PUNCHING MOUNTING PLATES

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1. GENERAL

1.1 Scope

1.11 This section covers the method of punching mounting plates (maximum thickness 1/8"), for the addition of certain new apparatus without disconnecting the apparatus already mounted on the plate of removing completely the plate from the frame.

1.12 Punching mounting plates can be broken into two categories, a universal and a specific.

1.121 The universal utilizes a standard square hole punch and adapter plates with the various apparatus hole configuration stamped into them.

1.122 The specific utilizes a punch or punches which knockout the exact configuration of the apparatus to be mounted. Both of these techniques will be discussed herein.

1.13 For those cases not applicable to punching, Section 54 of this handbook covers the drilling of mounting plates.

1.2 Associated Information

1.21 Specifications and drawing furnished the job.

1.22 Section 54 of this handbook shall be used in conjunction with this section where needed. In most cases no drilling is needed to start the punching operation.

1.3 Precautions

1.31 Precautions Against Personal Injury and Equipment Damange

1.311 The specific precautions to be taken against personal injury and to prevent damage to equipment and service interruptions are covered in this section or in other sections of this handbook with the associated operations. General precautions are covered in the general sections of this handbook and in Handbook 0. These precautions should be observed at all times, as they apply to the particular operation being performed.

1.4 Arrangement of Tools

1.41 Prior to the starting operations covered by this section, the tools and other items required should be arranged at the work location so as to minimize fatigue and inconvenience while handling.

1.5 Installing Equipment

1.51 The tools and material needed for operations covered by universal punching can be found in Tool Kit 80, the prime constituent of which is the R-3868 Square Hole Punch.

1.52 For specific punching, those punches presently available are the:
R-3753 Knockout Punch for TSP Keys and Lamps.
R-3803 Knockout Punch for Wire Spring Relays.
R-1010 Wire Spring Relay Punch.

1.53 All of the above tools are hydraulically operated and utilize the Greenlee Hydraulic Unit. This unit is included in Kit 80, but must be ordered separately via the R-3241 Hydraulic Conduit Punch Set for the R-3753 and the R-3803.

1.54 Additional Tools required:
1-R-3032 1/2" Capacity Electric Drill
1-R-3806 Handle, Reversible Deive 1/2"
1-R-2819 Wrench, Socket 19/32 inch.

2. UNIVERSAL PUNCHING WITH THE R-3868 PUNCH

2.1 Arrangement

2.11 The universal punching technique utilizes the R-3868 Square Hole Punch and adapter plates with the various apparatus hole configuration stamped into them. Adapter plates will be ordered in the job specification.

2.2 Limitations

2.21 There are two limiting factors to the use of this technique, the first being the space availability on the mounting plate and the second the adapter plate availability.

2.211 A minimum of 2" (horizontal distance) is needed on the wiring side of a mounting plate to use the R-3868.

2.22 Attached to this section is a Supplementary Table indicating the space needed for the adapter plates and those adapter plates available.

NOTE: If the need for additional adapter plates becomes apparent, this listing will be expanded accordingly.

2.3 R-4531 3/4" Knockout Punch

2.31 The R-3868 Square Punch requires a 3/4" pilot hole located centrally with respect to the mounting plate channel flanges. The R-4531 3/4" Knockout Punch was designed to provide the required pilot hole on 2" undrilled mounting plates.

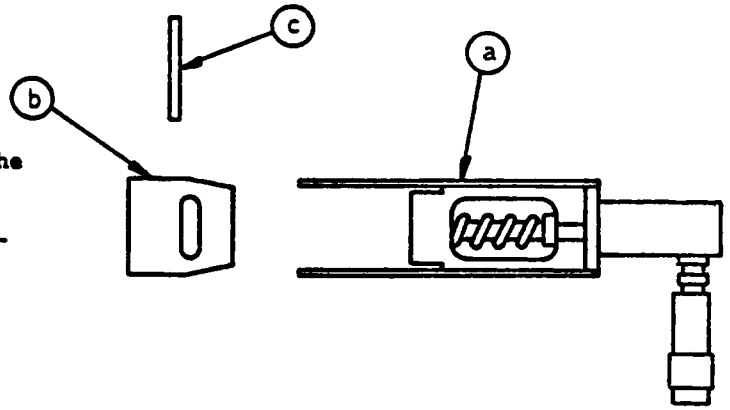
2.32 The R-4531 is driven by the R-4353 Hydraulic Pump. Operating Instructions for the R-4353 Hydraulic Pump are contained in HB 28 Section 605.

