

UNIVERSITY DF WISCONSIN - MILWAUKEE

## Sheet 150. 1-L

No. Of stocte 5
uny 20, 1931.
SHOCK LISN AND BRYCH LAYOUR

(BTHAY TEST CrOOP)

Fron the beymning of these studies, the identities of the presens unter sudy have been kept confidential. We fook t: ess to cary on the trust. Please guard the privacy of


| 8-8-150488 | Gump plata | 2-p-13904* | Sarw |
| :---: | :---: | :---: | :---: |
| 2- -2.15004 | Gimp Plate | $2-p-130169$ | Sorr |
| \% - $\mathbf{1}$-100305 | guehtre | $1-p-219045$ | Coll |
| 2-p-130589 | Bumbing | 1-P-14*88 | contert soming |
| $15-\mathrm{p}-141508$ | Imariatore | 1-P-148,05 | comteat spring |
| 1 - P-mis\%al | Torminal | 1-P-148098 | contact spring |
| 1-P-1187t | texalmat | $1-\mathrm{P}-281350$ | contest Sprivg |
| 1- $P$ - 1 | Terninal |  | cantant Spring |

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 mertad "L" on the Incture troe piate, of termaxial p-ilergi
 mertond "CM.



STOCK LIST ATD BRHCAI LAFOUT
 (RLHTM WRSH CROUP)
EFFECTIVE DEC. 4, 1931


| *-P-150483 | Clmp Plete | 2-P-139042 | Sorwe |
| :---: | :---: | :---: | :---: |
| 2-P-1390.8 | clue Plate | 2-P-13915 | Sarew |
| $2-p-106385$ | Buatime | $1-\mathrm{P}-219043$ | 0012 |
| 8-7-253389 | Buthing | 1-P-1/4085 | Arwatar |
| 12-p-138308 | Indulator | $1-1.148903$ | contect spxing |
| 1-P-13800-1 | Inmalator | 2-p-148\%06 | Contect spming |
| 1 - P-2187at | Teruinal | $1-\mathrm{p}-148948$ | Contact Spring |
| 1-P-1878\% | Tuminal | 1-p-821530 | conteot spring |
| 1-2-mport | Terminal |  |  |



 - am an fixtwre hame plate, of tuminale P-illeras in the eppoe

 plowel in the mace mitod "Dm.
Whom the perte plema on the fixtre boee plate are uad up nam


Sheet No. 1-C
No. of sheets 5
May \$0, 1951.
SHOCK LIST AND BENCE LAYOUT USED IN ASSBMBLING R-1498 GELAY (RALAX TEST GROUP)

COMPONENT PARTS OF HLATY TYPT RELAY R-1498

| 2-P-130428 | Clarip Plate | 2-P-139042 | Screw |
| :---: | :---: | :---: | :---: |
| 2-P-139051 | Clamp Plate | 2-P-139159 | Screw |
| $2-\mathrm{P}-106385$ | Busting | 1 - P-219043 | Coil |
| 2-P-138389 | Bushing | $1-\mathrm{P}-142985$ | Ameature |
| $13-\mathrm{p}-132398$ | Inculetor | $1-\mathrm{P}-148203$ | Contact Spring |
| 1-p-218781 | Terminal | $1-\mathrm{P}-148205$ | Contact Spring |
| 1-p-218782 | Terminal | 1 - P-148248 | Contact Spring |
| 1- P-219072 | Terminal | 1 - P-221330 | Contact Spring |

BENCH LAYOUT USGD BY OPKAMTORS $2 \& 3$ (BETAY ASSFMBLY TYEST GROUP) KN TEI ASSFIBLY OF HLAT TYPE RETAY R-1498


Oper. meated on 84" $\ddagger$ tool.
Mote: Operatore $2 \& 3$ place handful, of serews P-139042 in the space marked " $A^{n}$ on the fixture base plate, of texminals P-218782 in the space marked "B", of screns P - 139159 in the spacs markod " $\mathrm{C}^{\prime}$. Operator a places axmatures p-142986 in the container in front of the fixture plate, whila Oper. S placen coile P-219043 in this banket and armaturen $\mathrm{P}-142985$ in the space marked $\mathrm{nX}^{\prime \prime}$ on the fixture bame plate. Then the parta placed on the fixture base plate are uned up nen mppiy is obteined from the container. in the layout tray.

