

TROUBLE SHOOTING INDEX

Section 7

Page Reference

7.2 Table

7.4 Sweep

7.6 Distributor—Bin

7.7 Cushion—Pit Assembly

7.9 Chassis, General

7.11 Trouble Shooting Procedures

7.11 Burnishing Relay Contacts

7.12 Motor and Switch Tests

7.13 Motor Capacitors

TABLE TROUBLES

Trouble	Cause	Test—Remedy
Table will not feel for pins (1st ball light on)	Gripper protection switch out of adjustment or broken	Adjust, replace
	Respot cells in closed position	Open cells manually
	Defective time delay unit	Replace chassis
	Table connection plug loose or broken	Repair or replace
Respot cells will not pick up pins or drops pins	Respot rod out of adjustment. Respot cells (one or more out of adjustment)	Adjust rod check with gauge (ref. page 5.21) ST-6519
	If one cell only—check condition of fingers and cell adjusting screw	Replace or adjust
	Cell linkage binding or broken	Repair or replace
No pindicator lights. 10 pins originally picked up by table and indicated on masking unit	Thermal overload operated (Bowler too slow in delivering ball)	Normal operation, lamps will light after load cools
	Triac defective	Replace triac
Table runs continuously	TA1 adjusting screw turned out too far	Check with gauge ST-2748, adjust. ref. page 5.29
Table stops before zero position	TA1 adjusting screw turned in too far	As above.
1st ball-sweep down, time delay, sweep runs and cleans off all pins and comes to guard. Table does not come down	TA2 adjusting screw turned out too far	As step before
1st ball-sweep down to guard position, table continues to run	TA2 adjusting screw turned in too far	Check with gauge, ST-2748, adjust ref. page 5.29
Pin light on, no pin in gripper	Wire off gripper and touching frame	Visual, repair or replace
	Circuit grounded	Use testing procedure for grounds
	Board defective	Replace board
Pin in gripper, no pindicator light on	Wire disconnected or broken on gripper switch	Visual, repair or replace
	Circuit open from gripper to chassis	Use testing procedure for opens
	Circuit open in chassis board	Replace and repair chassis board
	Defective triac	Replace triac
First ball, sweep starts toward pit, table starts up with pins in gripper, both stop, neither will run with SA or TA-1	TB adjusting screw out of adjustment	Check with gauge, ST-2748. Adjust ref. page 5.29

TABLE TROUBLES

Trouble	Cause	Test—Remedy
Pin fell over during spotting	Chipped or badly worn pin base	Visual, replace pin
	Excessive wear in spotting linkage	Visual, replace necessary parts
	Spotting cup loose	Visual, tighten
	Spotting cup bent out of shape	Visual, repair
	Spotting rod out of adjustment	See table adjustments
	Yoke out of adjustment	See table adjustments

SWEEP TROUBLES

Trouble	Cause	Test—Remedy
Sweep runs up, down, and starts through to clean off the deck a second time as the table spots pins. Table and sweep stop because of interlock	SA out of adjustment	Check with gauge ST-2748, adjust ref. page 5.18
Sweep overruns all stopping positions	Sweep cams not adjusted properly	Check with gauge ST-2748, adjust ref. page 5.18
Sweep motor overloads trip to off position	Defective capacitor	Replace capacitor
	Bind in sweep drive assembly	Inspect and repair
Sweep hits gutter at 66° guard position	Rubber bumper 7283 worn	Replace
	Guide tube or rod assembly out of adjustment	Adjust, ref. page 5.20
Continuous sweep run	SA adjusting screw turned out too far	Check with gauge ST-2748, ref. page 5.18
After cycle starts sweep runs continuously	SB adjusting screw turned in too far	As step before
1st ball—after time delay the table comes down, sweep starts, and stops under the table as it comes down to respot pins, table stops	SB adjusting screw turned in too far	Check with gauge ST-2748, ref. page 5.18
1st ball—sweep down, table down about half way and stops. Table and sweep will not move by lifting TA or SA	SC adjusting screw turned out too far	As above
Sweep arms hit frame of machine at zero position	Readjust sweep link arm to allow sweep to run back further	Run machine, observe operation. See sweep linkage adjustments
1st ball—table down and picks up standing pins, but does not respot them. Sweep remains at guard position (66°)	Off spot switch adjusting screw screwed out too far	Check with gauge ST-2748 ref. page 5.28
1st ball—table comes down on top of an off spot pin, thus not picking up the pins. Then sweep cleans off all pins both standing and down, table comes down, spots pins, table goes up, sweep up, strike light on	Off spot adjusting screw turned in too far. Wire off switch or binding against frame of machine	Inspect, repair or adjust as above
	Broken wire at off spot switch	
2nd ball or strike-table will not spot pins, bins loaded with pins but will not drop the pins into spotting cups	BS switch or lever defective	Depress switch manually