2.321 The pump is connected to the punch by means of a quick disconnect hydraulic coupling.

2.33 Two installers are required for the operation of this tool. One man is positioned on the wiring side of the frame and one man is positioned on the equipment side of the frame.

2.34 The R-4531 3/4" Knockout Punch consists of three basic assemblies:

(a) Punch Assembly
(b) Die Assembly
(c) Locking Pin



RP-0832

FIG. 1 BASIC COMPONENTS OF R-4531 KNOCKOUT PUNCH

2.35 Mounting screws on the plate to be punched and on adjacent plates above and below the plate to be punched must be loosened to provide clearance for the tool.

2.36 The punch is assembled to the mounting plate from the equipment side by sliding the thin steel blades above and below the mounting plate and seating the punch body snugly against the mounting plate.

2.37 The die assembly is next attached to the thin steel blades on the wiring side of the plate by a pinning arrangement. The thin steel blades slide into the die assembly. Fig. 2 shows a punch assembled to an isolated mounting plate for instructional purposes.

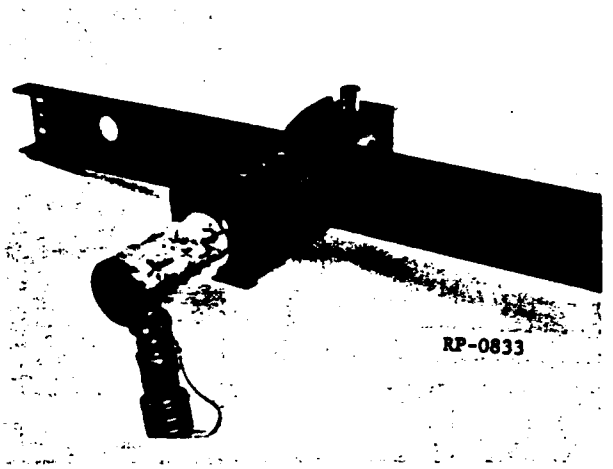


FIG. 2 PUNCH ASSEMBLED TO ISOLATED MOUNTING PLATE

2.38 Before the pump is activated and the mounting plate is perforated, it is necessary to verify that the locking pin goes through both guide blades.

2.39 Should the tool fail to strip from the mounting plate after perforation, the die may be unpinned and removed and the punch may be lightly tapped with wood from the wiring side to facilitate removal.

2.4 Procedure

2.41 The R-3868 Hydraulic Knockout Punch and Nibble consists of:
1 Det. 5 - Shaft
1 Det. 6 - Guide
1 Det. 7 - Spring
1 Det. 8 - Punch
1 Det. 9 - Die
1 Det. 10 - Special Nut

2.42 Following is a step-by step procedure for punching square holes for adapter plate mounting. Figure 3 arrangement 1 shows the complete assembly.

2.421 Drape canvas on both sides of frame under the mounting plate to be punched, to protect working equipment.

2.422 Locate on the apparatus side of the mounting plate the vertical center line for the apparatus to be mounted.

2.423 Use the R-4531 to perforate the mounting plate with 3/4" circular hole.

2.424 To knockout a 1-17/32" x 1-17/32" hole with the R-3868 Hydraulic Knockout Punch and Nibbler.

(a) Screw Det. 5 Shaft as far as it will go into the R-4032 Greenlee Hydraulic Ram.
(b) Slip Det. 6 Die Guide onto the shaft with guide assemblies up (away from ram) until it is flush with the ram.
(c) Insert Det. 9 Die onto Det. 6 Guide, make sure it is seated properly.
(d) Insert Det. 7 Spring onto shaft, flush with die guide.
(e) Insert assembly into the 3/4" hole from the wiring side of the mounting plate.
(f) Slip Det. 8 Punch onto Det. 5 Shaft.
(g) Screw Det. 10 Special Nut onto Det.5 Shaft flush with the punch, hand tighten.
(h) Using the R-3952 Alignment Gauge, insert between the bottom flange of mounting plate and the punch, to affix horizontal alignment.
(i) Start punching operation, apply pressure to the hydraulic punch unit, until the Det. 8 Punch cuts completely through metal.
(j) After hole has been punched, the Assembly can be pulled through the work.
(k) Continue to apply pressure until Det. 9 Die can be removed from assembly.
(l) Release pressure, of hydraulic unit, disassemble tool and remove blank.

