

MOUNTING AND ALIGNING APPARATUS

"REG" TO "REL" (REGISTERS THRU RELAYS)

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1. GENERAL

1.1 Scope of Section

1.11 This section covers the requirements and methods for mounting and aligning apparatus classified alphabetically from "REG" to "REL" inclusive.

1.12 The requirements covered in this section should be followed except as modified by applicable specifications and drawings.

1.2 General Information Pertaining to Arrangement of Tools, Precautions, Verification, Specifications, Drawings and Figures, and Associated Information

1.21 Refer to Section 52 for information pertaining to the above subjects.

2. INSTALLING EQUIPMENT

2.1 Tools

2.11 In addition to tools supplied in the general kits, the tools listed below may be required for the operations covered by this section.

2.12 Additional Tools

654A	Remover, Relay, 289 Type
654B	Remover, Relay, 290 Type
654C	Remover, Relay 293 Type
R-1760	Adjuster
R-4320	Wrench, Adjustable, 8"
R-2443	Screwdriver, Cab., 3"
R-4300	Wrench Set, Small Nut and Bolt

3. REGISTERS, MESSAGE AND TRAFFIC

3.1 Mount message registers so that the horizontal clearance between register caps is not less than 3/32" in order to permit insertion of the No. 90 tool for cap removal. Register shall be mounted approximately level and shall be fastened securely to the mounting plate. This shall be checked for by applying light pressure to the register in horizontal and vertical directions and not by attempting to turn it.

3.2 In order to facilitate the use of cameras for recording message register readings, registers on message register racks should be so aligned vertically that there will be a 3/32" clear vertical space between the fifth and sixth registers on the mounting plates in each bay, for the entire height of the bay.

3.3 Mounting materials consisting of a hex, nut and two RHM screws are furnished with some 14-type registers of the "L" code shipped unmounted. Register mounting plates 3/8" thick are generally drilled for stud mounting of the message registers, although some of the latter type of mounting plates are also drilled for mounting the message register with screws.

3.31 If the mounting plate is drilled only for stud mounting of the message registers, the nut should be used and the screws discarded.

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- 3.32 If the mounting plate is drilled for both stud mounting and screw mounting of the message registers, the screws should be used and the nut discarded.
- 3.33 Additional mounting material consisting of a fiber washer P-474389 and a steel washer P-474390, or a cup washer P-473941, are furnished as loose parts with some 14-type registers for mounting these registers on 0.090" thick mounting plates. These washers should be discarded when mounting the registers on 7/32" and 3/8" thick mounting plates.
- 3.4 On stud mounted registers the washers, ground lug and nut should be placed in the following order: fiber washer, ground lug, metal washer and nut. The fiber washer, when furnished, should be placed between the register and mounting plate.
- 3.5 When mounted 14A registers are to be replaced by 14E registers, a 117A adapter is required with each 14E register. Screws for attaching the adapter to the register are furnished with the adapter.
- 3.6 Stud mounted message registers such as 12B, 12C, 12E, 12F, 12H, 14LE, 14LF, 14LH and 14LL are intended to be insulated from the mounting plate as follows:
- 3.61 When mounted on other than 671F or 848B mounting plates (except 0.090" thick mounting plates) stud insulating bushings should be furnished separately. The P-460137 bushings are for 7/32" mounting plates and the P-474214 bushings are for the 3/8" mounting plates.
- 3.62 When mounted on either the 671F or 848B stud insulating bushings need not be furnished separately, since these mounting plates are equipped with bushings.
- 3.63 When mounted on 0.090" thick mounting plates, stud insulating bushings need not be furnished, since the drilling and method of mounting stud-mounted message registers on these mounting plates is such as not to require stud insulators.

- 3.7 When traffic registers are furnished unmounted, the terminal lugs, when provided, shall be located on the mounting stud so that they will not obscure any lettering or numbering designations which may be placed later in accordance with handbook or applicable equipment drawing requirements.
- 3.8 Masks for message registers (Form E-2973), furnished only when specified by the telephone company, are designed for use in the caps of 5 type message registers where photographic recording is employed. Their purpose is to reduce extraneous markings on the photographic reproductions of the registers. For the mask to maintain its proper relation to the register number wheels, the cap should fit tightly on the register frame. Side play in the cap should be eliminated by bending its tabs so positioning the cap that the register numbers are clearly visible through the mask opening.

