MOUNTING AND ALIGNING APPARATUS

COMMON REQUIREMENTS AND INFORMATION

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1. GENERAL

1.1 Scope of Section

1.11 This section covers requirements and information common to the procedures for mounting and aligning apparatus.

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

1.13 Refer to the Associated Handbook Reference Chart below for the location of information to which reference may be necessary when performing operations covered by this section.

1.2 Verification

1.21 Items for the verification of the equipment installed by the operations covered in this section are listed in Section 52V.

1.211 The items in Section 52V may also be used as a self-check guide when performing operations covered by this section.

2. PRECAUTIONS AGAINST PERSONAL INJURY

2.1 General safety precautions against personal injury and equipment damage are outlined in the general section of this handbook. Additional precautions applying to aligning operations are listed in the specific methods paragraphs covering the operations to which they apply.

2.2 Avoid using screwdrivers with cracked or splintered handles or with uneven or rounded blades which are apt to slip from the screw head. Tag and return defective screwdrivers to Installation Stockkeeping.

2.3 Select screwdrivers and wrenches of proper size and use them so as to avoid personal injury in case they slip. Particular care is necessary where two men are working together. Figure 1 shows the considerations to be given when selecting the proper size screwdriver blade for various types of screws.

ASSOCIATED HANDBOOK REFERENCE CHART

Subject	Handbook	Section
General Requirement and Information	30	1B
Mounting and Aligning Apparatus		
"A" to "CH" (Assemblies thru Charts)	30	52A
"CO" (Coils thru Covers)	30	52CO
"CU" to "LA" (Cushions thru Lamps)	30	52CU
"LE" to "REC" (Levers thru Receptacles)	30	52LE
"REG" to "REL" (Registers thru Relays)	30	52REG
"RES" (Resistors)	30	52RES
"SE" to "VAR" (Seats thru Varistors)	30	52SE
Protecting Apparatus Terminals	9	-
Verification	30	52V

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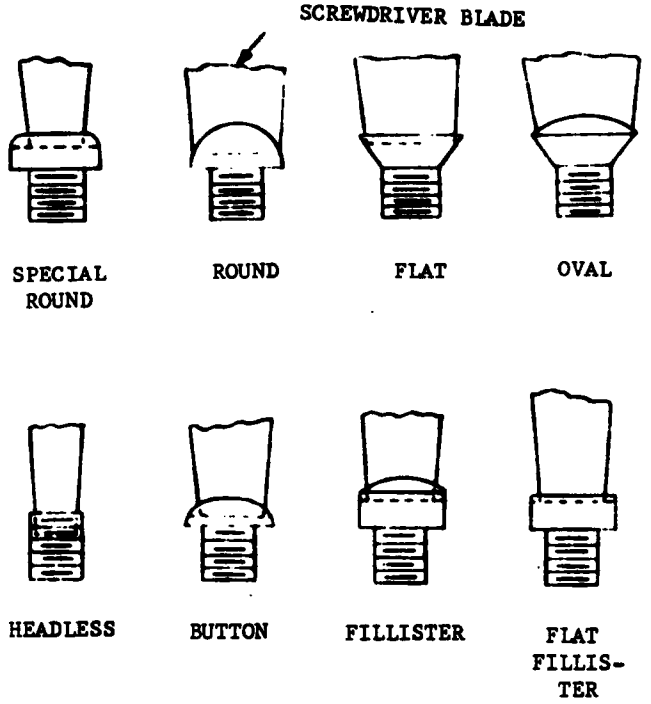


FIG. 1 METHOD FOR SELECTING SCREWDRIVERS (PARS. 2.3, 4.161)

3. PRECAUTIONS AGAINST EQUIPMENT DAMAGE

3.1 Observe the following precautions which apply generally to mounting and aligning apparatus.

3.11 Observe the precautions specified in Paragraphs 2.2 and 2.3 for the selection and use of screwdrivers and socket wrenches to prevent marring the heads of screws or nuts.

3.12 Use care not to drop or bump apparatus or tighten mounting screws unevenly since such treatment may render apparatus useless for its intended purpose, i.e., relays made impossible to adjust, coil windings shorted or opened, keys thrown out of adjustment, etc.

3.121 When mounting apparatus at the bench use pads made from canvas or other material and placed on the bench to prevent jarring and marring of the apparatus.

3.122 Use cotton gloves RM-669152 when mounting ceramic apparatus for carrier equipment as finger marks tend to increase electrical leakage especially at the frequencies used by the J, K, L, N and O systems.

(a) If ceramic parts are dirty or greasy, clean them before mounting with distilled water, obtained locally.