2.43 If a hole wider than 1-17/32" but not larger than 3-1/16" is required along with punching use the nibbling feature of the punch to enlarge the hole. For holes wider than 3-1/16" use a combination of punchings and nibbling.

CAUTION: NEVER OVERLAP IN THE PUNCHING OPERATION, ALWAYS LEAVE AT LEAST AN 1/8" STOCK BETWEEN HOLES. THIS IS TO PREVENT THE PUNCH FROM BINDING AND, THEREFORE, APPLYING UNEQUAL FORCES TO THE PUNCH ASSEMBLY.

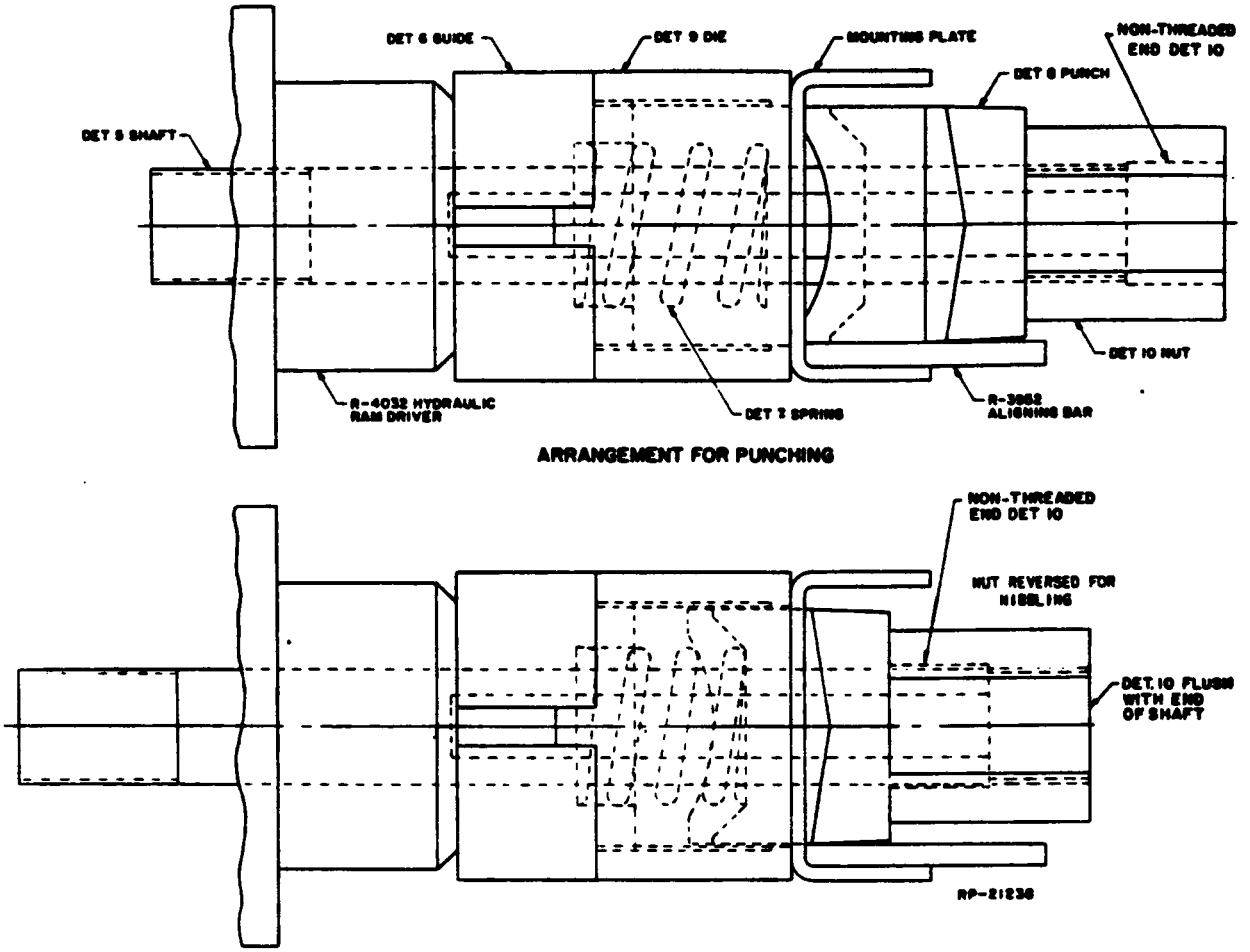


FIG. 3 UNIVERSAL PUNCHING WITH THE R-3868 PUNCH
(PARS. 2.42, 2.441)

2.44 Following is a procedure for nibbling to widen existing holes.

2.441 Assemble the punch for nibbling Paragraph 2 245), except Det. 10 Nut is reversed and screwed flush with end of shaft, (see figure 3, arrangement for nibbling).

2.442 Slip the assembled punch into the open hole in the mounting plate.

2.443 Fit the nibbling feature over the desired stock to be punched.

2.444 Align punch horizontally with the R-3952 Alignment Gauge.

2.445 Apply pressure to the hydraulic lever of the Greenlee Pump until the metal is cut through.

2.446 Release the pressure valve of the Greenlee Pump. The blank will fall out as the punch slips out of the die.

2.447 Perform this operation as many times as needed to each side of initial hole until required width is obtained.

2.5 Adapter Plates

2.51 Once the proper sized hole has been punched in the mounting plate according to the space needed as show in supplementary Table 1 for the particular apparatus to be mounted, install the adapter plate.

2.511 Place the adapter plate on the apparatus side of the mounting plate and the retaining clips on the wiring side.