SWEEP TROUBLES

Trouble	Cause	Test—Remedy
1st ball cycle completed successfully but sweep runs through again. On 2nd ball sweep runs but does not stay at guard while pins are spotted.	SA adjusting screw turned in too far	Check with gauge ST-2748 ref. page 5.18
Sweep not stopping at correct position. A) Guard position B) Run through C) Zero	Sweep cam switches not adjusted properly	Check with gauge ST-2748, adjust. rotate cams to get correct stopping position. Ref. page 5.18
Sweep runs too far into pit area.	Sweep connecting rods out of adjustment. Sweep crank arm rod too long	See adjustment section. Ref. page 5.20
Sweep travel too short	Sweep connecting rods out of adjustment. Sweep crank arm too short	As above

DISTRIBUTOR-BIN TROUBLES

Trouble	Cause	Test—Remedy
Distributor will not feed pins at correct position	Distributor drive cam not matched with pinion gear	Check bumps on nylon gear with punch marks on pinion gear
	Distributor not centered properly	Run distributor to #1 bin and center using 6047 safety link for adjustment
Pins feed continuously at one distributor location	Distributor clutch out of adjustment	Check spring tension
	Distributor rollers out of adjustment	See adj. section dist. roller adj.
Head first pins delivered to bin pockets	Pins not orienting properly	
	A) Pin slow in orienting, putting 2 pins on distributor too close together	Check orientor pan (clean)
	B) Pin stuck in wheel	Oversized pin (replace)
	C) Dirty pins or elevator wheel	Clean pins and elevator wheel
	D) Pins not seated in elevator wheel pockets	Adjust pin seating rod
	E) Pin rail 6098 or 6099 loose or out of adjustment	Observe pin release and adjust rail as required, to hold pin in wheel securely and release pin at the center of the orienting pan at the #1 pin position
Distributor front end hits bin during pin feed	Front end hardware loose	Adjust and tighten
	Distributor support assembly #7357 too low	Place shims between support ass'y. and cross bar as required

CUSHION-PIT TROUBLES

Trouble	Cause	Test—Remedy
Ball idles at cushion	Cushion leather stretched	Cut off excess
	Rubber rivet interference	Replace broken rivet
	Bounce plate support bracket loose or broken	Repair or replace
Ball idles at exit, will not enter lift	Ball lift too low	Adjust bumpers
	Kicker assembly loose or too far away from side plate	Adjust kicker rollers to 1/16" from side plates
	Kicker belt slipping	Visual inspection for bind, broken or loose tension spring
	Ball exit assembly not centered between side plates	Adjust accordingly
	Rudder jammed	Adjust rudder
	Interference caused by bounce plate	Check mounting bolts and rubber dampener for tightness
	Bounce plate support bracket loose or broken	Repair or replace
Ball failed to start machine	Metal guide plate loose or bent	Visual—Repair or replace
	Start switch actuator return spring weak or broken	Actuate switch by hand. Replace spring
	Start (S.S.) switch faulty. Not closing when actuated	Continuity check. Replace switch
	Start (S.S.) switch bracket bent or broken	Visual inspection. Straighten or replace bracket
	Bind in shock absorber	Manual inspection. Repair or replace
Machine continues to cycle	Start switch actuator return spring weak or broken	Actuate switch by hand. Replace spring
	Start (S.S.) switch faulty, not opening after actuation	Continuity check. Replace switch
	Switch (S.S.) brackets bent or broken keeping switch closed	Visual inspection. Straighten or replace brackets
	Pin jam under cushion actuating start (S.S.) switch	Visual inspection. Release jam
	Shock absorber faulty	Manual inspection. Repair or replace
	(S.S.) switch, cycle button, 10th frame switch button shorted or faulty	Manual inspection. Repair or replace
	Ball lift clutch slipping clutch worn	Visual inspection. Replace necessary parts
Ball lift fails to elevate ball	Set screw loose on drive pulley	Tighten set screw

