



Specification for Remanufacture of Alstom/US&S Relays



Alstom VTB Relay



US&S Code Following Relay



US&S FN-16A Flasher Relay



Alstom B1 Relay

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1 SCOPE AND INTENT

This document describes Patco Industries, Inc. remanufacturing standards for Alstom and US&S relays. Work shall be performed in a manner that is consistent with the requirements of the Alstom and US&S service manual.

2 GENERAL

2.1 *PROCEDURE*

- 2.1.2 This specification is for relay remanufacturing and testing of signal relays this may include vital or non-vital signal relays, timing relays, flasher relays, or searchlight signal mechanisms. The material used, test equipment, and workmanship will be of the highest quality.
- 2.1.3 Remanufacturing will consist of complete disassembly of the relay coils and contact assemblies, replacement of worn or damaged parts, cleaning, painting, and plating, operational testing at the manufacturer's specifications, assembly, and final inspection and testing before shipment.
- 2.1.4 This specification is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the minimum type and quality of relay remanufacturing.
- 2.1.5 Capacities and dimensions listed herein will be interpreted as minimums.
- 2.1.6 Relay remanufacturing will meet the requirements of OEM and AAR Signal Manual all that comply with units.
- 2.1.7 Replacement parts for relays will be identical in piece number or drawing number to the part being replaced.

2.2 *RELAY INSPECTION AND REMANUFACTURING*

- 2.2.1 The requirements will apply to AC and DC relays unless otherwise specified. The following contain procedures, which will be used for shop remanufacturing, operational testing, and final inspection and testing of relays.
- 2.2.2 Units received are to be inspected for physical damage that may have occurred in service or shipment.
- 2.2.3 All units shall be tagged to identify specific customer ownership.
- 2.2.4 Relays must be fully taken apart and all parts cleaned, checked, measured and tested as required by OEM, AAR, and FRA specifications.
- 2.2.5 Relays will be tested and inspected for defects.
- 2.2.6 All paints and plating will be of the approved type and used where applicable.
- 2.2.7 Inspect and clean pivots and bearings and replace any, which are worn or defective.
- 2.2.8 Replace all ribbons, worn carbons, worn contacts, and damaged covers.
- 2.2.9 Eyes of wires coming from the coils must be clean, crimped properly, and soldered. The coils must be checked and cleaned. The leads must be checked for cracks, and if cracked, the lead wires must be replaced and the coil rewound.
- 2.2.10 Replace all gaskets.
- 2.2.11 The relay cover will be replaced with a new one.
- 2.2.12 Any terminal with damaged threads or washers will be replaced.
- 2.2.13 All pins, trunions, and armatures must be in good condition before reinstallation.

- 2.2.14 Inspect all screws, nuts, and binding posts to determine that they are securely fastened, and lock washers, where used, are effective.
- 2.2.15 Determine by observing the operation of the relay that at least 1/8" clearance exists between the cover and moving parts and that adequate clearance is provided between other fixed and moving parts.
- 2.2.16 Contacts of the relay will be tested for contact resistance before and after the cover is in place and before and after the relay is sealed.
- 2.2.17 After assembly and before operational testing, an insulation breakdown test will be made between binding posts and relay frames. First, the insulation resistance from the coil or any terminal to the frame will be measured and will not be less than 1 megohm. Second, a high potential test will be made with a voltage of 2400 volts rms (3394 Volt peak).
- 2.2.18 The test voltage is defined as a 60Hz. sine wave, and the test current will not exceed one mill ampere when applied for 60 seconds. Further, the test should be conducted under conditions approximating a standard day, which are:

Barometric Pressure.....	29.92"
Temperature.....	+15C (+50F)
Humidity.....	75%

Measurement will be made from each relay terminal of the device to any other isolated terminal and from any isolated terminal to the relay frame. Isolated terminals include all coil and contact terminals on the relay.

