

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 the persons involved by substituting fictitious names, or initials, symbols for real names.

STOCK LIST AND BENCH LAYOUT USED
IN ASSEMBLING R-1498 RELAY
RELAY ASSEMBLY TEST ROOM

May, 1931

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

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

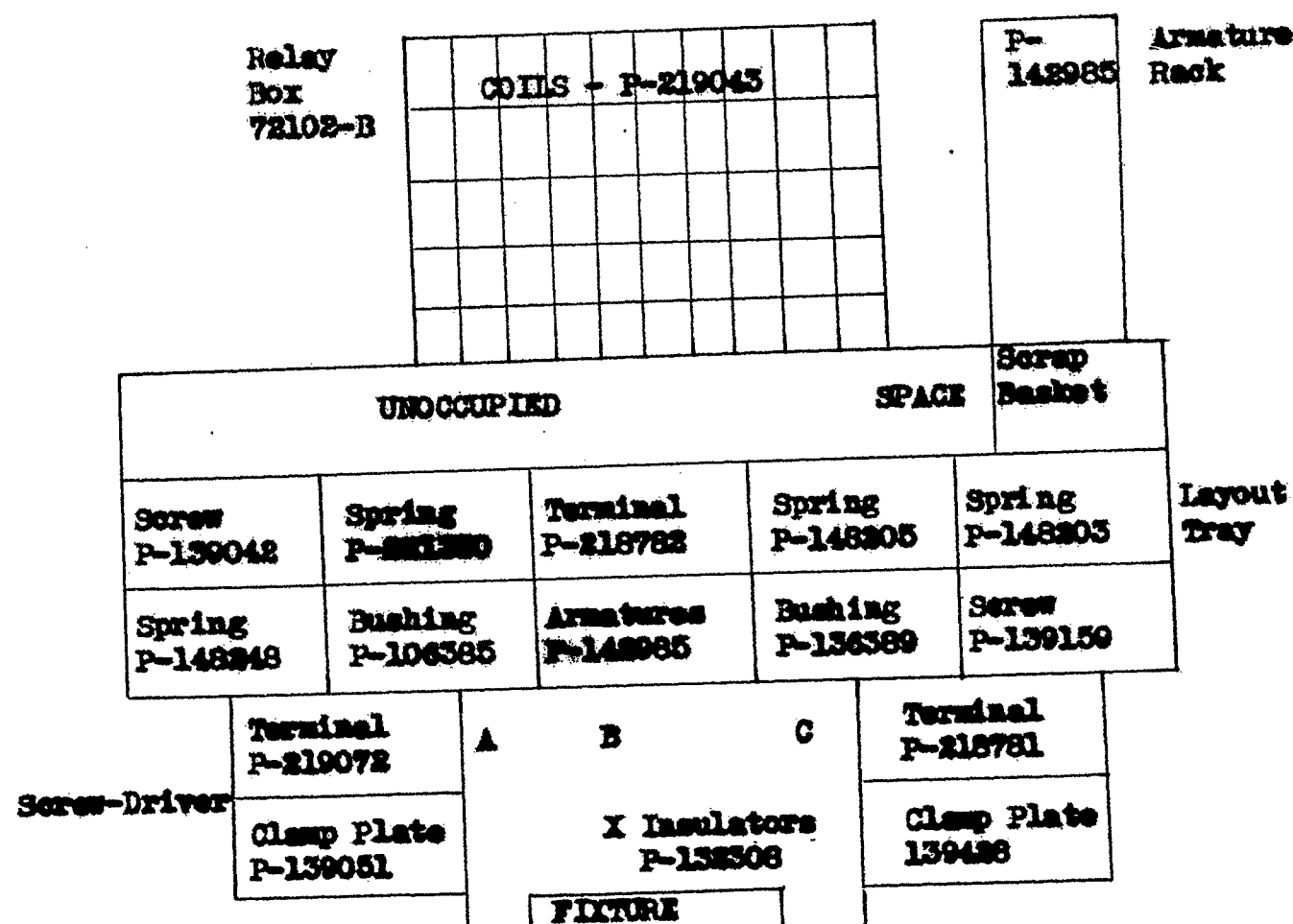
DON'T DISCLOSE IDENTITIES

From the beginning of these studies, the identities of the persons under study have been kept confidential. We look to you to carry on this trust. Please guard the privacy of the persons involved by substituting fictitious names, or symbols for real names.