CUSHION-PIT TROUBLES

Trouble	Cause	Test—Remedy
Ball lift fails to elevate ball	Ball lift clutch broken	Visual inspection pulley rotates, but ball lift belt does not. Replace clutch.
	Ball lift belt tension low. Belt tension spring retainer nut too loose	Check length of belt compression spring (4603). Proper belt tension is maintained when spring length is 4" to 4½". Readjust when spring exceeds 4½"
	V drive belt slipping on pulleys	Visual inspection. Replace belt.
	A) "V" belt stretched or worn B) Belt tightener spring broken or stretched	Visual inspection. Replace spring
Back-end motor overload, trips to off position	Jam in pin area causing motor to overload	Visual inspection. Remove jam
	Carpet rollers out of position	Visual Inspection. Replace rollers
	Defective chassis	Substitution. Replace chassis
	Defective back-end motor	Substitution. Replace motor

CHASSIS TROUBLES—GENERAL

Trouble	Cause	Test—Remedy
Table and sweep time delay too long or too short	Time delay circuit defective	Replace P.C. board
Machine cannot be turned off	Relay M contacts arced together or faulty armature	Repair, clean, or replace relay
Machine pit time delay too long or too short		Replace P.C. board
Halo light inoperative	Light dirty. Loose or broken plug. Reflector not in position	Wipe with damp cloth. Repair or replace
Machine dead, (M) relay not energized	Masking switch in off position	Turn switch on
	One or more circuit breakers in off position	Turn breakers to on position
	CB-1 open	Visual, replace
	Managers control switch in off position	Visual, turn on
	Power plug disconnected	Insert plug
	No power to machine	Check master circuit breakers
No cycle start		✓ Replace P.C. board
No sweep run		✓ Replace P.C. board
No table run		✓ Replace P.C. board
No foul cycle		✓ Replace P.C. board

NOTES

TROUBLE SHOOTING PROCEDURES

USE OF THE CONTINUITY TESTER (Open Circuits). Item 64 in Tool Kit

NOTE: Do not use on live circuits. Disconnect all power on device to be tested.

To check continuity of any wire, disconnect one end. Connect one side of tester to one end of the wire suspected, and the other side of the tester to the end of the disconnected wire. If wire is good, tester should light. If wire is open, tester will not light.

USE OF CONTINUITY TESTER (Shorts)

To check for a short between two wires, disconnect both ends of the wires suspected. Connect tester across the two wires. If tester lights, wires are shorted. If tester does not light, wires are OK.

USE OF CONTINUITY TESTER (Grounds)

To check for possible ground, disconnect both ends of the wire suspected. Connect one side of the tester to the conduit or frame of machine and the other side of the tester to one end of the wire being tested. If wire is grounded, tester should light. If wire is not grounded, tester will not light.

