



Elec-Trak[®]

Garden Tractor

PRODUCT SERVICE BULLETIN NO. 72-19 (19)

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*see also Bulletin #16
dated 2/4/72*

E-15 AND E-12S REVERSE RELAY

TROUBLESHOOTING GUIDE FOR ELEC-TRAK TRACTOR MECHANICS

This troubleshooting guide is provided to enable the Elec-Trak tractor mechanic to rapidly find the cause of burned reverse relay contacts in the E-15 and E-12S. Mechanics should keep this list in their Product Service Manual in the beginning of the Service Bulletin section, along with the Reverse Relay Failure Check List previously received.

TROUBLESHOOTING GUIDE - Find condition under which relay failure occurred.

- A. Returning speed control lever to neutral from forward.
Check #4, 7, 10.
- B. Returning speed control lever to neutral from reverse.
Check #3, 4, 6, 7, 10.
- C. Changing direction from forward to reverse.
Check all steps.
- D. Changing direction from reverse to forward.
Check #1, 2, 3, 4, 6, 7, 10.
- E. Impact occurred in forward.
Check #1 and 2.

Note: Impact may cause top and center points to burn without any other cause. Replace relay.

- F. Impact occurred in reverse.
Check #3, 4, 6.
- G. Applying brake in reverse.
Check #3, 4, 6.

Note: If check 3, 4, 6 reveals nothing, take model and serial number and call "Hot Line".

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GENERAL ELECTRIC



1. Determine if relay contact leaves are abnormally bent. In the de-energized position (forward operation) the center set of points should make contact with the top set. In the energized position (reverse operation) the center set should make contact with the bottom set. Bending of relay leaves is usually due to mishandling. Handle relay with care. If leaves are found to be bent, repair by restoring to original condition or replace relay.
2. Determine if relay travel is restricted. Relay should move up and down freely. If it does not, replace it. Relay travel may be restricted by the wiring harness when the upper control panel is closed. In this case, dress the wiring away from the relay.
3. Determine if there are any loose connections at the reverse relay coil. A loose connection here will cause intermittent relay operation. If relay coil loses voltage during reverse operation, the bottom and center points will draw an arc and burn the points. If connections are bad, replace terminals.
4. Determine if there are any loose connections on Card #1 or Card #3.* Especially check positions 7, 8, 9, 12 and 12 on Card #1, and positions 1 and 7 on Card #3. A loose connection at these positions will cause intermittent relay operation and intermittent hold circuitry operation. If hold circuitry is not functioning, relay points may burn while switching from forward to reverse. If terminals are loose, replace only with 60156-3 phosphor bronze Part No. 243A4569P1. These terminals are not in original parts stock, but are being sent from the factory for dealer stock. Terminals 60826-1 in original parts kits should be scrapped.
5. Determine if Card #1 is the latest model. Latest cards are marked 211A3160G1-R6. Cards listed as Part No. 163B9814G1 are also latest model. If card is not latest model, replace card. Refer to Product Service Bulletin #12 for part number changes.
6. Determine if reverse switch on the speed control is positively held actuated in all reverse positions. If switch deactivates in reverse, the reverse relay will de-energize and draw an arc between the bottom and center points and burn them. If switch is not held closed, replace switch or bend switch lever to correct the problem.
7. Determine if speed control cam overtravels and starts the drive motor in the right and left neutral positions. To test this, place range selector in neutral, advance speed control lever to maximum speed forward and after motor reaches maximum speed, quickly return lever to neutral. If drive motor continues to run, the cam has overtraveled. Perform the same procedure from reverse. If the above tests do not reveal overtravel, place the speed control lever into any forward speed. Then return the lever to neutral observing which direction

the cam turns. Once the lever is in neutral, turn the cam manually in the same direction as observed. If drive motor starts, speed control is defective. Cam overtravel is usually due to loosening or wear of speed control mechanism. Repair or replace as required.

8. Determine if drive motor field resistance is approximately 16 ohms. Use the R x 10 scale on multimeter. Disengage the power disconnect and remove wires 49 and 10 from the drive motor. Insert each probe into the field plug and observe reading. If meter shows infinite resistance (∞), remove plastic plug from motor and check for a poor internal connection. If meter shows zero resistance, remove plug and check for shorted internal connections.
9. Determine if field is shorted to armature or case of drive motor. Test by using resistance scale of multimeter. Insert one probe into field plug and place one probe on armature stud. Reading should be infinite ohms (∞). Test field to case in the same fashion; reading should be the same.
10. Determine if the L contactor sticks closed occasionally as verified by the drive motor continuing to run with the speed control lever in neutral. Be sure that this symptom is not produced by overtravel of cam as described in Step 7. With range selector in neutral, measure coil voltage at L contactor while motor is still running; if voltage is present (36 V D.C.), cam has overtraveled. If no voltage is found, contactor has stuck closed. Replace L contactor if it is sticking.

REVERSE HOLD TEST

(E-15 ONLY)

To be performed only after all other checks are completed and the following conditions met:

Range selector in neutral, power disconnect engaged, key "On", foot off brake, sitting on seat, upper control panel lowered.

1. Advance speed control lever to maximum forward position.
2. Allow motor to attain maximum speed (5 seconds).
3. Quickly return speed control lever to maximum reverse position.
4. Observe relay operation and arc between points.

After Step 3 is completed, approximately one second later the reverse relay should energize and drive motor should shut off. If motor continues to run but relay has delay in actuation, Step 3 may not have been performed

quickly. Repeat test. If drive motor continues to run and relay does not delay, replace Card #1. If relay delays and motor shuts off but there is a large arc, check 8 and 9 again. If check 8 and 9 are OK, call "Hot Line" for assistance.

Arc Description

A normal arc will make a pinpoint sized mark in the relay point.

An abnormal arc will make a pinhead sized mark in the relay point, with possible carbon splashes.

ATTACH THE COMPLETED REVERSE RELAY FAILURE CHECKLIST UPON SUBMISSION OF THE WARRANTY CLAIM.

REVERSE HOLD TEST

(E-15 ONLY)

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2. Allow motor to attain maximum speed (5 seconds).
3. Quickly return speed control lever to maximum reverse position.
4. Observe relay operation and arc between points.