4. COMMON REQUIREMENTS AND METHODS

4.1 Mounting

4.11 Mount the type of apparatus specified on the equipment drawings in the apparatus positions or other locations as shown thereon unless otherwise specified.

NOTE: "J" Specifications or separate ED Drawings are furnished on standard equipment. Where non-standard conditions exist, job equipment drawings in the "T" or "H" series are furnished.

4.111 On serially numbered apparatus such as meters and sensitrol relays, check serial numbers and see that correspondingly numbered shunt, resistance, or other associated apparatus is correctly paired.

4.12 When possible, mount added apparatus on shop wired units or panels before running in cables.

4.121 To prevent damage to apparatus and wiring, do not mount fuses, heat coils, vacuum tubes, resistance lamps, ballast lamps and telegraph relays until the time specified by testing instructions.

4.13 Code Markings: In the absence of other controlling factors apparatus on mounting plates, such as capacitors,

repeating coils, and resistances should be mounted with the code markings at the top or left side as viewed from the apparatus side. Where the code stamping is on the end of the apparatus it should be mounted so that the code reads from left to right or from bottom up. This requirement also applies to this type of apparatus when mounted on angle mounting plates of the 629 or similar types. When mounted per items 1 and 3 of the 629 plate, as shown in Figure 2, the code will be at the left and when mounted per items 2 and 4, the code will be at the top.

(a) When apparatus such as that mentioned above is to be mounted in any other manner than that outlined herein, the method of mounting should be indicated on the equipment drawing.

(b) Single stud - or single screw-mounted apparatus, such as a spool or vitreous enamel-type resistances, electrolytic condensers, varistors, etc., should be turned so that the terminals are in the most convenient location for wiring. Also, where practicable to do so, they should be mounted so that the code markings are visible. Unless otherwise specified, the code markings may read either from the mounting plate or toward the mounting plate.

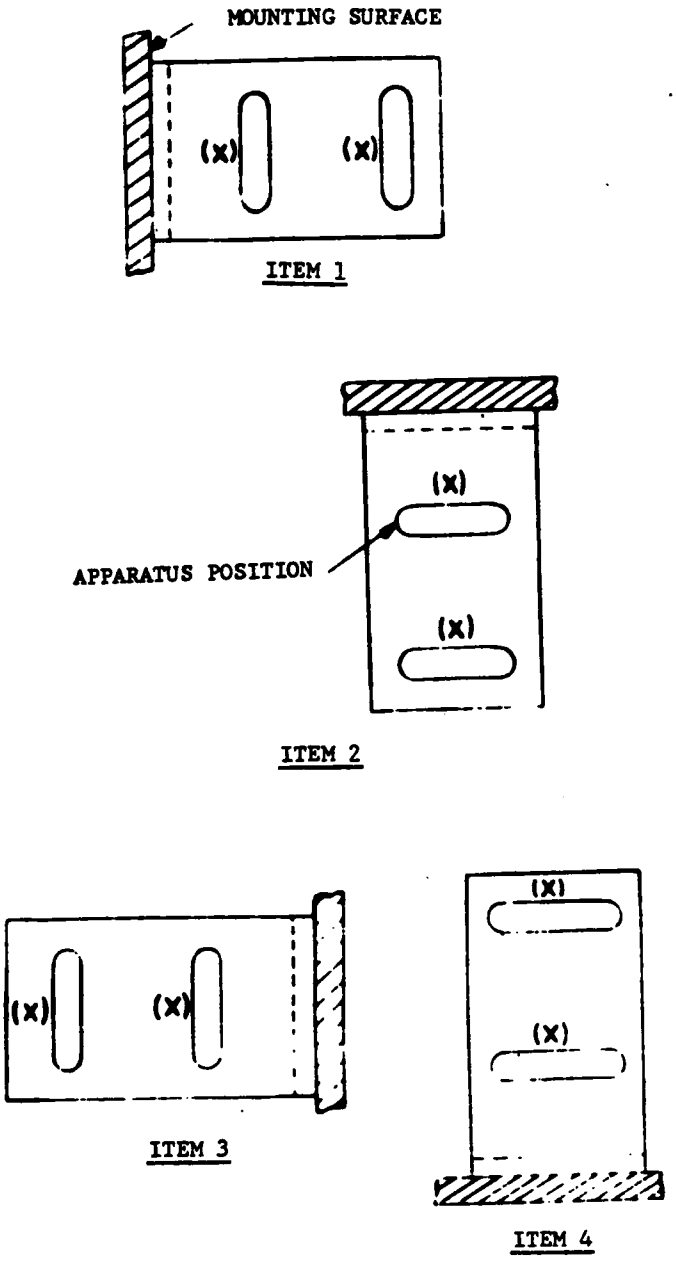
4.14 Mount all apparatus by means of the screws, nuts, washers, insulators, bushings, etc., furnished with the apparatus unless otherwise specified.