Sheet No. 1-D No. of Sheete 5 Jen. 15, 1932.

GTOOE LIST AND BENCH LAYOUT USGD TN KSSHBBLTNG B-1498 RTLAY
(RKLAY TECT CROUP)
EFFECTIVE DEC. 4, 1931.
COMPONENT FARTS OF HLAT TTP倠 RILAY R-1498

| 2-R-150428 | Clamp Plate | 2-P-139042 | Scrow |
| :---: | :---: | :---: | :---: |
| 2-P-130051 | Clamp Plate | 2-P-159159 | Sorem |
| 2-P-106385 | Bushing | 1 - P-219045 | Coil |
| 2-P-156389 | Bushing | 1-P-142985 | Armature |
| 12-P-132308 | Insulator | $1-\mathrm{P}-148203$ | Contact Spring |
| 1 - P-132308-1 | Ingulator | 1-P-148205 | Contact Spring |
| 1-P-218781 | Torminal | 1 - P-148248 | Contact Spring |
| 1-P-218762 | Poratial | 1-p-221330 | contact Spring |
| 1-9-210072 | Terminal |  |  |

 IN THE ASSXIBLY OF FLAT TYEE RBLAT R-1498


Note: Opers. $2 \& 3$ place handful, of acowe $\mathrm{P}-159042$ in the space marked "A ${ }^{\prime \prime}$ on the fixture bene plate, of terminale p-ini8788 in the space marked "B",
 piasies in the container in front of the fixture plate, wile oper; 3 plecen eoila P-210045 on the fixture bate plate. Sinee Dec. 4, 1931, both eperatore plece a handrul of $P-152300-1$ on the fixture bame plate in the apace marime wim. 解on the parts placed on the inxture bame plute are need up a new mpply is obtalned fram the coutainera in the layout tray.

STOCK LISP AND BHNGH LAYOUT USYD IN ASSMMBLTNG R-1498 RETAY (REMGY TEST GROTEP)

COMPONGNT PARTS OF FLAR TYPE RELAX R-1498

| 2- P-130428 | Clamp Plate |
| :---: | :---: |
| 2-P-159081 | Clamp Plate |
| $2-\mathrm{P}-108335$ | Bumhing |
| 2-p-136389 | Bushing |
| 18-P-132398 | Inmulator |
| 1- F-818781 | terminal |
| 1- P-218782 | Torminal |
| 1 - P-210078 | Terminal |


| $2-\mathrm{P}-139042$ | Serew |
| :--- | :--- |
| $2-\mathrm{P}-139159$ | Screw |
| $1-\mathrm{P}-210045$ | Coil |
| $1-\mathrm{P}-142985$ | Armature |
| $1-\mathrm{P}-148203$ | Contact Spring |
| $1-\mathrm{P}-148205$ | Contact Spring |
| $1-\mathrm{p}-148248$ | Contact Spring |
| $1-\mathrm{p}-221330$ | Contact Spring |

BRNGF LAYGUT USED IT OFMRAMORS 4 t 5 (RTLAY ASSEMELY TEST GROUP) IN THP ASSEMBLY OF RLATH TYPY REMAY R-1498


Note: - Opore. \& 5 F place handrul, of mores. P-139042 in the space marked " $\mu^{\prime \prime}$ on the fixture base plate; of texminale in the space marked "B", of acrone $\mathrm{P}-159159$ in the apace marked " CH , and about six armatures, P-148985 in the apace marked "I". When the parte placed on the fixture base plate are used up new supply is obtained from the oontainers in the layout tray.