2.512 Secure the retaining clips with the four FHM Screws supplied. Install these screws through the adapter plate to the retaining clips. The R-3946 Screw Holding Screwdriver will aid in holding and driving the screws.

3. SPECIFIC PUNCHING

3.1 Specific punching utilizes a punch which knockouts the exact configuration of the apparatus to be mounted. Presently this is limited to those pieces of apparatus that don't lend themselves to universal punching.

3.2 R-3803, Wire Spring Relay Knockout Punch

3.21 This tool was developed before universal punching, or the R-1010 Wire Spring Relay Punch came into existence. Therefore, three methods exist for adding wire spring relays to 2" mounting plates. The R-1010 punch is covered in Section 53A.

3.22 The R-3803 Wire Spring Relay Knockout Punch is hydraulically operated and consists of the following parts furnished in Kit 73:

1-R-3803 Punch, Wire Spring Relay Knockout
1 Det. 1 - Knurled Nut
1 Det. 2 Punch
1 Det. 3 Stud
1 Det. 4 Die Guide
1 Det. 5 Die

Also Included in Kit 73:

1-R-3848 1/2" Punch
1-R-3843 Shipping Case

3.23 Following is a step-by-step procedure for punching rectangular holes for wire spring relays. Figure 4 shows the complete assembly.

> CAUTION: CANVAS SHOULD BE DRAPED ON EQUIPMENT SIDE OF FRAME OVER AND UNDER PUNCH TO PROTECT WORKING EQUIPMENT.

3.2301 Locate and drill 1/4 inch hole in mounting plate.

3.2302 Knock out 1/2 inch hole with No. 730 1/2 inch Greenlee Punch.

NOTE: Some difficulty may be encountered in removing 1/2 inch blank from die. This may be overcome by taping on stud head until blank is disengaged.

> CAUTION: CARE SHOULD BE TAKEN WHEN REMOVING BLANK FROM STUD, SINCE THE EDGES OF MATERIAL ARE SHARP AND COULD CAUSE A SERIOUS ACCIDENT, THEREFORE, PROTECT FINGERS WHEN REMOVING 1/2 INCH BLANK.