2.3 COIL SPECIFICATION

- 2.3.1 At +20C (+68F), the percentage variation in the resistance of individual coils will not exceed the values shown below.
 - 2.3.1.1 For below 5 ohms, +or- 5%
 - 2.3.1.2 Above 5 ohms, +or- 10%
- 2.3.2 Coils will be secured in place to prevent their being damaged due to vibration.

2.4 CONTACT SPECIFICATION

- 2.4.1 The flexible connection from the binding post to the contact finger will be formed and attached so as not to affect the operating characteristics of the relay.
- 2.4.2 Inspect the contacts, replacing any that are defective.
- 2.4.3 Finger contacts must meet fixed contact surfaces squarely and at the same time.
- 2.4.4 Metal support of the non-fusible contact element will not come within 1/16" of the contact surface.

2.5 OPERATIONAL TESTING

- 2.5.1 Determine by actual operation that the relay has a positive drop-away and that the relay contacts open without retardation of movement due to friction or any other cause.
- 2.5.2 By visual inspection, make sure that the armature of the relay moves freely and that similar moving contacts meet the fixed contact surfaces squarely and simultaneously.
- 2.5.3 Highway crossing and wayside flashers will be adjusted as per OEM specifications, unless otherwise noted by customer.
- 2.5.4 Timer relays will operate smoothly over their entire range. Timers will run evenly and provide a linear adjustment over their entire range.
- 2.5.5 When taking relay measurements, meters will be connected in accordance with the testing arrangements as specified in OEM specification's sheets.

- 2.5.6 Meters will be in calibration and meet the requirements of the section "Test Instruments".

2.6 FINAL INSPECTION

- 2.6.1 Relays should be identified by serial number on all records. The manufacturer's serial number should be used if available, otherwise the customer or Patco Industries will assign a number.
- 2.6.2 Contacts of relays will be tested for contact resistance before and after the relay is sealed.
- 2.6.3 Relay cover retaining screws will be sealed with Banker's wax and impressed with the insignia of the seal must require that the seal to be destroyed to gain access to the base retaining screws. For searchlight mechanisms and other devices requiring a wire press seal, the relay remanufacturing facility must compress the seal with their seal press for identification.
- 2.6.4 Final drop-away, pick-up, and working value tests will be made after the relay is sealed. The values obtained will not vary more than 2% from the previous tests.
- 2.6.5 Enclosed parts will be free from foreign matter, in proper position, and in good condition.
- 2.6.6 By visual inspection, the armature of the relay must be seen to operate freely and the relay contacts must be seen to meet squarely and practically simultaneously.
- 2.6.7 All connectors, hardware, locks, and other related parts and holders must be seen to be complete and functional.
- 2.6.8 New wire seals will be provided with all timer relays.
- 2.6.9 Screens on the relay bases will be sealed for shipping.

2.7 TEST INSTRUMENTS

- 2.7.1 Meters and test sets used for relay testing shall be shopped for recalibration quarterly.
- 2.7.2 Test meters will be recalibrated at a recognized repair facility which uses standards traceable to the National Institute of Standards and Technology.

2.8 IDENTIFICATION AND SHIPPING

- 2.8.1 All remanufactured units will be legibly marked as REMANUFACTURED. The marking will be printed or stamped on a cloth or stock paper tag in block letters 3/4" high. The tag will be tied or otherwise securely fastened to the outside of the relay.
- 2.8.2 Shipping screws, ties, or similar methods to block the armature for shipment will be installed before packaging a relay for shipment.
- 2.8.3 Any loose pieces will be packed separately, but firmly attached to the unit.
- 2.8.4 Each relay will be packaged in a separate carton or be suitably protected before being placed in a packing box for shipment.

2.9 PRELIMINARY CALIBRATION CHECKLIST

- 2.9.1 A visual inspection will be made before any calibration steps are taken, checking the following points.
- 2.9.2 Contact Stack Inspection
 - 2.9.2.1 Milled slot in heel spring checked for kinks and tears.
 - 2.9.2.2 Contact tips properly applied.
 - 2.9.2.3 Carbons checked for chips and cracks.
 - 2.9.2.4 Bakelite flash removed.
 - 2.9.2.5 Back contact prongs properly aligned.
- 2.9.3 Magnetic Circuit
 - 2.9.3.1 Check plating on all exposed surfaces.