EFFECTIVE DEC. 4, 1931.


| 2- ${ }^{\text {P-130428 }}$ | Clamp Plate | 2-p-139042 | Serem |
| :---: | :---: | :---: | :---: |
| 2-P-130051 | Climp Plate | 2-P-139158 | Screw |
| 2-P-106485 | Bushing | $1-\mathrm{P}-219043$ | Coll |
| 2-P-136389 | Bushing | 1-F-142985 | srmature |
| 12- 2 - $13 \% 408$ | Inculator | 1-P-14E20\% | Contact Spring |
| 1- $-1.138808-1$ | Insulator | $1-\mathrm{P}-148305$ | Contact spring |
| 1- $\mathrm{P}-218781$ | Tominal | $1-\mathrm{P}-148248$ | Contact Spring |
| 1-3-218782 | ferminal | 1-p-221380 | Contact spring |
| I- - 219072 | Terini |  |  |

 IN THE LSSEBBLY OR MLAT IXPE RTLLAY R-1498


Note: - Operators $4 \%$ place a handrul, of sarems $8-139042$ in the space marked "i" on the fixture bane plate, of terminals in the epace maxked "B", of serewa $p-189150$ in the space mariced $" C^{\prime \prime}$, and about six maturen, $\mathrm{P}-142985$ in the mpael marked "Y". Sinoe Doc. 4, 1931, both operators place a hasdíul of inaulators 138308-1 in the pase marked "D".
When the parta placed on the fixture base plate are used up a now aupply is obtained from the containers in the layout tray.

DAC-NR

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(rast room operators beat assembly time for this relay - 38.8 saconds - oper. 2)
(Lest roon operators averate assenbly timo for thia relay - 4\% acconas - Grown)

Left Mend

1. hove hand to containar and with *( ${ }^{2}$. I. I., grasp, piok up, trameport, and place clamp plate, P-230051, into nest farther from-the operator, simultaneously,
2. Roach, and nith T. I. gxamp, pick up, tremeport and insert (i) pin through clamp plate hole into nest farther away from the operator, simultaneously.
3. Reach, and with T. ( I. grasp, plek up, traneport and inwert (1) pin throueh clamp plate hole into nest nearer the operator. eiranltunoounly
4. Wove hand to container and with 7.\& I. grasp and pick up (i) bushlage n-136889; aimultaneously.

Pranaport (2) bushings held in T.\& I*, to poaition over fixture and place over plae nearar the operator; aimultaneouraly,
6. pick up, and With T. IG I., grasp, pick up, trensport, and place (1) insulator, 1-152308, over pine neaver the operator; simaltaneousiy,
7. Hove hand to container and with दे.\& I., graep and plek up (1) torminal, P -218782, simutaneousiy,
8.

Transport hand to position over ilxture and plage terminal over pins farthor from the operator, wimultaneously,
9.

3ove hand to oontainer and with T. I., grasp and plick up, transport $^{\text {g }}$ and place ( 1 ) epring, $p-221530$, orer pins nourer the oporator, siwultaneously

> Fight Fona
> move hand to container and with $\mathrm{T} . \mathrm{k}_{\mathrm{i}}$ I., grasp, plek up, trensport, and place sacond clamp plate, F-130051, Into nest noarer the operator, slmultencously,
> reach, and with wix I., gramp, pick up, tranaport, and inaert (1) pin through clamp plate hole into nost farther away from the oparator.
> raach, and with T.\& T., grasp, pick ap, transport and insert (1) pin through clamp plate bole into nest nearer the operator.

move hand to container and with T. I. I., Erasp and pick up (8) bubhings $E-10$ oss 85 .
transport (2) bushing held in Te I., to position over fixture and place ovar pins farther from the operator.
reach, and with was I., grasp, pick up, trambport, and place (1) insulator, $\mathrm{P}-1 \mathrm{taz} 0 \mathrm{e}$, over pine farther from the operator.
reach and with 9 .t. $I_{0}$ grasp, and pick up (1) insulator $\mathrm{P}-132500$.
transport and place insulator ovar pins on tarminal F-218782, farther from the operator. (See motions under Left Hand coluran.)
move hand to contwiner and with
2.\& I., grasp and pick up, transport and place (2) spring, p-148208, orer pins farthor from the operator.