3.2303 Locate Det. 5 Die on wiring side of mounting plate in position desired to be punched out.

3.2304 Screw Det. 3 Shaft into Greenlee Ram.

NOTE: Remove all shafts from ram before inserting Det. 3.

3.2305 Slip Det. 4 Shaft and Punch Guide into Det. 3 Shaft with .250 relief up.

3.2306 Insert Det. 5 Die onto Det. 4, small opening on top.

3.2307 Insert assembly into 1/2 inch hole on wiring side of mountin plate.

3.2308 Insert Det. 2 Punch onto Det. 3 Shaft.

3.2309 Secure above with Det. 1 knurled Nut.

NOTE: Some difficulty may be encountered while threading and unthreading by hand. It may become necessary to use a wrench. Operator should support ram until the punch and die have engaged mounting plate.

3.2310 Apply pressure until Det. 2 Punch completes the cutting operation.

NOTE: Never force punch if there is undue resistance in the punch, release valve and see if you have properly assembled punch.

3.2311 After hole has been punched, the Punch and Nut can be pulled through work.

3.2312 Continue to apply pressure until Det. 5 Die may be removed from assembly.

3.2313 Release pressure remove nut punch and blank by tapping lightly with Det. 4 Shaft and Punch Guide.

CAUTION: WHEN OPERATING AT OTHER THAN FLOOR LEVEL WITH A HAND PUMP, THE R-3937 HOLDER SHALL BE USED IF AVAILABLE.

3.2314 Drill winding and mounting holes using R-3902 Template per information furnished in drilling section of this handbook.

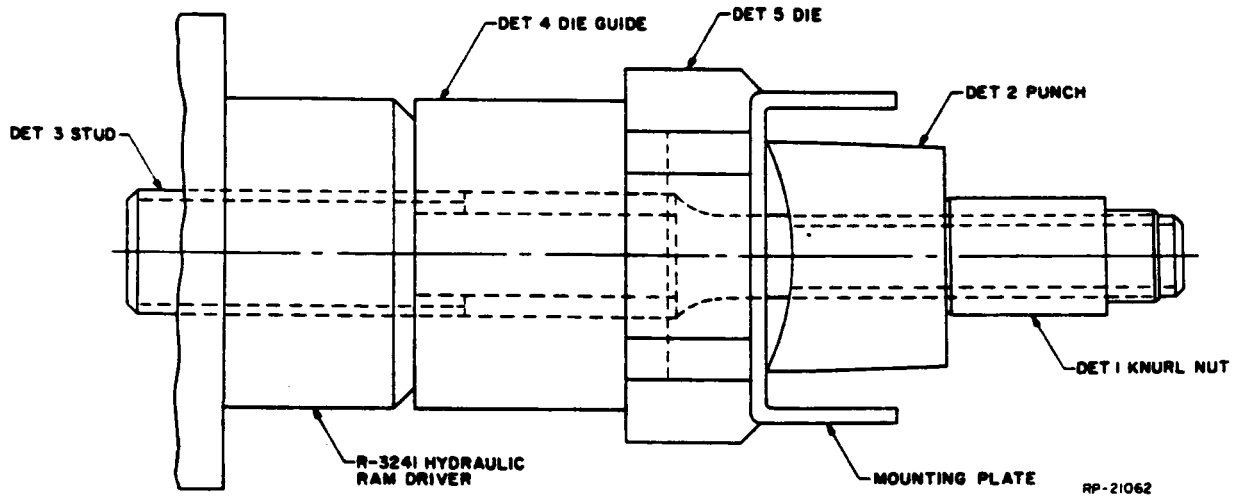


FIG. 4 SPECIFIC PUNCHING WITH THE R-3803 (PAR. 3.23)

3.3 R-3753 Traffic Service Position Knockout Punch

3.31 The R-3753 Punch was developed for punching holes for the addition keys and lamps in the keyshelf of Traffic Service Position systems. It can be hydraulically or manually operated depending on the availability of the R-3241 Greenlee Hydraulic Unit. The R-3753 TSP Knockout Punch consists of the following details: (See Figure 5)