4. RELAYS

- 4.1 Mount individual relays with full complement of screws and washers furnished and tighten securely.
- 4.11 In checking for tightness apply vertical and horizontal pressure rather than attempting to turn the relay.
- 4.12 Note any special requirements involved in mounting of the relay and the position of cover guides and springs included in the section of Handbook 6 covering the particular type of relay.
- 4.2 In general, insulating washers are provided to insulate relays from the mounting plate.
- 4.21 Mount insulators for E, R, S and similar type relays with the mounting holes in positions shown in Figure 1 when viewed from the apparatus side.
- 4.22 Where B and G type relays of initial design, J or 280-type relays are mounted on channel or punched type mounting plates (plates 1/8" thick or less) an insulator (P-474106) is used under the mounting screws, on the wiring side of the mounting

plate, to prevent the screws from coming in contact with the lugs on which the relay windings terminate. On very thin mounting plates (0.065" thick) an extra metal washer, in addition to the metal washer or washer head screw furnished with the relay, is also required under each mounting screw. An insulator for each unequipped position is furnished as part of the mounting plate (attached with metal paper fasteners). The extra metal washer is also supplied with the mounting plate for unequipped positions.

4.221 Mount added relays with the P-474106 Insulator (when required) on the wiring side omitting the phenol fiber washers normally furnished with the relay. Use the additional washer furnished for the 0.065" thick mounting plates.

4.222 The additional insulator and washer are not required with the B and G type relays of modified design since the relay is furnished with two lengths of mounting screws.

4.223 The modified design B and G type relays may be easily identified by the presence of the threaded nylon inserts, instead of slotted holes, into which the adjusting screws are threaded (viewed from the apparatus side).

4.23 E, H, L, N, R, or S type relays to be mounted in positions from which B, G or J type relays have been removed from mounting plates drilled for optional mounting of either group of relays, or vice versa, require insulators and washers as shown in Figure 2.

4.3 Mount specific type of relays as follows:

4.301 Replace the regular mounting screws furnished with B and G type relays of initial design and J type relays by P-111866 (.164" - 36 x 7/16" R.H.M. screw) when these relays are mounted on resistance or other type mounting plates which are approximately 1/8" thick, where the P-474106 insulator is not provided.

4.302 The following relays should be mounted with the armature in a vertical position and to the right of the pole piece when viewed from the front of the relay, unless otherwise specified.

4.3021 Flat type.

4.3022 B, G and J and other types of the same general design.

4.303 S type relays are mounted using a shock absorber per D-141619 to prevent false operation when the location of this type of relay is subjected to vibration. When approved for use, these shock absorbers will be shown as part of the mounting on J and ED drawings and should not be removed.

4.304 In mounting telegraph relays, such as 21A, 22A and 24A, it may be found that there is a discrepancy between the drillings for the mounting screw holes in the relay base and those in the mounting plate. In this case it will be satisfactory to ream out the holes in the mounting plate and bolt the relays in position instead of mounting them with the machine screws furnished.

4.305 Mount 114, 124 and 198 type relays in the position illustrated by Item 1 or Figure 3 unless one of the other positions shown in Figure 3 is specified.

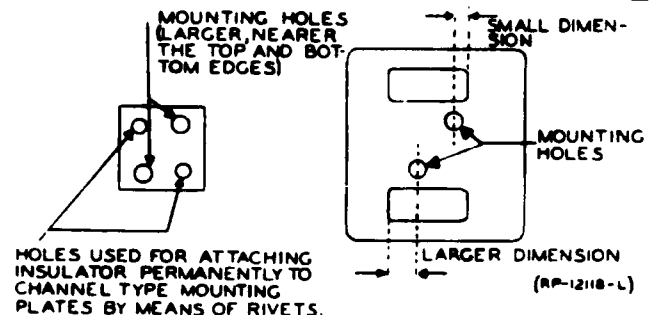
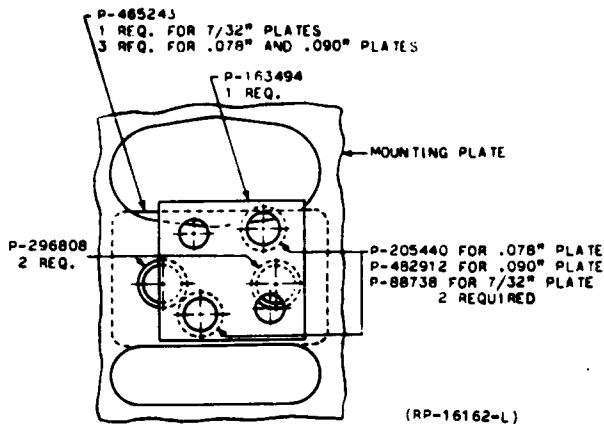


FIG 1 METHOD FOR MOUNTING INSULATORS FOR E, R, S AND SIMILAR TYPE RELAYS (PAR. 4.21)