## Lett Hend

10. Heach and With 2 . ${ }^{2}$ 品. Erasp, pick up, transport and place (1) Indulator, E-18Rted, over pins nearor the operatior, simaltanom oumy,
 piak up and tramaport and place (1) temainal. P-219072, ovar pine aecer the oporator, stmaltaneousily.
11. Feise hand to ponition over flxtwre and: simultanooualy;
12. Stralunten laca-out wres with

13. With tingorg grasp ond hold coll (lead-out wites to Left).
14. 
15. Adfust and twiet lead-out who of coll and ameture asaenbly with fingers of hand; ataurtenoously,
16. Lover coll and armature ascembly over (4) pine in fixture*
17. Heach, and whth T\& I., grasy, pick uy, traneport, and place (1) In nesrer the operator; mimitaneoum17,
18. 

raach, and with T. $k$ I., grasp, piok up, tranaport, and place (I) intulator over pine on terminal, F-ilap6l, nearar the operator.
 and trenmport and plece (2) infalators ovar pina marthez rion operator.
 5ransport, and slace (2) ingulator over pins on tamainal. p-slogha, noma or the owerator. (see mothons under Last heme column.)

 tixture, and tranmort to position ovar itexture.

Contwine to hold coll over six ture。

Nelagse coll. Reach, and with
 at right of 1ixture plate (2) Erme ture $\bar{j}-1429 e 5$, and transport to poaition ovar fixture.
 ovar coil. With tingers, grasp oo11 and armature asambly.
turn coll and armeture tasembly, (12) turn) towara tha oporator.

Hand assiats til thim motion.
raach, and with fot T., grasp, pick up, tranaport, and place (2) inmulators, P 132300, over pins farm than from tho oporator.

Move hand to container and with rat I., gramp, pick up, tranaport, mad place terminal, P-R1E7El, ovor pine nearer operstor, sinultaneously, ( weo motions under Lert hand colum.)


Shaet Ko. 4
W०. of Mueets 5

20. Nova hend to container and (ith T. I., Erasp, pick ap. trenmport, and place apring, 4-146248, ovar pine nearex the operntor; simultaneoubly,
 plek 唄, and piace (1) insulator 3 -26200e, over ping nearer the operator, aimultamenely,
 pick up, twanaport and piace (1)
 since 12-4-s.3.) over pins fapthem from the operator, shmaltaneously

2t. Lowax hond and whth wat I., hold pilowp zearet the operator in pooltion; simutaneousiy,
24. netch, and with T. T. I., hold pile-up farther frow the operator in posttion: almultaneously,
25. Masch anc with 3 . $k$ Io, grasp, plok up, trensport, and place (1) serax, $\mathrm{B}-189042$, Lnto lart hole or plle-up rarther from opesator; simultandoudy,
26. Hove hand to container and with T. K L., grasp, plek up, transport, and pluee (1) seraw, -159150 , into let hole of pilemp nearer the operator; sinultaneously,
27. Hoach and with fingers, 6rasp the lower portion of the scrowdriver, piek up and tramsport to josition over pile-up,
28. Fand assist in transporting bit of serev-driver to the head of moren in the right aide of pile-up farthor from the operator, and

5Bht Hisnd
wove hand to container and with T. I., grasp, fick up, transport, and
 farther from the operitor.
 grash, pack tap, tranavort, znd nace cluty plate 3-130428, over pind, on indalatior newrer the operator.
 graty, plek up, transport, and placo clamp plato y-180438, ovar pine, on ingwator farther from oportor.
reach, gna mith rewove (2) pina from pilemp nemer the operator, trandiont, ena plece pine on tixure base piate ferrthex frour tho opertwor.
rouch, and 位ith wat I., grasp and renove (2) pine from pliamp farther from the oper tion, trunaport, and place pins on fixtare base plate farther trom the operstor.
 up, tranaport, and place (1) acraw, p-1z9042, into right hole of pileup farther from the operator.
move hend to container and with Tot I., grasp, plek up, transport, and place (1) soxem, P-129159, into right hole of pilewp nearer the oporator.
reach und erip the hande of the cerem-driver with the hand.