- 2.9.3.2 Dowel pins in armature bracket installed and screws tight.
- 2.9.3.3 Any foreign material removed from armature air gap.
- 2.9.3.4 Check armature endplay.
- 2.9.3.5 Check trunion bearings.
- 2.9.4 Relay Calibration
 - 2.9.4.1 Check armature air gap.
 - 2.9.4.2 Check armature alignment with cores.
 - 2.9.4.3 Check nylon stop pin for burrs and see that it strikes core surfaces squarely.
 - 2.9.4.4 Safety stop pins must not come in contact with the core.
- 2.9.5 Proceed with calibration following instructions in relay service specifications.

2.10 PRELIMINARY SEALING CHECKLIST

- 2.10.1 Armature endplay.
- 2.10.2 Check for foreign material in armature air gap and in cases.
- 2.10.3 Top and bottom cases properly applied.
- 2.10.4 Relay calibration tag installed in proper position and all necessary information is entered on the tag.
- 2.10.5 All lock washers properly locked.
- 2.10.6 Glyptol paint applied to joints, screws, and nuts per instruction.
- 2.10.7 Relay is properly indexed.
- 2.10.8 Contact springs checked for kinks and alignment.
- 2.10.9 Pusher rods properly locked.
- 2.10.10 Contact wiping actions checked.
- 2.10.11 Proper name plate installed and service number matches relay.
- 2.10.12 Relay electrical calibration meets required specifications.
- 2.10.13 Trunion bearing shaft properly locked.
- 2.10.14 Relays are properly sealed and dust free inside and out, no fingerprints inside or outside of unit.
- 2.10.15 Where applicable, circular tag is placed on screens.
- 2.10.16 All information is recorded.
- 2.10.17 All purchase order numbers and names are on shipping tag that is fastened to the unit.
- 2.10.18 Shipping screws used when applicable.
- 2.10.19 All units are properly sealed.

3 Warranty

Patco Industries, Inc. warranty information can be found on page 9 of this specification.

Warranty Information

We warrant that goods remanufactured or manufactured by Patco Industries, Inc. will, when delivered to you conform to our product specification or original equipment manufacturer specification and be free from defects in material and workmanship. Warranty period shall be three years for relays and/or seven years for switch machines and all other products one year from the date of shipment. Goods fail to function under normal and proper use and service because of defects in material or workmanship demonstrated to our satisfaction to have existed at the time of delivery, we will, reserving the right to either inspect them in your hands or request return to us, at our option, repair or replace the defective good(s) at our expense, FOB our plant. In any event, all dismantling, reassembly, and packaging are assumed by you and transportation costs will be collect to Patco Industries, Inc. If upon inspection it is found to not be a warranty issue you will be charged for any collect shipping.

We shall not warrant any part, or parts of any type of equipment sold by us to you that have been installed without proper inspection or testing prior to installation. We shall not warrant relays, switch machines or any other product or products sold to you if they are not installed properly, not properly inspected and/or maintained, altered or damaged while installing or by other equipment.

We shall not be liable for the cost or expense, including labor, in connection with removal or reinstallation; for the indirect incidental or consequential damages of any kind nor for any claim or claims arising out of the supply or use of our products. You will hold us harmless and indemnified against any and all claims, demands, liabilities, damages, costs and expense resulting from our sale of products or parts or any goods sold to you.

No goods may be returned more than thirty days after the date of delivery except with our written consent. Standard goods may be returned within thirty days after delivery, subject to a cancellation and restocking fee of 15% of total order value. If the box, container or packaging has been opened, standard goods may be returned within thirty days after delivery, subject to cancellation charge of 25% of the total order.

The rights and duties of the parties shall be governed by the laws of the state of Wisconsin.