4.141 When one washer is furnished with a screw, place it under the nut, or under the screw head if no nut is furnished except as covered in the following note.

NOTE: When one washer is furnished with a screw used to mount terminal strips, the washer should be placed under the screw head in all cases.

4.142 When two plain washers are furnished, place one under the nut and one under the screw head.

4.143 When one lock washer and one plain washer are furnished, place the lock washer under the nut. Keep split portions of lock washers out of slots in mounting plates and elsewhere.



(X) INDICATES THE LOCATION OF CODE MARKINGS AS VIEWED FROM THE APPARATUS SIDE

FIG. 2 POSITION OF CODE MARKINGS OF APPARATUS MOUNTED ON 629 AND SIMILAR TYPE MOUNTING PLATES (PAR. 4.13) (BSP 800-610-154 FIG. 2)

4.144 On stud mounted apparatus with adjustable stop nut, locate the stop nut on the stud so that the stud will not be under flush, nor project more than 1/4" beyond the mounting nut.

NOTE: It is the purpose of this requirement to insure a degree of uniformity of stud projections. It is therefore, more important that the amount of stud projection be approximately uniform on any one lot of equipment than that the specified minimum and maximum projection requirements be strictly followed.

4.145 Where additional mounting screws, nuts and washers are required to mount the various types of apparatus, they may be requisitioned where the piece part numbers are not available, by indicating the code number and type of apparatus for which these screws, nuts or washers are used.

EXAMPLE: Mounting screws, nuts and washers for 6 No. 37 type terminal strips.

4.146 Assemble square or hexagonal nuts used to mount apparatus with either chamfered or unchamfered surface against the part on screws or threaded parts up to and including .164" (No. 8). On screws over .164" (No. 8) in size, the unchamfered surface of the nut should be adjacent to the surface against which the nut is tightened.

4.15 Make mounting screws and nuts as tight as practicable with the tool facilities and methods specified.

4.16 Bolts, machine screws and similar threaded parts shall be free from stripped threads and defaced heads and shall not be burred or bent to such an extent as to interfere with their placement or removal.

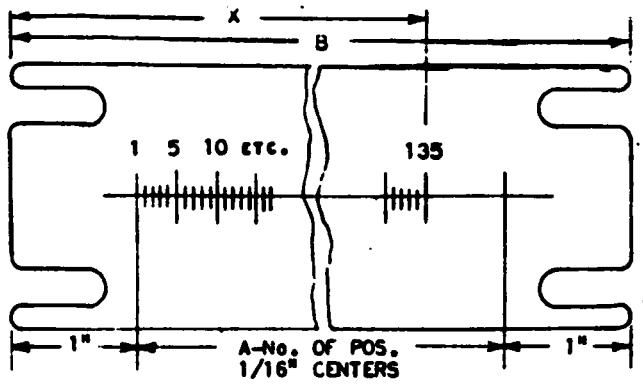
4.161 Where a particular screwdriver is not specified for mounting the apparatus, select one of the proper size in accordance with Figure 1. The R-2226 Screwdriver with screw holding attachment should be used where needed for starting screws. The use of an R-1625 Spiral Ratchet Screwdriver for mounting apparatus should reduce the time required to install and tighten the mounting screws.

4.162 When a wrench of another type is not specified and space permits, use a box or socket wrench for tightening the nuts.

4.17 Stake mounting screws when required with the R-1640 Center Punch and R-9430 Claw Hammer.

4.18 Where practicable, use the bench to facilitate mounting of apparatus. Prevent apparatus from rubbing against the bench.

4.19 Position locations on special (D spec.) mounting plates, with drilling positions 1/16" apart, are determined by dividing the position number by 16 and then adding 15/16". This gives the location of the position from the left end of the mounting plate in inches. For example, to find X (see Figure 3) for position 135:
$X = \frac{135}{16} + \frac{15}{16} = 9\text{-}3/8"$.



B A

SPEC.	LENGTH	WIDTH	No. OF POS. PER ROW	NOTE
D-48928	19"	1-3/4"	273	2
D-48929	21-5/8	1-3/4	315	2
D-48930	23	1-3/4	337	2
D-141634	26	1-3/4	385	2
D-48931	27	1-3/4	401	2
D-157783	19	3-1/2	273	1
D-157944	23	3-1/2	337	1

NOTES:

1. THE D-157944 AND D-157783 PLATES HAVE THREE ROWS OF MOUNTING CENTERS, 7/8" BETWEEN ROWS. THE ROWS ARE DESIGNATED TOP DOWN "A", "B", AND "C". ANY POSITION IN ANY ROW MAY BE USED AS REQUIRED BY THE APPARATUS.
2. THE 1-3/4" PLATES HAVE ONE ROW OF MOUNTING CENTER.