1 Det. 1 - Guide, Pilot Hole (not shown)
1 Det. 2 - STUD
1 Det. 3 - STUD and Die Guide
1 Det. 4 - Punch
1 Det. 5 - Nut Coupling — Combination to be used for keys
1 Det. 6 - Die
1 Det. 7 - Nut, Special
1 Det. 10 - Punch
1 Det. 11 - Die — Combination to be used for lamps
1 Det. 12 - Nut Coupling

3.32 The outline below and Figure 5 will be helpful in assembly and operation of this tool.

3.321 Information given below will be for a key hole punching using Details 4, 5 and 6. Use the same information for lamps only now substitute Details 10, 11 and 12 for 5 and 6.

3.33 Place Det. 1 Pilot Hole Guide into an adjacent keyhole. It will be necessary to remove a key in order to use guide and drill 3/8" pilot hole.

NOTE: If there is a problem of obtaining proper centering of pilot hole with stud and punch, it will be necessary to enlarge 3/8" hole.

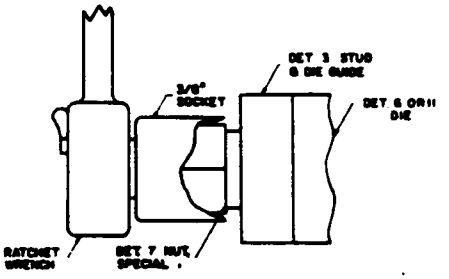
3.34 The hole is punched through the keyshelf mask only. See Figure 5 for assembly of R-3753 punch used hydraulically or manually.

3.35 Assemble Det. 3 and Det. 6 with relief on Det. 6 inserted into Det. 3.

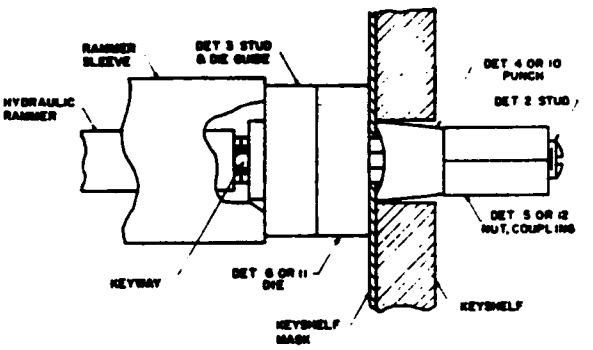
3.36 Hydraulic Punching

3.3601 If hydraulically operated, install stud 3/8" thread Det. 2 into R-3241 Hydraulic punch set rammer.

3.3602 Install the R-3241 Greenlee Itemd 9, 10 & 11, long, medium and short bushings on rammer.



ASSEMBLY FOR MANUAL PUNCHING



ASSEMBLY FOR HYDRAULIC PUNCHING

SPECIFIC PUNCHING WITH THE R-3753
(PAR. 3.31, 3.32, 3.34, 3.3604 and 3.371)

3.3603 Slide Det. 3 and 6 on stud with die opening away from bushing.

3.3604 Insert assembly from the top into the 3/8" pilot hole. See Figure 5.

3.3605 Place Det. 4 Punch over the stud making sure that it engages the key bolt in Det. 2 stud.

3.3606 Thread Det. 5 Nut, finger-light into the stud and continue until nut is tight agains punch.

3.3607 Position Det. 3 and 6 parallel to existing keyhole for proper alignment.

3.3608 A few strokes of the hydraulic punch will cut through mask.

NOTE: Never force punch if there is undue resistance in the punch, release valve and see if you have properly assembled punch.

3.3609 After the hole has been punched, the Det. 4 Punch, can be pulled through work.

3.3610 File any burrs that may exist after punching hole.

3.37 Manual Punching

3.371 If manually operated, attach Det. 7 to assembly in place of hydraulic rammer. See Figure 5.

3.372 Thread Det. 7 nut finger tight into stud and continue tightening with either an adjustable wrench or proper rachet handle and socket.

NOTE: At no time should it be necessary to force punch into metal. Stop operation and see if the punch is assembled properly.