COMPONENT PARTS OF FLAT TYPE RELAY R-1498

2 - P-130438	Clamp Plate	2 - P-139042	Screw
2 - P-139051	Clamp Plate	2 - P-139159	Screw
2 - P-106385	Bushing	1 - P-219045	Coil
2 - P-136389	Bushing	1 - P-148985	Armature
13 - P-132308	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 OPERATOR 1
(RELAY ASSEMBLY TEST GROUP)
IN THE ASSEMBLY OF FLAT TYPE RELAY R-1498**



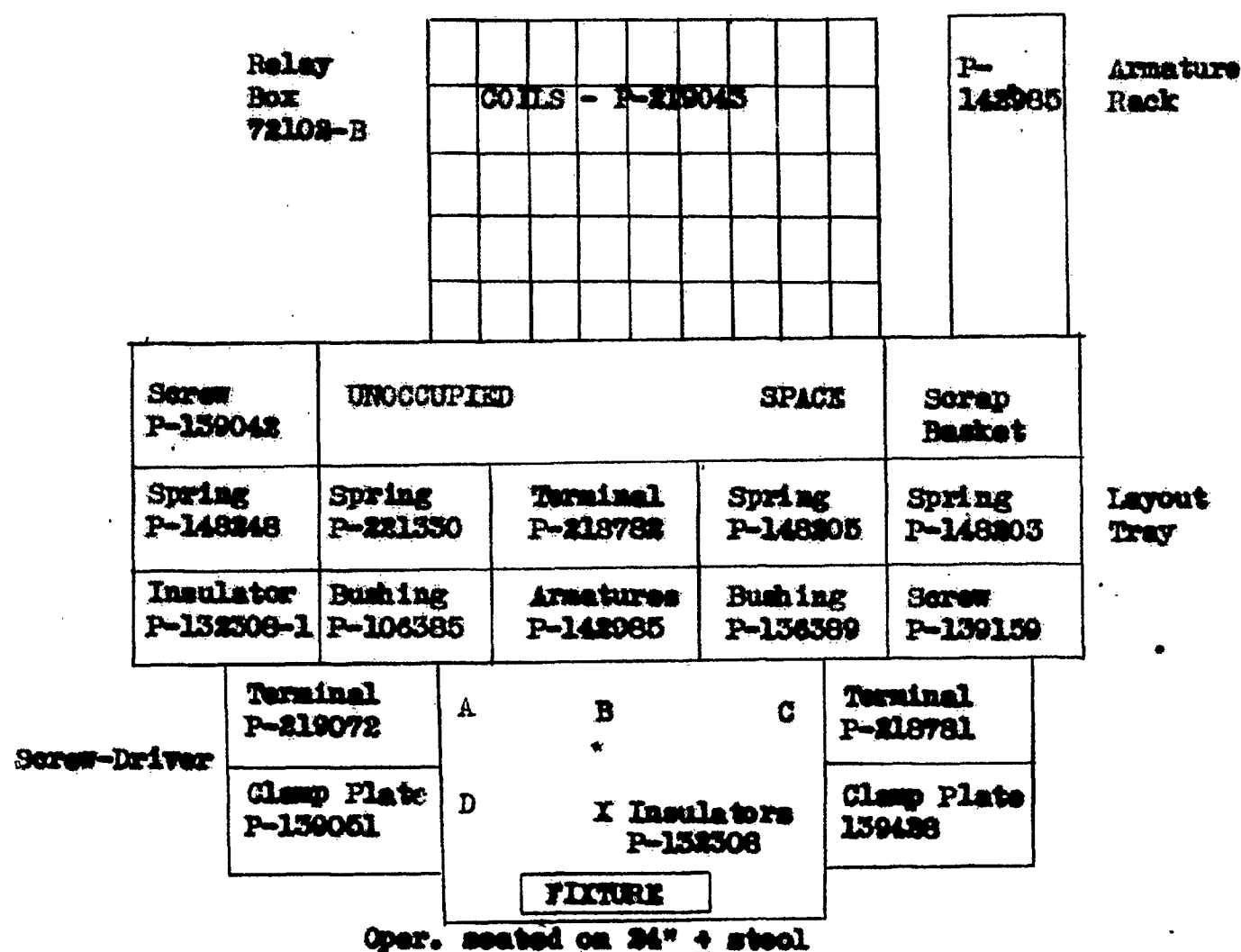
Note: Operator 1 places a handful, of Screws P-139042 in the space marked "A" on the fixture base plate, of terminals P-218782 in the space marked "B", of screws P-139159 in the space marked "C".
When the parts placed on the fixture base plate are used up a new supply is obtained from the containers in the layout tray.