(RP-12671-M)

FIG. 3 METHOD OF LOCATING DRILLING POSITIONS ON SPECIAL MOUNTING PLATES (PAR. 4.19)

4.2 Alignment and Clearance

4.21 All apparatus not having movable parts such as capacitors, coils, networks, resistances and similar apparatus, when mounted in a group on one mounting plate, should be aligned so that the top edges will not be tilted out of horizontal alignment more than approximately 1/16" as gauged by the eye nor should any apparatus be rotated or tilted sidewise from its normal position more than approximately 1/16" as gauged by the eye.

4.22 Where bay equipment consists of several adjacent like units, all units or panels in a group of like units should be dressed to the left so that the left hand ends of the plates or panels will be aligned to within 1/16" of each other. However, where equipment with panel covers is mounted on cable duct-type bays, the units shall be dressed to the left so that the left-hand ends of the plates or panels are within 1/64" of each other. This can be most effectively done by using a straight edge between adjacent panels. No further alignment of apparatus between adjacent units will be required.

4.23 Provide a clearance of approximately 1/32" as gauged by eye (1/64" if actually gauged) between the apparatus terminals and the metal mounting plate unless some insulating material interferes.

4.231 Obtain the necessary clearance, if possible, by bending the apparatus terminals. If the required clearance cannot be obtained in this manner, sleeve the terminals as specified in Handbook 9.

(a) When bending or separating terminals of apparatus having spring pile-ups, such as relays, jacks, keys, etc., handle the terminals carefully so as not to disturb the adjustment of the apparatus.

4.3 Insulation of Apparatus

4.31 All apparatus designed to be insulated from the mounting plate shall, when mounted in the usual manner, be capable of withstanding a 500 volt ac breakdown test between the apparatus and the mounting plate. This requirement, in the case of relays, shall apply only to the core or frame of relays which is insulated from the mounting plate. Verification of this requirement may be omitted in the case of AF, AG, AJ and AK wire-spring relays and single-stud 18- and 19- type resistors.

(a) As a practicable means of checking this requirement in the field, an ohmmeter or receiver test using 48 volts may be used by the installer.

(b) Where the core or frame of the relay is part of the circuit, such as in the case of B-, G-, J-, L-, S-, and 280-type relays, the insulation breakdown test need only be made before wiring.

(c) When making the above check on relays, such as E, EA, F, H, R and T - types with individual covers that are not required to be insulated from ground, these covers should be removed if there is any chance that they have been grounded through contact with mounting plate flanges or other adjacent parts.

4.4 Apparatus Mounted on Channel Type Bars

4.41 Equipment units consisting of multi-contact relays (286 Type) and/or terminal strips (BW and similar type) are now being furnished with channel type P-44J350 Mounting Bars instead of the previously standard 3/8" x 1/2" solid type P-40B657 or P-42D481 Mounting Bars. The channel bars have punched apparatus mounting holes and require thread forming (Taptite) screws for mounting relays, terminal strips and networks. The No. 10-32 thread forming screws furnished with units equipped with channel bars cannot be used for mounting apparatus on the 3/8" x 1/2" mounting bars, which are drilled and tapped for .190-24 machine screws.

4.42 When adding units provided with P-44J350 Channel Mounting Bars on partially equipped frames, the mounting location may require removing one of the unit bars in order to use on existing tapped 3/8" x 1/2" mounting bar as one support for the added unit. In such cases, substitute .190 x 24 machine screws, furnished separately with the unit, in place of the No. 10-32 Taptite screws when attaching the added unit to the

existing tapped bar. Where 180A networks are involved, substitute .190 x 24 x 1-1/4" screws and .19-24 hex nuts, also provided, as required.

4.43 Initially, some channel bar equipped units were shipped without including additional machine screws and nuts. If required, requisition machine screws and nuts for these units using the following ordering information:

P-181688 BHM Screw (.190-24 x 1-1/4")
P-181683 BHM Screw (.190-24 x 5/8")
P-210690 Hex Nut (.190-24)

→ Indicates new or changed information.

Vertical lines at side of paragraphs indicates requirements.

Engineering Planning Manager
(Installation)

Reason for Reissue:
Update BSP Issue.