DON'T DISCLOSE IDENTITIES From the beginning of these studies, the identities of the persons under study have been kept confidential. We look to you to carry on this trust. Please guard the privacy of $m_{\rm c} \simeq {\rm sens}$ involved by substituting fictitious names, or with symbols for real names. STOCK LIST AND BENCH LAYOUT USED IN ASSEMBLING R-1498 RELAY RELAY ASSEMBLY TEST ROOM May, 1931

UNIVERSITY OF WISCONSIN - MILWAUKEE

No. of Sheets 5 May 20, 1931.

STOCK LIST AND BENCH LAYOUT USED IN ASSEMBLING R-1498 RELAY (RELAY TEST GROUP)

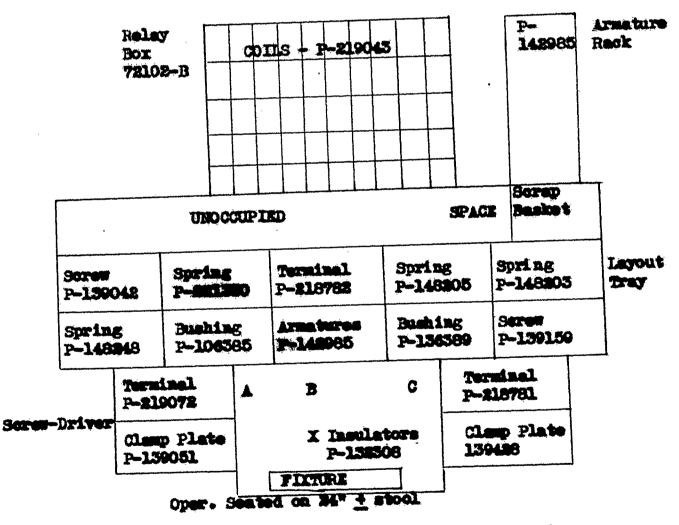
DON'T DISCLOSE IDENTITIES

From the beginning of these studies, the identities of the pursons under study have been kept confidential. We look to vou to carry on this trust. Please guard the privacy of

COMPONENT PARTS OF FLAT TYPE RELAY R-1498 cubos for real names.

2 - P-130428 Clemp Plate 2 - P-139061 Clemp Plate 2 - P-106585 Bushing 2 - P-156389 Bushing 13 - P-132508 Insulator 1 - P-218781 Terminal 1 - P-218788 Terminal 1 - P-218788 Terminal	2 - P-139042 Serew 2 - P-139109 Serew 1 - P-219045 Coil 1 - P-148965 Armature 1 - P-148305 Contact Spring 1 - P-148305 Contact Spring 1 - P-148348 Contact Spring 1 - P-221330 Contact Spring
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BENCH LAYOUT USED BY OPERATOR 1 [RELAY ASSEMBLY TEST GROUP] IN THE ASSEMBLY OF FLAT TYPE RELAY R-1498



Note: Operator 1 places a handful, of Surews P-159042 in the space marked "A" on the fixture base plate, of terminals P-218782 in the space marked "B", of series P-159159 in the space marked "C".

When the parts placed on the fixture base plate are used up a new supply is obtained from the containers in the layout tray.

Sheet No. 1-8 No. of Sheets 5 Junio 14, 2002.

STOCK LIST AND BENCH LAYOUT USED IN ASSEMBLING R-1498 RELAY (RELAY TEST GROUP) EFFECTIVE DEC. 4, 1931.

COMPONENT PARTS OF FLAT TYPE RELAY R-1498

2 - P-130428	Clamp Plate	2 - P-139042	Seren
2 - P-139051	Class Plate	2 - P-139150	Sorew
2 - P-106385	Bushing	1 - P-219043	Coil
2 - P-156389	Bushing	1 - P-142985	- · · · · · · · · · · · · · · · · · · ·
12 - P-132308	Insulator	1 - P-148803	Contact Spring
1 - P-138306-1	Insulator	1 - P-148205	Contact Spring
1 - P-218781	Terminal	1 - P-148948	Contact Spring
1 - P-218782	Terminal	1 - P-221330	Contact Spring
1 - 5-010000	Manuadania		