Sheet No. 1-B
No. of Sheets 5
Jan. 14, 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 - P-219043	Coil
2 - P-136389	Bushing	1 - P-148985	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	Terminal	1 - P-221330	Contact Spring
1 - P-219072	Terminal		

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 screws P-139042 in the space marked "A" on the fixture base plate, of terminals P-218782 in the space marked on "B", of screws P-139159 in the space marked "C". Since Dec. 4, 1931, a handful of insulators P-132308-1 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.

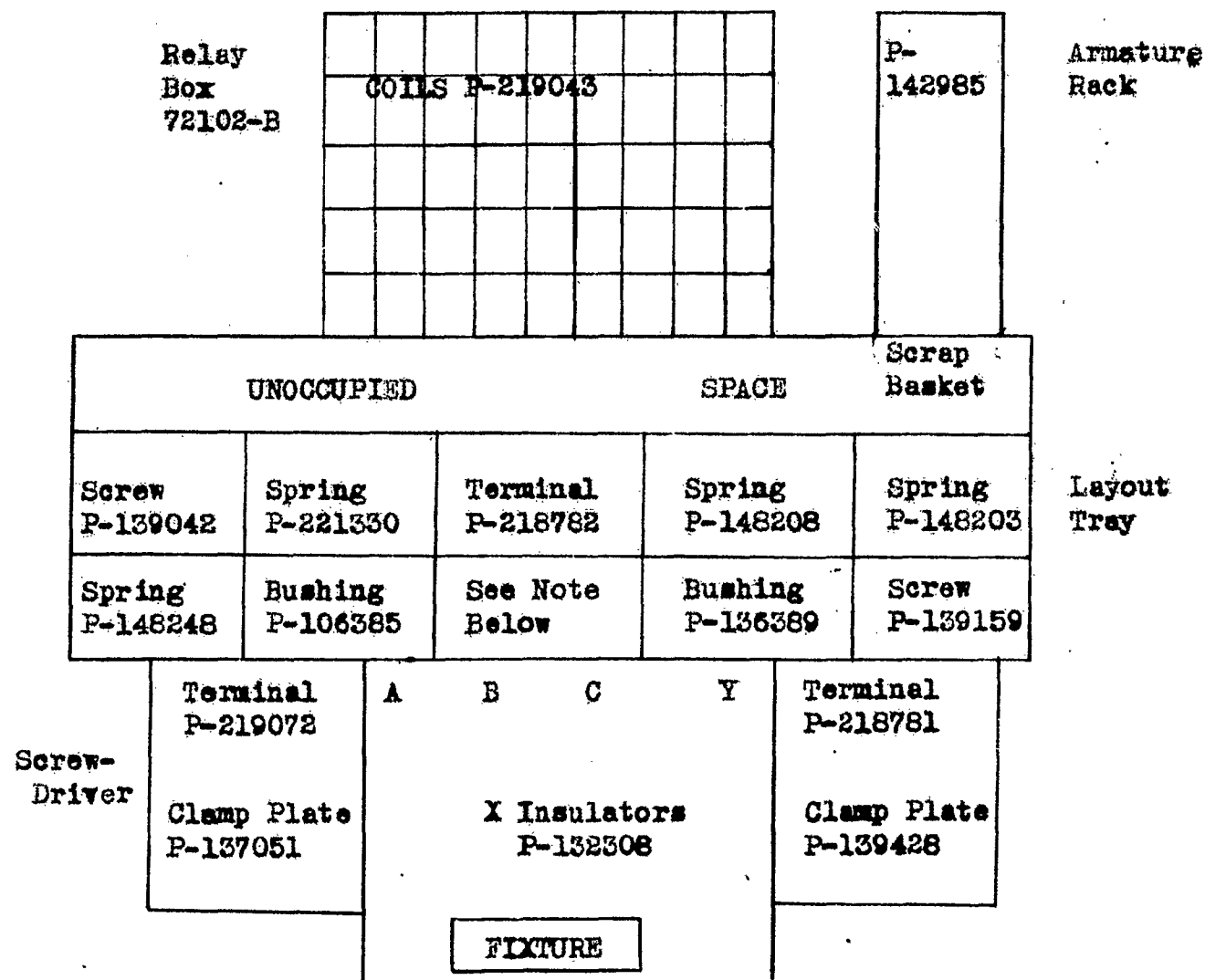
Sheet No. 1-C
No. of Sheets 5
May 30, 1931.