NOTES:

1. RELAY SIDE OF PLATE SHOWN.
2. WHEN MATERIAL IS REQUIRED TO MOUNT E, H, L, N, R & S TYPE RELAYS, ONE PHENOL FIBRE WASHER, P-140818 SHALL BE ASSEMBLED BETWEEN INSULATOR, P-465243 AND THE HEAD OF THE MTG. SCREW IN THE SLOTTED HOLE ADJACENT TO THE UPPER TERMINAL HOLE.
3. WHEN MATERIAL IS REQUIRED TO MOUNT B, G AND J TYPE RELAYS, THE PHENOL FIBRE WASHERS, P-80125, FURNISHED WITH THE RELAY SHALL BE OMITTED AND THE BASE-PLATE INSULATOR FURNISHED WITH THE RELAY SHALL BE USED INSTEAD OF P-163494.

FIG 2 INSULATORS AND WASHERS FOR OPTIONAL MOUNTING OF E AND B TYPES OF RELAYS (PAR. 4.23)

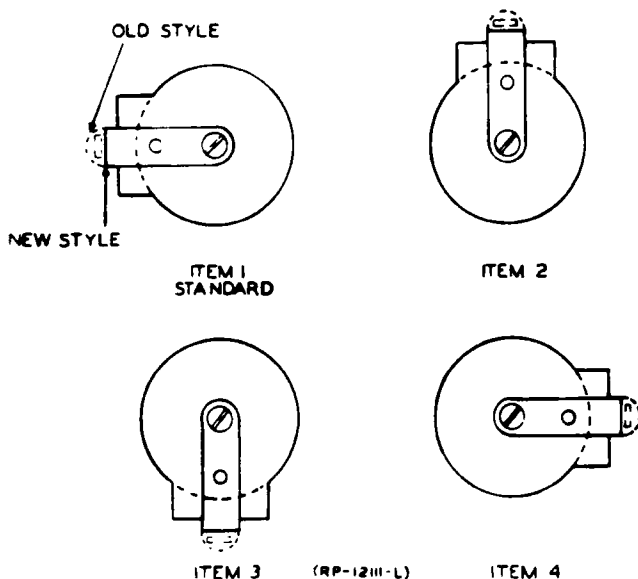


FIG 3 MOUNTING POSITIONS FOR 114, 124 AND 198 TYPE RELAYS (PAR. 4.305) (BSP 800-610-154 FIG. 19)

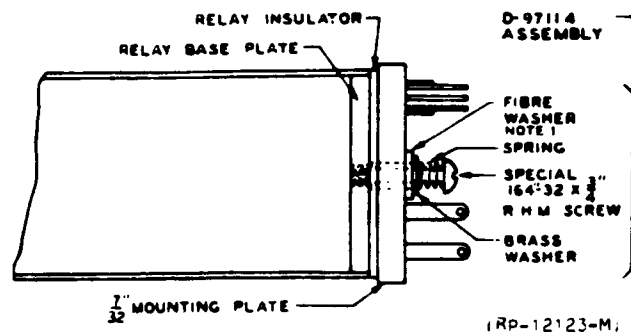
4.306 122, 125, 149, 162, 178 and similar type relays, when mounted by the shop, have a shock absorber per D-97114, inserted between the head of each mounting screw and the mounting plate, as shown in Figure 4 to protect the relay adjustment during shipment.

4.3061 It will not be necessary for the installer to remove the shock absorbers after the relays have been installed. However, the mounting screws should be checked for tightness. If a relay equipped with a shock absorber is removed from the mounting plate for any reason, the shock absorber and special mounting screws may be replaced by the standard mounting screw, if available.

4.307 Sensitrol relays and associated resistors should be mounted in accordance with information furnished in the paragraph in Section 52A that covers Mounting Serially Numbered Apparatus.

4.308 Mercury type relays should not be turned upside down suddenly when mounting. Handle carefully to avoid breaching the glass tube containing mercury.

4.309 Mounting 287 and 288 type.



NOTE 1: THREE FIBER WASHERS ARE USED ON EACH SCREW WHEN RELAY IS MOUNTED ON A .090\"

FIG 4 METHOD FOR MOUNTING D-97114 SHOCK ABSORBER ON 149, 162, 178 AND SIMILAR TYPE RELAYS (PAR. 4.306) (BSP 800-610-154 FIG. 24)

4.3091 In mounting a 287 type relay, carefully guide the terminals between the levels of the horizontal strapping taking care to keep the terminals clear of the strapping.