BENCH LATOUT USED BY OPERATOR 1 (RELAY ASSEMBLY TEST CROUP) IN THE ASSEMBLY OF FLAT TYPE RELAY R-1498

	Relay Box 72109-B		-	2011	s	- 1	-21	9043					P	15	Armature Rack	
•	Seren P-150		UNOGO	UPI.	SD					S	PAC	35		orap		
	Spring Spring P-148248 P-22133						Spring P-148205		-	Spring P-148803		;	Layout			
•			Bushin P-1063				etu L20	res 85			h i n 363			rew 139159		•
Seres-D	-4	Term P-21		A			B		 	1	C	-,	min 1187			
			Plate 9051	D					Clamp Plate 159488							
		L		1		ID	CTU!	RE								
			Oper		ate	do	XR 2	14 *	<u>+ 1</u>	to	oJ	1				•

Note: Operator 1 places a handful, of serous P-150042 in the space marked "A" on the fixture base plate, of terminals P-218782 in the space marked on "B", of serous P-150150 in the space marked "C". Since Dec. 4, 1951, a handful of insulators P-152508-1 has been placed in the space marked "D".

When the parts placed on the fixture base plate are used up a new supply is obtained from the containers in the layout tray.

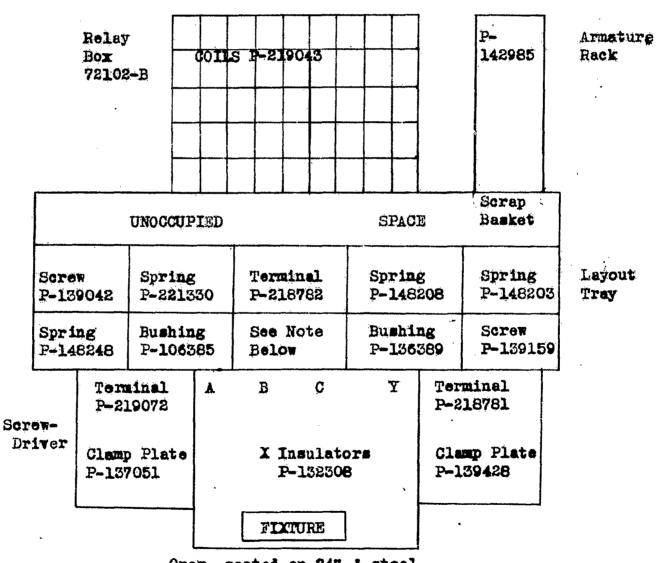
Sheet No. 1-C No. of Sheets 5 May 30, 1931.

STOCK LIST AND BENCH LAYOUT USED IN ASSEMBLING R-1498 RELAY (RELAY TEST GROUP)

COMPONENT PARTS OF FLAT TYPE RELAY R-1498

0 5 100 100	Mi	2 - P-139042	Canan
2 - P-130428	Clamp Plate		Screw
2 - P-139051	Clamp Plate	2 - P-139159	Screw
2 - P-106385	Bushing	1 - P-219043	Coil
2 - P-136389	Bushing	1 - P-142985	Armature
13 - P-132398	Insulator	1 - P-148203	Contact Spring
1 - P-218781	Terminal	1 - P - 148205	Contact Spring
1 - P-218782	Terminal	1 - P-148248	Contact Spring
1 - P-219072	Terminal	1 - P-221330	Contact Spring

BENCH LAYOUT USED BY OPERATORS 2 & 3 (RELAY ASSEMBLY TEST GROUP) IN THE ASSEMBLY OF FLAT TYPE RELAY R-1498



Oper. seated on 24" + stool.

Note: Operators 2 & 3 place a handful, of screws P-139042 in the space marked "A" on the fixture base plate, of terminals P-218782 in the space marked "B", of screws P-139159 in the space marked "C". Operator 2 places armatures P-142985 in the container in front of the fixture plate, while Oper. 3 places coils P-219043 in this basket and armatures P-142985 in the space marked "Y" on the fixture base plate. When the parts placed on the fixture base plate are used up a new supply is obtained from the containers in the layout tray.

Sheet No. 1-D No. of Sheets 5 Jan. 15, 1932.