4. VERIFICATION ITEMS

4.1 All metal projections and burrs shall be removed from punched holes.

4.2 Bare metal exposed by drilling and or cutting operations covered with protective finish.

→ Indicates new or changed information.

Engineering Planning Manager
Common Installation and Services

ATTACHMENT
Table 1

Reason for Reissue
(1) To include information about the R-4531 3/4" Knockout Punch.
(2) To make minor revisions.

TABLE 1

LIST OF APPARATUS, THAT ADAPTER MOUNTING PLATES ARE AVAILABLE TO ACCOMODATE

Apparatus Description	Code	"A" Dwg	Adapter Plate Number (Note 1)	Adapter Plate Width (Note 2)
Amplifier	227		L50	2-1/8"
	V3		L23	2-1/8"
Bell	7		L60	3-1/16"
Blocks - Fuse	18A	776870	L47	1-5/16"
	19A	776916	L77	1-1/8"
	20A	777004	L77	1-1/8"
	21A	568967	L77	1-1/8"
	22	554115	L75	6-9/32"
	23	554117	L75.1	3-5/16"
Capacitor	187	133181	L18	2"
	226A	162931	L18	2"
	282	133181	L18	2"
	431	133181	L18	2"
	437	133181	L16	1-25/32"
	437	133181	L17	1-5/32"
	439	526453	L17	1-5/32"
	439	526453	L19	27/32"
	440	526453	L17	1-5/32"
	441	148797	L19	27/32"
	442	148797	L19	27/32"
	444A	526453	L17	1-5/32"
	473C	-	L17	1-5/32"
	475	148797	L19	27/32"
	476A	148797	L19	27/32"
	511	148797	L19	27/32"
	513	526453	L17	1-5/32"
	520	133181	L16	1-25/32"
Coils - Rep.	94	316878	L14	3-3/16"
	120	316878	L14	3-3/16"
	149	-	L14	3-3/16"
	151	316878	L14	3-3/16"
	173	316878	L14	3-3/16"
	175A	316878	L14	3-21/32"
	178B	319358	L27	3-21/32"
	181A	526114	L27	1-19/32"
	185	526114	L40	2-7/8"
	189	526596	L27	1-19/32"
	202	540016	L27	1-19/32"
Connector	912A	554395	L78	15/16"
Equalizer	23A	316878	L15	3-21/32"
Indicator	15	-	L33	2-1/2"
Inductor	251	133181	L16	1-25/32"
	293	133181		
	257A	316878	L15	3-21/32"

TABLE 1 (Cont'd)

Apparatus Description	Code	"A" Dwg	Adapter Plate Number (Note 1)	Adapter Plate Width (Note 2)
	268A	316878	L15	3-21/32"
	274	525828	L27	1-19/32"
	307	525828	L27	1-19/32"
Interrupter	KS-1500	-	L53	3-5/8"
Jack	395A	151203	L52	3/4"
	395B	703190	L52	3/4"
Key	56	-	L59	5-9/16"
	52	104466	L64	1-1/16"
Lamps - Resistor	11	165163	L21	1-5/16"
	13	165163	L21	1-5/16"
Mountings - Jack	252A	212431	L28	1-3/32"
Networks	115	526381	L34	7-1/4"
	156A	133181	L16	1-25/32"
	177	148797	L19	2-7/32"
	200	526500	L15	3-21/32"
	425D	579440	L72	3-3/4"
	837A	316878	L15	3-21/32"
Pad	1	163166	L20	2-1/16"
Relay	186	204238	L63	1-9/16"
	196	107641	L44	2-3/4"
	221	147094	L39	2-1/2"
	248	147094	L39	2-1/2"
	280	141428	L36	2-3/32"
	293	703283	L65	2-1/4"
	295	526991	L67	1-7/8"
	316 A	141428	L36	2-3/32"
	B	141428	L6	1-9/16"
	E	141511	L11	1-19/32"
	E	141511	L11	1-19/32"
	G	141428	L6	1-9/16"
	J	141428	L6	1-9/16"
	R	141511	L11	1-19/32"
	R	141511	L11A	1-3/4"
	S	144350	L42	1-29/32"
	U	702976	L7	1-27/32"
	U	702976	L8	2-3/32"
	U	702976	L9	2-15/32"
	Y	702976	L7	1-27/32"
	Y	702976	L8	2-3/32"
	Y	702976	L9	2-15/32"
	AF	526876	L4	1-27/32"
	AG	526876	L4	1-27/32"
	AJ	526876	L4	1-27/32"

