. If the voltage doesn't cycle as described, the transistor switch in the Electronic Control Station is probably bad. Before replacing either the Electronic Control Station or the solenoid valve, visually inspected the wiring between the solenoid valve and Electronic Control Station. Be sure that all connectors and terminals on the terminal block are tight.

Stroke Length Control

The stroke length is adjustable by means of the control knob on the front face of the Electronic Control Station. The stroke length should be at the maximum when the knob is set to the no. 8 on the dial. The stroke shortens proportionately as the knob is rotated counter-clockwise. The stroke is adjustable to any desired length between maximum and minimum stroke. Minimum stroke should be approximately one foot. If stroke control can't be achieved, the Electronic Control Station is bad and should be replaced.

Governor Setting

If the governor speed is too far off from 2200 rpm, the stroke length will vary from the 8 ft. maximum stroke normally expected. The Electronic Control Station times the up stroke. Therefore, if the engine runs faster than 2200 rpm - causing more oil to be pumped - the stroke length will be increased for any given setting of the stroke-length control knob. Conversely, the stroke length will be decreased if the engine runs slower than 2200 rpm.

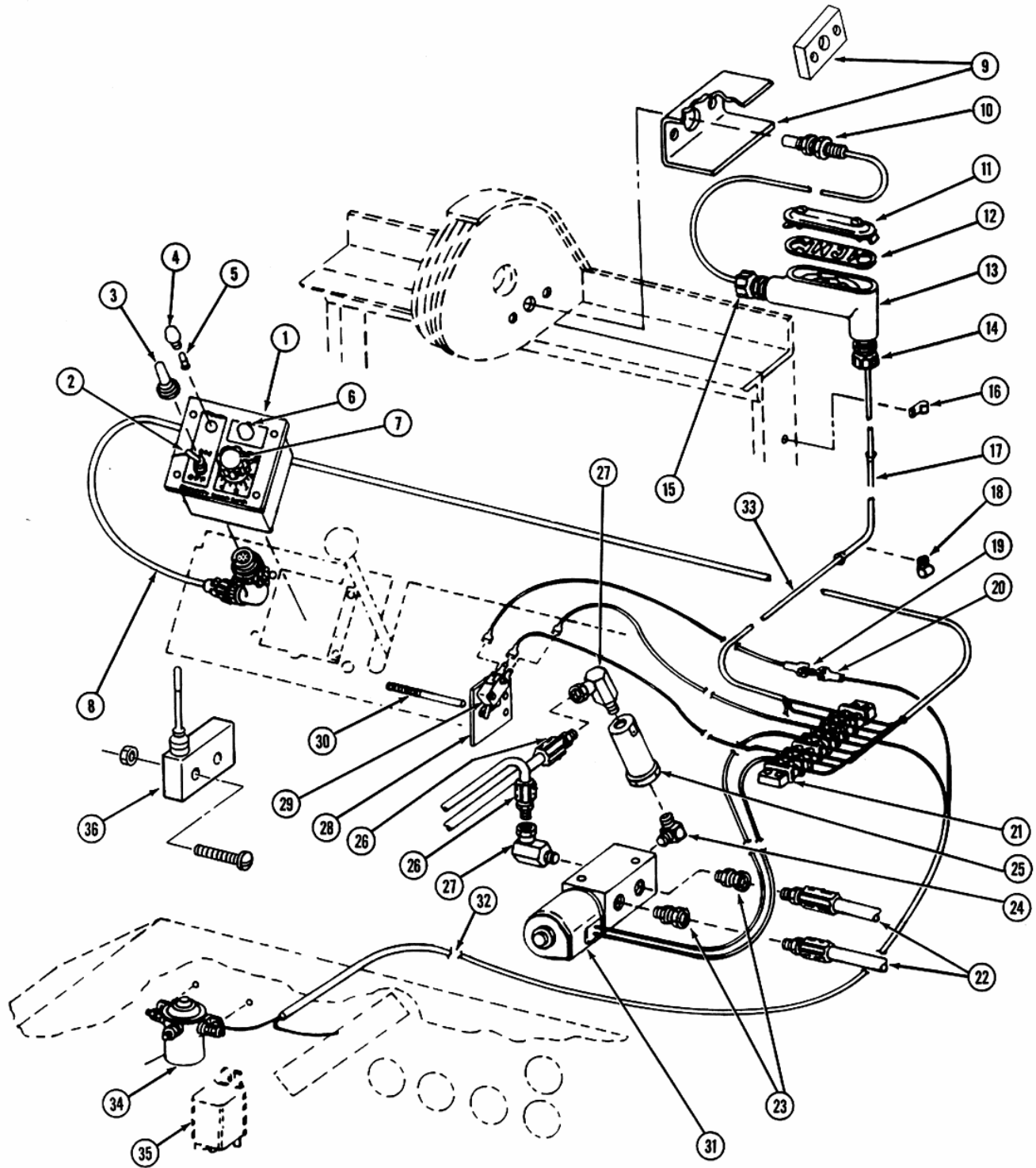


Figure 12-1
Electronic Stroke Control

Electronic Stroke Control

Item	Part Number	Description
1	2000608	Controller
2	4001852	Toggle Switch
3	4001853	Boot
4	4001724	Red Lens
5	4001723	Lamp (2)
6	4001725	Amber Lens
7	4001721	Knob
8	2000609	Control Cable
9	3001827	14mm Sensor Bracket (1982-87)
	3002003	18mm Sensor Bracket (1987- . . .)
10	18mm Sensor w/Nuts (1987- . . .)
	4001890	
11	4001791	Cover
12	4001790	Gasket
13	4001789	Conduit Body
14	4001788	Cord Grip
15	4001782	Cord Grip
16	4000584	J-Clip (4)
17	3001895	Conduit
18	4000686	Clamp (2)
19	4001779	5-Amp Fuse
20	4001778	Fuse Holder
21	4001234	Terminal Block
22	4001421	3/8" x 30" Hose (2)
23	4001296	1/4" x 3/8" Swivel (2)
24	4001891	Male Elbow
25	4001812	Oil Filter
26	4001306	3/8" x 40" Hose (2)
27	4001806	1/4" x 3/8" 90°- Swivel
28	3001887	Switch Bracket (Thru S/N: 6021)
	3002161	Switch Bracket (S/N: 6022 - 6299)
29	4001786	Valve Switch (Thru S/N: 6021)
	4002081	Valve Switch (S/N: 6022 - 6299)
30	3001858	Actuating Rod (Thru S/N: 6021)
31	4001805	Solenoid Valve
32	2000626	Relay Wiring Harness
33	2000625	Shielded Cable
34	4001849	Solenoid (Discontinued 1995)
35	4001722	Solenoid (Discontinued 1985)
36	4002143	Safety Switch
	5503071	#6-32 x 1-1/8" Screw
	5550402	#6-32 Locknut