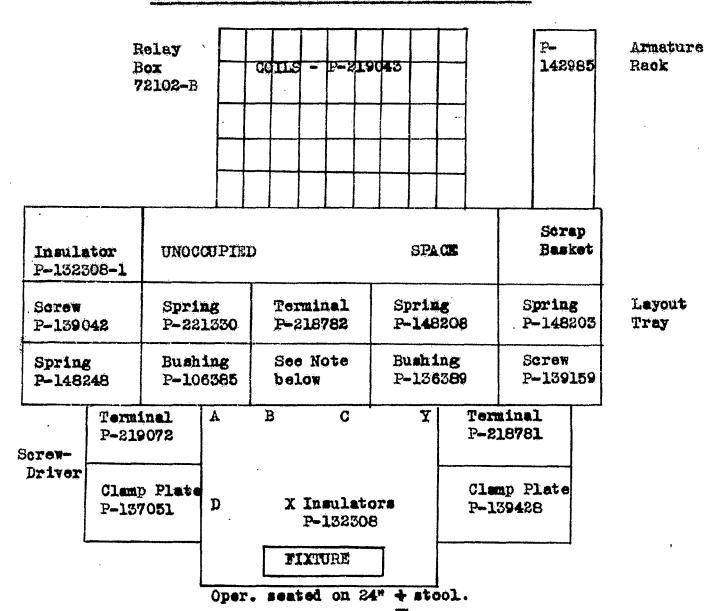
STOOK LIST AND BENCH LAYOUT USED IN ASSEMBLING R-1498 RELAY (RELAY TEST CROUP) EFFECTIVE DEC. 41 1931. COMPONENT PARTS OF FLAT TYPE RELAY R-1498

2 - P-150428	Clamp Plate	2 - P-139042	Scrow
2 - P-139051	Clamp Plate	2 - P-139159	Sorem
2 - P-106385	Bushing	1 - P-219043	Coil
2 - P-136389	Bushing	1 - P-142985	Armature
12 - P-132308	Insulator	1 - P-148203	Contact Spring
1 - P-132308-1	Insulator	1 - P-148205	Contact Spring
1 - P-218781	Terminal	1 - P-148248	Contact Spring
1 - P-218782	Torminal	1 - P-221330	Contact Spring

BENCH LAYOUT USED BY OPERATORS 2 & 3 (RELAY ASSEMBLY TEST GROUP) IN THE ASSEMBLY OF FLAT TYPE RELAY R-1498

1 - P-219072

Terminal



Note: Opers. 2 & 5 place a handful, of screws P-139042 in the space marked "A" on the fixture base plate, of terminals P-218782 in the space marked "B", of screws P-139139 in the space marked "C". Oper. 2 places armstures P-142985 in the container in front of the fixture plate, while Oper. 3 places coils P-219045 on the fixture base plate. Since Dec. 4, 1931, both operators place a handful of P-132308-1 on the fixture base plate in the space marked "D". When the parts placed on the fixture base plate are used up a new supply is obtained from the containers in the layout tray.

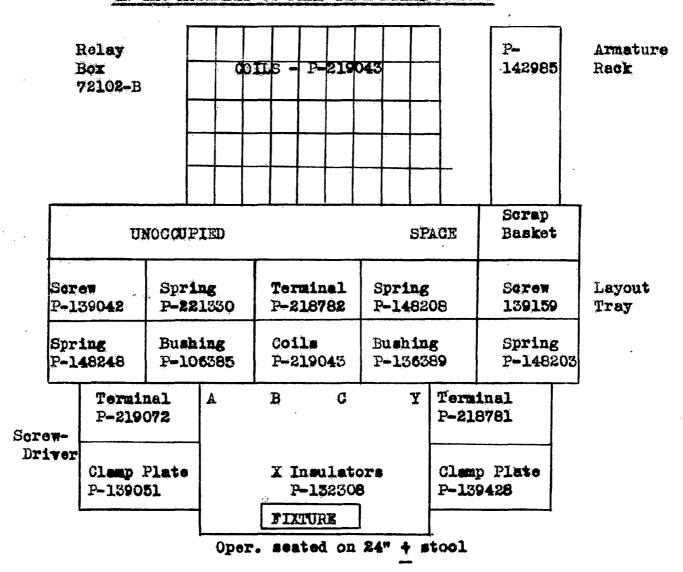
Sheet No. 1-E No. of Sheets 5 May 20, 1931.