USE OF VOLTAGE TESTER Item 20 in Tool Kit

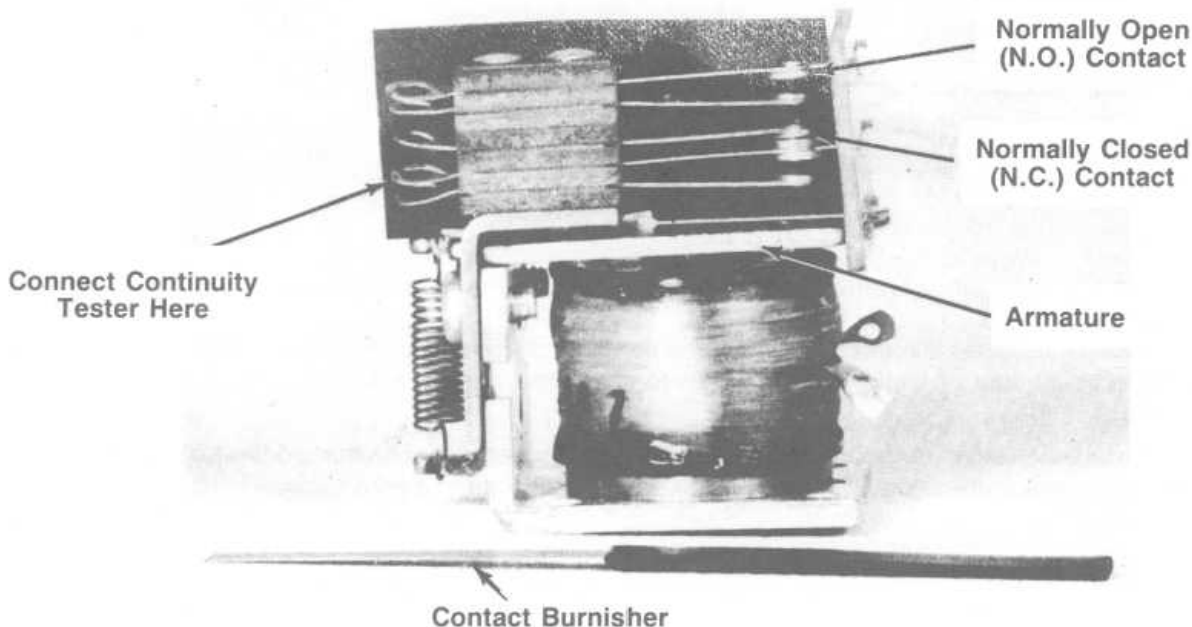
NOTE: For use on alternating or direct current. (AC or DC) 80 to 600 volts. All power to the machine or device to be tested should be turned on. Caution should be used when testing live circuits.

To check for voltage, connect tester in parallel or across line on device to be tested. Neon bulb will glow if voltage is present. when checking across 220 volts, neon bulb will be twice as bright as when checking 110 volts. Tester cannot be used on circuits below 80 volts.

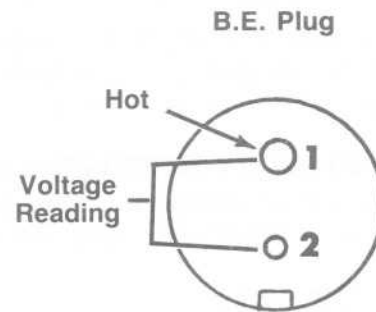
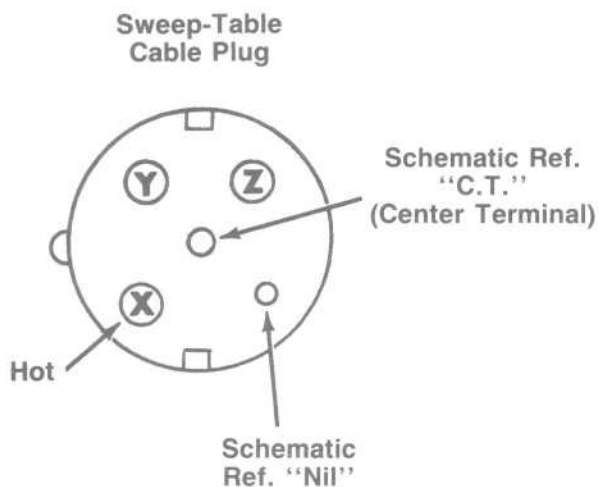
INSTRUCTIONS FOR USING RELAY CONTACT BURNISHER

1. Insert the burnishing tool between the two contacts to be cleaned, keeping the tool parallel with the contacts.
2. Slide the tool back and forth to obtain a smooth clean contact.
3. If normally open contacts are to be cleaned, it will be necessary to apply a slight amount of pressure to the armature to bring both contacts of the relay in contact with the burnishing tool.