4.3092 When a 287 or 288 type relay is to be mounted in place of a 263 or 264 type, the clearance between the winding terminal test lugs of the 287 or 288 type relay and the adjacent relay at the right should be minimum 1/32". The clearance between the cover of the 287 or 288 type relay and the relay at the left should be sufficient to permit removal of the cover. This clearance should also be sufficient to prevent the cover of the 287 or 288 type relay from interfering with the operation of the armature of the relay at the left.

PRECAUTION: WHEN REPLACING THE CAN COVER ON A 263 TYPE RELAY MOUNTED ADJACENT ON THE RIGHT SIDE OF A 287 TYPE RELAY ON A WORKING FRAME, USE EXTREME CARE TO AVOID TOUCHING THE WINDING TERMINAL LUGS OF THE 287 TYPE RELAY WITH THE LEFT REAR EDGE OF THE COVER. THESE TERMINAL LUGS ARE "LIVE" AND SINCE THE COVER BECOMES GROUND-ED WHEN PLACED ON THE RELAY FRONT COVER GUIDES TOUCHING THE "LIVE" TERMINALS MAY BLOW THE FUSE SERVING THESE TERMINALS AND RESULT IN A SERVICE INTERRUPTION. IN REPLACING THE COVER, GUIDE IT CAREFULLY OVER THE FRONT COVER GUIDES UNTIL THE LEFT REAR EDGE OF THE COVER BECOMES ENGAGED BY THE LEFT REAR COVER GUIDE BEFORE PUSHING IT "HOME".

4.3093 The brackets of the 287 and 288 type relays have elongated mounting holes for positioning the relay with respect to the adjacent relays. If the minimum clearances cannot be obtained by positioning the new relay, it will be necessary to bend the mounting lugs of one or both adjacent 263 or 264 type relays.

4.3094 To bend the mounting lug apply an R-4320 Adjustable Wrench or an R-1760 Adjuster (if one is available) to the mounting lug of the adjacent relay. Place the wrench so that the

mounting lug is between the jaws of the wrench and apply sufficient pressure to the handle of the wrench to obtain the minimum clearance. Adjust the top and bottom mounting lugs as required. Check the clearances between other relays which may have been affected and make additional adjustments as required.

4.310 When relays having diagonally located mounting screws such as the E, R, U, Y and similar type relays are provided with 26A terminal punchings, mount the terminal punchings so that the overhang extends to the top right in order to provide the maximum space for designation purposes.

4.4 Removing 289, 290 and 293 Type Relays.

4.41 To remove 289, 290 and 293 type relays, disconnect all but one of the external leads. The one lead is left connected to prevent the relay from falling when it is disengaged from the mounting plate.

4.42 Using the proper 654 type tool for the type of relay (see Paragraph 2.12), hold one of the U-shaped details in each hand. Apply the prongs of the U held in the left hand to the left side of the relay cover and the other U held in the right hand to the right side of the cover. Keeping the closed ends of the U's close together, insert the prongs between the mounting plate and the inner surfaces of the legs of the relay cover.

4.43 Insert the prongs as far as possible. Then, by swinging the closed ends of the U's away from each other, spread the legs on the relay cover horizontally far enough to disengage them from the mounting plate. Disconnect the remaining lead from the wiring terminal and remove the relay.

4.5 Align relays to conform with the following requirements.

4.51 Align relays mounted on mounting plates so that there will be a minimum clearance of 1/32" between the terminals of the relays and any edge of the terminal cut-out in the mounting plate

4.52 Align relays under common can covers so that a straight edge laid across the edges of any two cover guides will show a minimum of 1/6" clearance between itself and the springs

of the relays. This applies to both edges of the cover guide which are parallel to the springs.

4.53 Align relays under common covers or other relays without individual covers such as relays inside of casings, so they do not touch any adjacent apparatus.

4.531 When 222, 223 and similar types of relays are mounted on step-by-step switches, there is no objection if the rear spoolhead of these relays are allowed to touch each other after mounting.

4.54 Align relays with individual covers as follows:

4.541 B, G, J, and 280 types with a clearance of approximately 1/32" as gauged by eye (1/64" minimum if actually gauged) between individual covers and adjacent apparatus.

NOTE: To meet the above requirement it will be necessary when mounting B relays on 1-1/4" centers to the right of R relays with R1 covers to employ B relays which have the welded seam covers instead of the older type with folded seam covers.

4.542 Other types of relays, such as N, U, S, Y, etc., where clearance is not required for electrical reasons, so as to present a good appearance and not to touch any adjacent apparatus.