STOCK LIST AND BENCH LAYOUT USED IN ASSEMBLING R-1498 RELAY (RELAY TEST GROUP)

COMPONENT PARTS OF FLAT TYPE RELAY R-1498

2-	P-130428	Clamp Plate	2 - P-139042 Screw
2 -	P-139051	Clamp Plate	2 - P-139159 Screw
2 -	P-106335	Bushing	1 - P-219043 Coil
2 -	P-136389	Bushing	1 - P-142985 Armature
15 -	P-132398	Insulator	1 - P-148203 Contact Spring
1 -	F-218781	Terminal	1 - F-148205 Contact Spring
1 -	P-218782	Terminal	1 - P-148248 Contact Spring
1 -	P-219078	Terminal	1 - P-221330 Contact Spring

BENCH LAYOUT USED BY OPERATORS 4 & 5 (RELAY ASSIMBLY TEST GROUP) IN THE ASSEMBLY OF FLAT TYPE RELAY R-1498



Note: - Opers. 4 & 5 place a handful, of screws P-139042 in the space marked "A" on the fixture base plate, of terminals in the space marked "B", of screws P-159159 in the space marked "C", and about six armatures, P-142985 in the space marked "T".

When the parts placed on the fixture base plate are used up a new supply is obtained from the containers in the layout tray.

Sheet No. 1-F No. of Sheets 5 Jan. 15, 1932.

STOCK LIST AND BENCH LAYOUT USED IN ASSEMBLING R-1498 RELAY (RELAY TEST GROUP) EFFECTIVE DEC. 4, 1931. COMPONENT PARTS OF FLAT TYPE RELAY R-1498

2	-	P-130428	Clamp Plate	2	*	P-139042	Screw
2	-	P-139051	Clamp Plate	2		P-139159	Screw
2	-	P-106385	Bushing	1	Ó	P-219043	Coil
2	4	P-136369	Bushing	1	_	F-142985	Armature
		P-132306	Insulator	1	-	P-148203	Contact Spring
		P-132308-1	Insulator	1	-	P-148205	Contact Spring
	,	P-218781	Terminal	1	***	P-146248	Contact Spring
,		P-216782	Terminal	1	***	P-221330	Contact Spring
		P-219072	Terminal				

BENCH LAYOUT USED BY OPERATORS 4 & 5 (RELAY ASSEMBLY TEST GROUP) IN THE ASSEMBLY OF FLAT TYPE RELAY R-1498

		Relay Box 72102-B	<u> </u>	corts	- P-210	043		P- 142985	Armatur Rack
Insul P-132	ator	U	NOCCUP	IFD		SPA	CIE	Scrap Basket	
Screw		Spri P-22	ng 1330		minel	Spring P-148208		Screw 139159	Layout Tray
Sprin P-148		Bush P-10	ing 6385	Coi P-2	1s 19043	Bushi P-130	-	Spring P-148203	
crow-	Termi P-219		A	В	C	X	1	minal 18781	
river	Clamp P-139	Plate 051	D.	· I	insulato -132508	· · · · · · · · · · · · · · · · · · ·		mp Plate 39428	
					IXTURE	24" + 51			

Note: - Operators 4 & 5 place a handful, of screws P-139042 in the space marked "A" on the fixture base plate, of terminals in the space marked "B", of screws P-159159 in the space marked "C", and about six armatures, P-142985 in the space marked "T". Since Dec. 4, 1931, both operators place a handful of insulators 132308-1 in the space marked "D".

When the parts placed on the fixture base plate are used up a new supply is obtained from the containers in the layout tray.

DAC-BR

No. of Sheets 5 Way 20, 193/.