TABLE 1 (Cont'd)

Apparatus Description	Code	"A" Dwg	Adapter Plate Number (Note 1)	Adapter Plate Width (Note 2)
	AJ200	526876	L5	2-3/32"
	AJ700	526878	L5	2-3/32"
	AK	526786	L4	1-27/32"
	UA	702976	L7	1-27/32"
	UA	702976	L8	2-3/32"
	UA	702976	L9	2-15/32"
	UB	702976	L7	1-27/32"
	UB	702976	L8	2-3/32"
	UB	702976	L9	2-15/32"
Registers - Message	12	-	L29	1-5/8"
	14	753304	L29	1-5/8"
Resistor	19	204226	L10	3/4"
	19	204226	L10.2	1-3/16"
	19	204226	L10.3	1-5/8"
	19	204226	L10.4	2-1/16"
	59	132573	L48	1-1/8"
	60	204226	L48	1-1/8"
Selector	204	151675	L41	4-7/8"
Socket - Tube	KS-13364L2		L35	1-11/16"
Lamp	39A	135425	L58	1-9/16"
Strips - Terminal	208A	319763	L31	5/8"
	224A	701781	L12	2-1/8"
	224B	701781	L13	1-15/16"
	224F	701781	L12	2-1/8"
	224G	701781	L13	1-15/16"
	227A	318613	L26	1-1/2"
	278A	554048	L68	1-1/4"
	D1A	330244	L30	1-1/2"
	D2A	330244	L30	1-1/2"
	D3A	330244	L30C	1-15/16"
	D4A	330244	L30C	1-15/16"
	D5A	330244	L30D	2-1/16"
Transformer	2507	540073	L70	1-1/4"
Tubes Electron	346C	526244	L43	1-11/32"

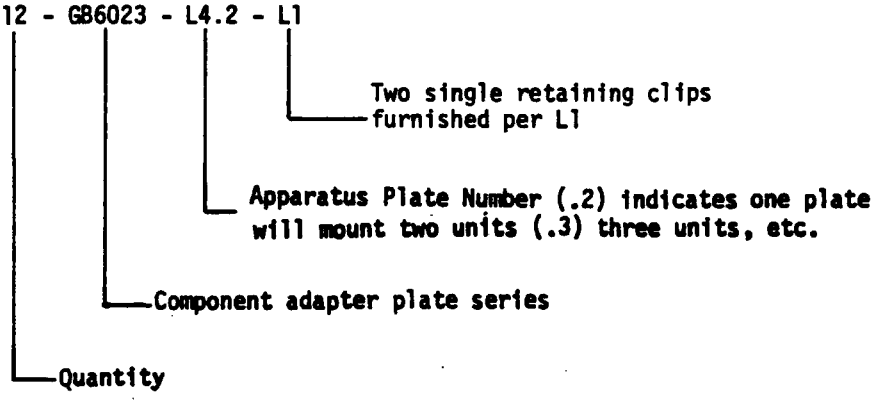
TABLE 1 (Cont'd)

Apparatus Description	Code	"A" Dwg	Adapter Plate Number (Note 1)	Adapter Plate Width (Note 2)
Varistor	30A	112450	L27	1-19/32"
	33	133181	L51	1-5/16"
	309	516514	L37	2"

Note 1: Each Adapter Plate Consists of:

1. GB6023 Component Adapter Plate
2. 3/16" x 2" Single Retaining Clip
4. 4-40 x 5/16" Fil. Head Mach Screw
1. Insulator when required

when ordered as follows:



NOTE 2: This dimension is the minimum length of punch slot required to mount the adapter plate using two single retaining clips. All adapter plates require 3/8 of an inch more mounting width than the closest recommended horizontal mounting centers specified in the Bell System card catalog for a particular piece of apparatus.

NOTE 3: Apparatus not shown, have no plate associated with them at present.