4.55 Align E, F, H, R, T, U, Y, EA, UA and UB relays so as to obtain a 1/4" minimum vertical clearance between the springs of the relay and apparatus mounted directly above or below. The clearance is satisfactory if it can be obtained by removing the covers of the apparatus directly above or below, provided such covers are readily removable.

4.551 The 1/4" minimum clearance referred to above (required for inserting the relay spring adjusting tools) cannot be obtained on equipments employing 1-3/4" mounting plates if the following apparatus is located immediately above or below these relays:

178-type induction coils

448A jacks

212A jack mountings

213A jack mountings

39A lamp sockets

280 type relays

B-, C-, G-, and J- type relays

94, 120, 189, 202 and other repeating coils having a nominal vertical height in excess of 1-1/2"

231, 271, 274, 307 and other retardation coils having a nominal vertical height in excess of 1-1/2"

646, 659 and other input transformers having a nominal vertical height in excess of 1-1/2"

517, 526 and other output transformers having a nominal vertical height in excess of 1-1/2"

18 and 19 type resistors of the single-stud design

4.552 Apparatus having a nominal vertical dimension in excess of 1-1/2" may be mounted above or below any of these flat-type relays on 1-3/4" mounting plate by turning it "on flat" (rotating 90°) where the nominal width of the apparatus is not in excess of 1-1/2" providing such apparatus can be turned "on flat" without adversely affecting its operation or use. In such cases, the special mounting arrangement should be specified on the equipment drawing.

4.553 The 1/4" vertical clearance mentioned in 4.55 is preferred, but when it cannot be obtained under the conditions shown in 4.551, then a 3/16" minimum vertical clearance shall be maintained.

4.56 Align relays on 2" channel mounting plates as follows:

4.561 B, C, G, J, S, or 280 types with a clearance of approximately 1/32" as gauged by eye (1/64" minimum if actually gauged) between the flanges of these plates and the covers.

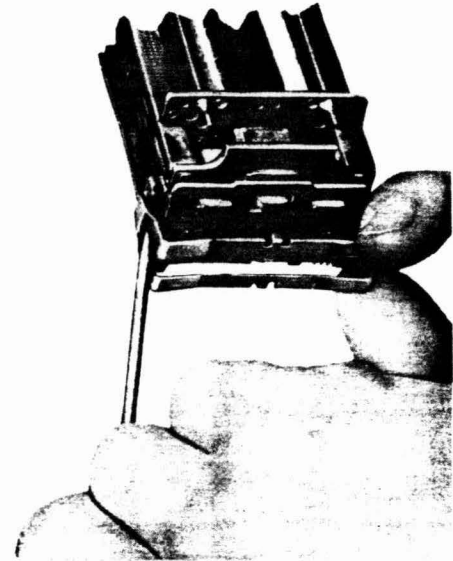
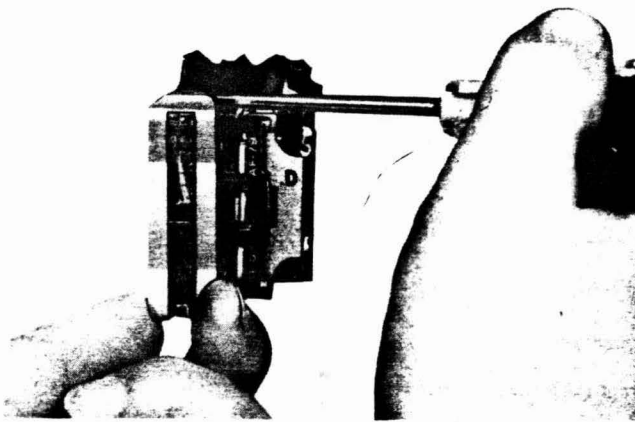
4.562 Other types of relays where clearance is not required for electrical reasons, so as to present a good appearance.

4.6 Wire Spring Relays with 4B Cover Clip

4.61 The 4B cover clip is intended to prevent dislodgment of contact cover and minimize damage or misplacement of the relay card and contacts during handling and shipping and have no value after the relays have been installed in permanent installations. It is recommended that 4B clips supplied with wire spring relays on non-X units and plug in units be removed prior to mounting.

4.62

To remove 4B clips: Hold clip with left hand. Disengage the top and bottom tang by inserting the tip of a KS-6854 Screwdriver between the upper and lower end of the 4B clip and the relay cover. A slight twist disengages the tang. Do not pry on the relay card. (See Fig 5) After removal of 4B cover clips from all relays they shall be disposed of locally.



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FIG 5 REMOVAL OF 4B CLIPS
(PAR. 4.62)

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→ Indicates new or changed information.

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indicate requirements.

Engineering Planning Manager
(Installation)

Reason for Reissue:
Update BSP issue.