MOTIONS FOLLOWED BY RELAY TEST OPERATORS IN ASSEMBLING R-1498 HELAY

(Test room operators best assembly time for this relay - 33.8 seconds - Oper. 2) (Test room operators average assembly time for this relay - 43 seconds - Group)

Loft Hand

- *T.& I., grasp, pick up, transport, and place clamp plate, P-139051, into nest farther from the operator, simultaneously,
- 2. Reach, and with T.& I. greep, pick up, transport and insert (1) pin through clamp plate hole into nest farther away from the operator, simultaneously.
- Reach, and with T.& I. grasp, pick up, transport and insert (1) pin through clamp plate hole into nest nearer the operator, simultaneously
- T.& I. grasp and pick up (2) bushings "-136389; simultaneously.
- 5. Transport (2) bushings held in T.& I., to position over fixture and place over pins nearer the operator; simultaneously,
- 6. Reach, and with T.& I., grasp, pick up, transport, and place (1) insulator, P-132308, over pins nearer the operator; simultaneously,
- 7. Hove hand to container and with T.& I., grasp and pick up (1) terminal, P-218782, simulaneously,
- 8. Transport hand to position over fixture and place terminal over pins farther from the operator, simultaneously.
- 9. Move hand to container and with T.& I., grasp and pick up, transport and place (1) spring, P-221550, over pins nearer the operator, simultaneously

Right Hand

move hand to container and with T.& I., gresp, pick up, transport, and place second clamp plate, P-159051, into nest nearer the operator, simultaneously,

reach, and with T.& I., grasp, pick up, transport, and insert (1) pin through clamp plate hole into nest farther away from the operator.

reach, and with T.& I., grasp, pick up, transport and insert (1) pin through clamp plate hole into nest nearer the operator.

move hand to container and with T.& I., grasp and pick up (2) bushings F-106385.

transport (2) bushings held in T.& I., to position over fixture and place over pins farther from the operator.

reach, and with T.& I., grasp, pick up, transport, and place (1) insulator, P-132308, over pins farther from the operator.

reach and with T.& I., grasp, and pick up (1) insulator P-132308.

transport and place insulator over pins on terminal P-218782, farther from the operator. (See motions under Left Hand column.)

move hand to container and with T.& I., grasp and pick up, transport and place (1) spring, P-148205, over pins farther from the operator.

Right Hand

10. Reach and with T.& I., grasp, pick up, transport and place (1) insulator, F-132508, over pins nearer the operator, simultaneously,

reach and with T.& I., grasp, pick up and transport and place (2) insulators over pine farther from operator.

pick up and transport and place
(1) terminal, F-219072, over
pins nearer the operator, simultaneously.

reach and with T.& I., grasp, pick up, transport, and place (1) insulator over pins on terminal, P-219072, nearer the operator. (See motions under Left Hend column.)

12. Raise hand to position over fixture and; simultaneously,

reach, and with T.& I., grasp, pick up coil P-219043 from right edge of fixture, and transport to position over fixture.

15. Straighten lead-out wires with fingers of hand.

Continue to hold coil over fix-

14. With fingers grasp and hold coil (lead-out wires to left).

Release coil. Reach, and with T.& I., grasp, pick up from position at right of fixture plate (1) armsture P-142985, and transport to position over fixture.

15.

Assemble armature held in T.& I., over coil. With fingers, grasp coil and armature assembly.

16. Adjust and twist lead-out wires of coil and armature assembly with fingers of hand; simultaneously,

turn coil and armsture assembly, (12) turn) toward the operator.

17. Lower coil and ermature assembly over (4) pins in fix-

Hand assists in this motion.

18. Reach, and with T.& I., grasp, pick up, transport, and place (1) insulator, P-152508, over pins nearer the operator; simultaneously,

reach, and with T.& I., grasp, pick up, transport, and place (2) insulators, P-132308, over pins farther from the operator.

19.

Move hand to container and with T.& I., grasp, pick up, transport, and place terminal, P-218781, over pins nearer operator, simultaneously, (see motions under Left Hand column.)

reach, and with T.& I., grasp, pick up, transport, and place (1) insulator over pins on terminal, P-218781, nearer the operator.

Right Hand

20. Move hand to container and with T.& I., grasp, pick up, transport, and place spring, P-148248, over pins nearer the operator; simultaneously,

.......