NOTE: The burnishing tool will work best if kept free from dirt, grease or oil. It should not be touched with the fingers. After using, it should be stored in its carrying case.



TESTING MOTOR PLUGS



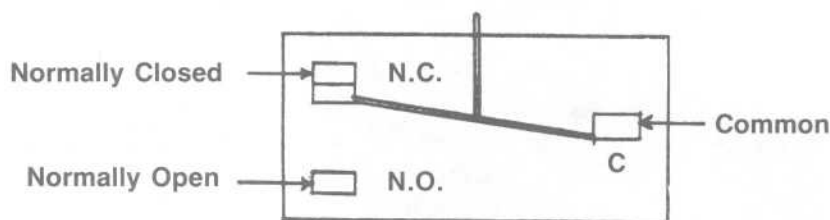
**Voltage Tests
With Power On**

		Between
X	and	Nil
X	and	Z
X	and	Y (Sweep Reverse)
1	and	2

**Continuity Tests
With Power Off**

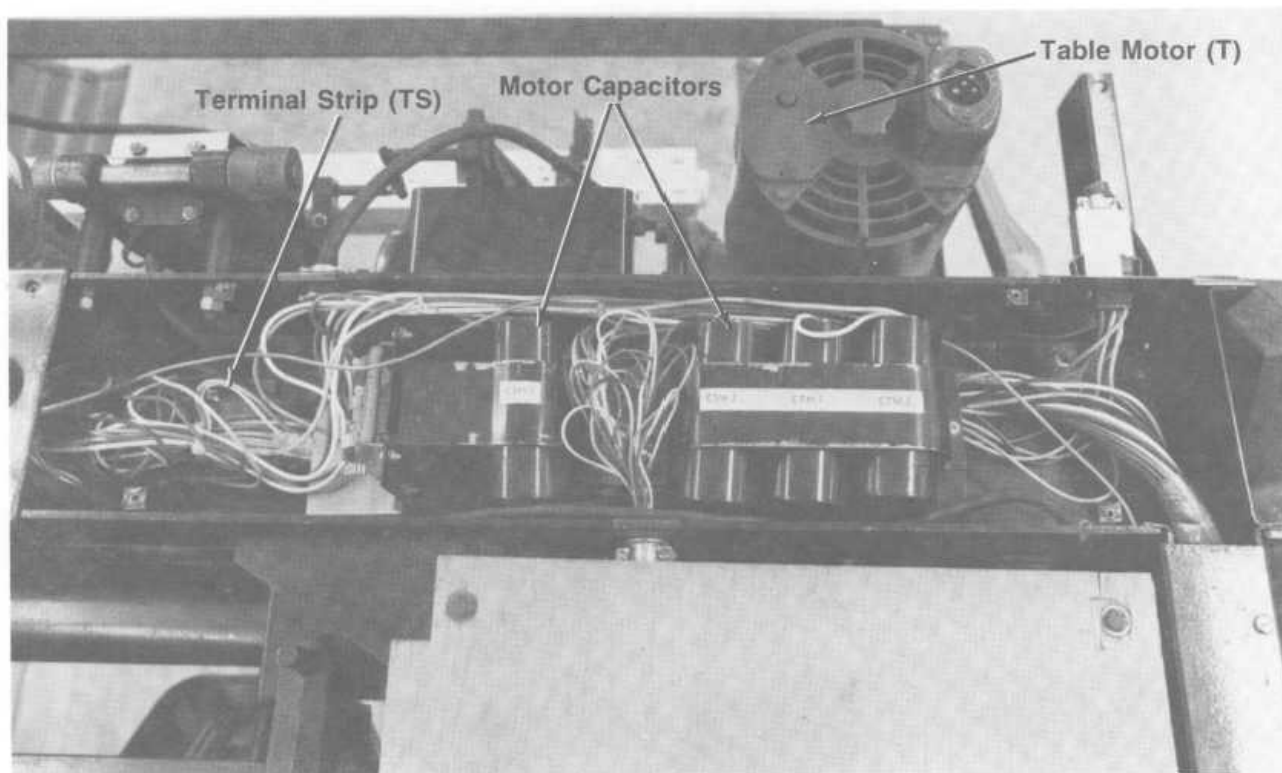
		Between
X	and	Z (300 ohms)
Y	and	C.T.
Z	and	Nil