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

COMPONENT PARTS OF FLAT TYPE RELAY R-1498

2 - P-130428	Clamp Plate	2 - P-139042	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" $\frac{1}{2}$ 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.

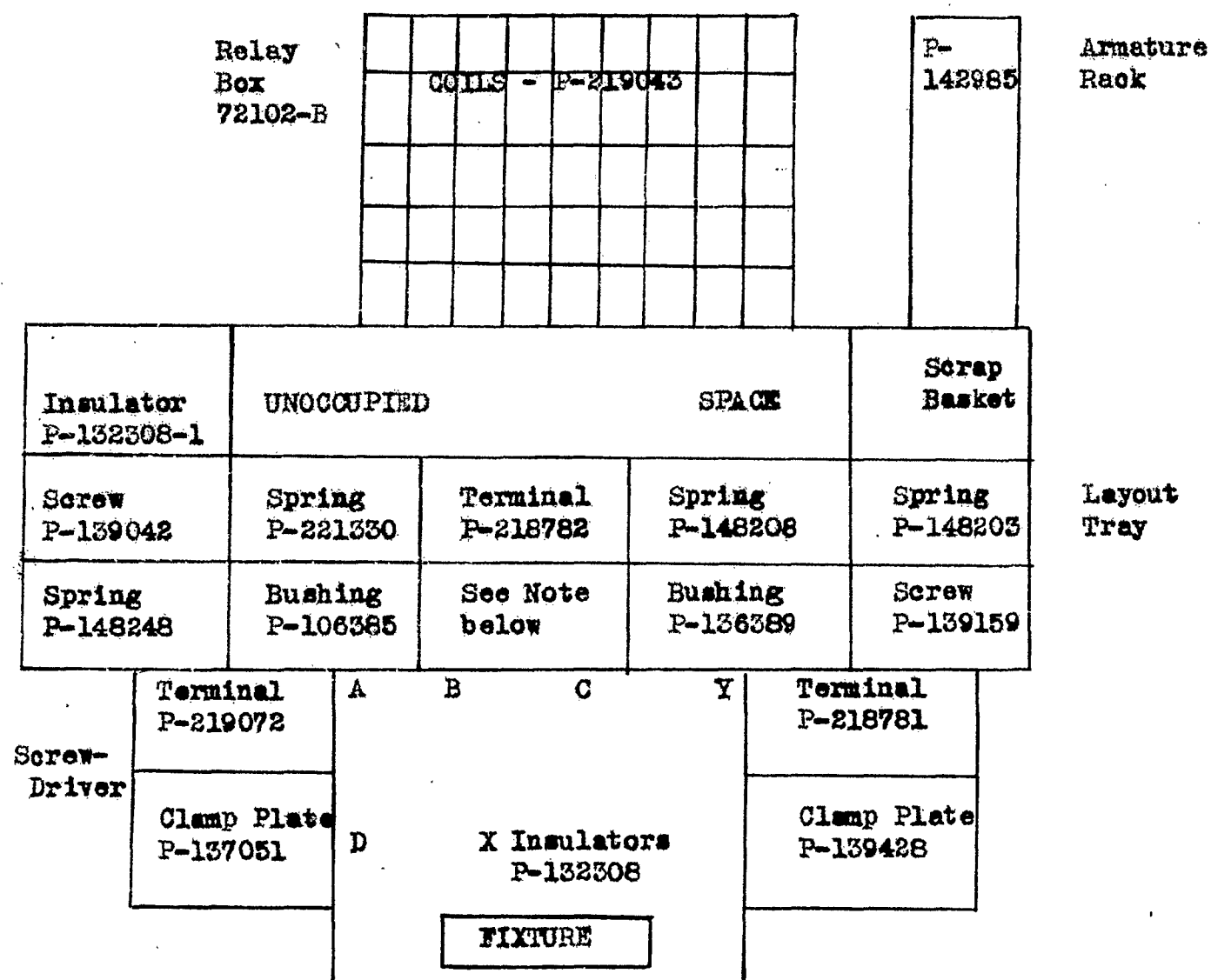
STOCK LIST AND BENCH LAYOUT USED IN ASSEMBLING R-1498 RELAY
(RELAY TEST GROUP)

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 - 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	Terminal	1 - P-221330	Contact Spring
1 - P-219072	Terminal		

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: Oper. 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". Oper. 2 places armatures P-142985 in the container in front of the fixture plate, while Oper. 3 places coils P-219043 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.