- Pl. Reach, and with T.& I., grasp, pick up, and place (1) insulator P-152308, over pins nearer the operator, simultaneously.
- 22. Reach, and with T.& I., grasp, pick up, transport and place (1) insulator P-132308 (P-132308-1 since 12-4-31,) over pins farther from the operator, simultaneously
- 28. Lower hand and with T.& I., hold pils-up nearer the operator in position; simultaneously.
- 24. Reach, and with T.& I., hold pile-up farther from the operator in position; simultaneously,
- 25. Reach and with T.& I., grasp, pick up, transport, and place (1) screw, P-139042, into left hole of pile-up farther from operator; simultaneously,
- 26. Move hand to container and with T.& I., grasp, pick up, transport, and place (1) screw, F-139159, into left hole of pile-up nearer the operator; simultaneously,
- 27. Heach and with fingers, grasp the lower portion of the screwdriver, pick up and transport to position over pile-up,
- 28. Hand assist in transporting bit of screw-driver to the head of screw in the right side of pile-up farther from the operator, and

move hand to container and with T.& I., grasp, pick up, transport, and place spring, P-148203, over pins farther from the operator.

move hand to container and with T.& I. grasp, pick up, transport, and place clamp plate P-130428, over pins, on insulator nearer the operator.

move hand to container and with T.& I. grasp, pick up, transport, and place clamp plate P-130428, over pins, on insulator farther from operator.

reach, and with T.& I., grasp and remove (2) pins from pile-up nearer the operator, transport, and place pins on fixture base plate farther from the operator.

reach, and with T.& I., grasp and remove (2) pins from pile-up farther from the operator, transport, and place pins on fixture base plate farther from the operator.

reach and with T. & I., grasp, pick up, transport, and place (1) acrew, P-139042, into right hole of pile-up farther from the operator.

move hand to container and with T.& I., grasp, pick up, transport, and place (1) screw, P-139159, into right hole of pile-up nearer the operator.

reach and grip the handle of the screw-driver with the hand.

drive serow down into clamp plate, P-129051, with the serew-driver by muscular exertion of the arm.

Sheet No. 5 No. of Sheets 5 May 20, 1931.

Left Hand

Right Hand

29. Guide bit of screw-driver to the head of screw in the right side of pile-up nearer the operator, and

Same motions as for right hand-28.

30. Same motions as for left hand 29, except screw is in the left side
of pile-up nearer the operator, and

Some motions as for right hand-28.

29, except screw is in the left side of pile-up farther from the operator, and

Same motions as for right hand-28.

52. Transport and place screw-driver on bench at left of layout tray.

Move hand, and with fingers grasp and remove relay from fixture, transport and place relay in chute at right of fixture plate.

Note: - *The thumb and index fingers.

Note: - The above information was prepared after a general observation of the working procedure of all of the test operators. Although the piece parts in the spring pile-ups are in the same order when the relay is completed, there are numerous operations peculiar to each operator, which vary from the above general procedure, such as the order in which the screws are placed in the pile-ups, deviations in the use of either hand in the placement of the various parts, which enter the assembly, etc.

DAC-ER

January 13, 1932.

STOCK LISTS AND SPRING FILEUP A - DEAVINGS RELAY TEST

			•		
Relay Type	Stock <u>List</u>	Spring <u>Plleup</u>	Relay Type	Stock <u>List</u>	Spring <u>Pileups</u>
B -1	A135009-101-3	A-109500	E-804	A-122086	A-121297-1008 121411-2007
B-9	11 .	109962			
B-10	\$ \$	109961	E-805	122037	121164-1111 121373-2110
B-15	. #	111170	E-901	122607	121443-1003
B-17	. 13	111665			121116-2001
3-56		114560	E-1187	124245	121215-1102 121416-2102
B-167	155363-1143	122491	I-6494	146044	148042-10210
B-260	155009-101-3	126234	,		146043-20211
B-456	135427-106-3	138813	и-503	139458	121630 - 1010R 121631-2002
G-28	135740-102-3	131242	R-913	142651	121440-1101-R
G-30	23	131670			121154-2101
G-32	15	131672	R-1246	143839	121153-1103F 121154-2101
			R -131 6	144258	121440-1101-F 144257-21191
			R-1317	144284	121650-10 1 0-R 121631-2002
			R-1496	146037	146035-10208-1 146036-20209
			R -14 98	146138 - 2138	146137-11213-k 146036-20209
			1		

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