TESTING MICRO SWITCHES USING CONTINUITY TESTER



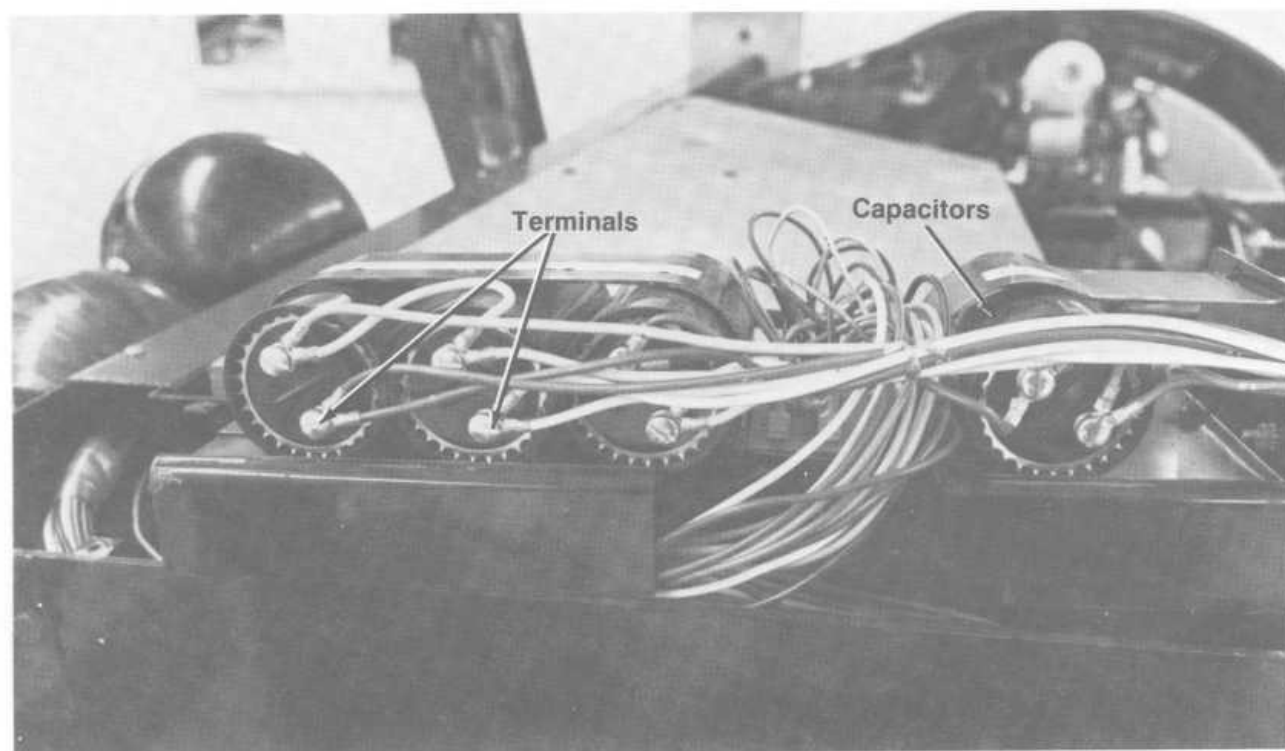
NOTE: To make this test on machine, remove wire connected to common terminal of switch.

1. Connect continuity tester across common (C) and normally closed (N.C.) contacts of switch. Tester should light. Depress plunger on switch several times to check mechanical action. Tester light should go on and off.
2. Connect continuity tester across common (C) and normally open (N.O.) contacts of switch. Tester should not light. Depress plunger on switch several times. Tester light should go on and off.



MOTOR CAPACITORS

Occasionally a capacitor will short out resulting in an inoperative motor. To test a capacitor, remove the connections from one terminal (see photo below) and take a resistance reading. Connect the meter and wait approximately one minute for the capacitor to charge up. A reading of 50,000 Ohms or more indicates a good capacitor, zero Ohms (short), no reading (open).



NOTES