LaEt Hand
29. Guile bit of serewmiriver to the hoad of corew in the rigint slde of pile-up nearer the operator, and
30. Saw motion ts tor leit hand 29, excopt merew is In the left wide of pile-ip nearar the operator, and
31. Sumerotions ae for left hand 29, ercept screw is in the laft side of plle-ap farther from the operator, and

SR. Tranaport and place acrew-driver on bonch at lett of layout tray.

Sata motions as for wight hand-28.

Sane motions as for right hand-28.

Sum motions an for right hend-28.
Wove hand, and with ilingers grasp and remove relay from tixture, tranaport and place relay in chate at right of ixture plate.

Note: - The above information was prepared after a general observation of the workine procedure of all of the tont operators. Although the plece parts in the apring pile-ups are in the wame order when the relay is completed, there aremumeroun operation peculiar to each oporator, which vary from the above general procodure, such as the order in which the merowe are placed in the pilo-upw, doviatione in the use of either hand in the placement of the various parte, which onter tho assmbiy, stc.

DAC-min

January 13，1832．

##  GBLAY TEST

| Relay <br> Iype | $\begin{aligned} & 5 \text { tock } \\ & \underline{158} \\ & \hline \end{aligned}$ | $\begin{aligned} & \text { Spring } \\ & \text { Bizeup } \end{aligned}$ | Roley type | Stock <br> 前解 | $\begin{aligned} & \text { Spring } \\ & \text { Eileupg } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| B－1 | A135009－101－3 | A－109500 | K－504 | Am－122086 | $\begin{array}{r} 4-121897-1008 \\ 121611-2007 \end{array}$ |
| \％${ }_{\text {3 }} \mathbf{- 9}$ | ＂ | 109962 |  |  |  |
| B－10 | ＊ | 109981 | 2－805 | 185037 | $\begin{aligned} & 181164-1111 \\ & +21575-2110 \end{aligned}$ |
| 9－3． 3 | － | 111170 | 5－301 | 128607 | $\begin{aligned} & 121443-1003 \\ & 181116-2001 \end{aligned}$ |
| 8－17 | ＂ | 111685 | 管－1187 | 124285 | 121215－1102 |
| 3－56 | ＊ | 114560 |  |  | 121410－2102 |
| B－167 | 135563－1143 | 122491 | 2－6494 | 140044 | $\begin{aligned} & 140048-10210 \\ & 14: 048-20211 \end{aligned}$ |
| B－260 | 185009－101－3 | 126234 | 2－508 | 139458 | 121050－1010R |
| B－456 | 135427－106－3 | 138813 |  |  | 181831－2002 |
| 6－28 | 135740－102－3 | 131242 | 1－913 | 142651 | $\begin{aligned} & 121440-1101-7 \\ & 121154-2101 \end{aligned}$ |
| a－30 | ＊ | 131670 |  |  |  |
| 6－32 | ＊ | 131672 | R－1846 | 143639 | $\begin{aligned} & 121153-11035 \\ & 12154402101 \end{aligned}$ |
|  |  |  | R－3．316 | 144258 | $\begin{aligned} & 121440-1102-7 \\ & 144257-21192 \end{aligned}$ |
|  | ． |  | 1－1317 | 344224 | $\begin{aligned} & 121630-1010-11 \\ & 121631-2002 \end{aligned}$ |
|  |  |  | 2－1496 | 146037 | $\begin{aligned} & 140035-10203-x \\ & 1.46036-20209 \end{aligned}$ |
|  |  |  | R－1498 | $\begin{gathered} 146138 \\ 21.38 \end{gathered}$ | $\begin{aligned} & 146137-11213-\mathrm{F} \\ & 1460300-20209 \end{aligned}$ |

DAC－TI