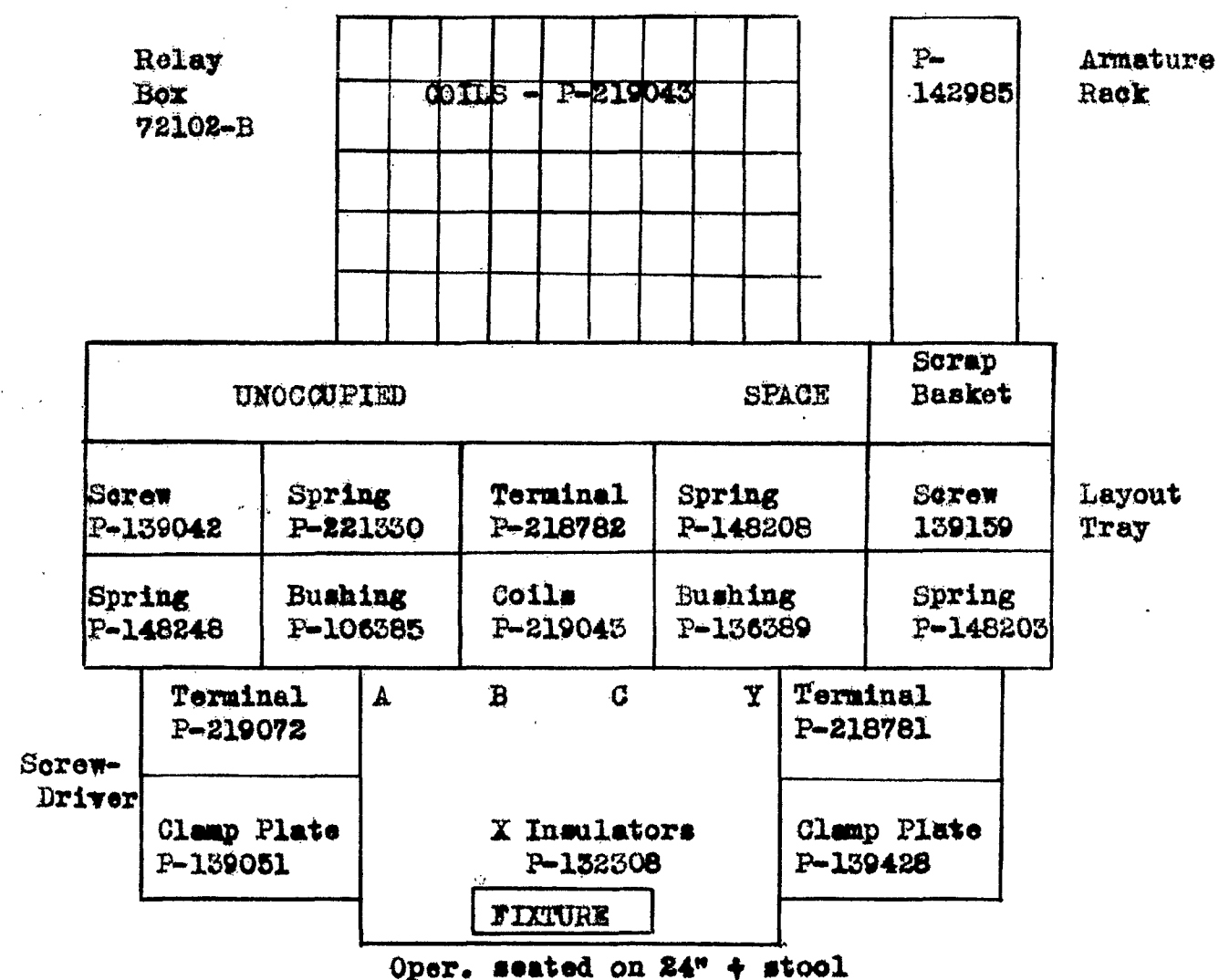
Sheet No. 1-E
No. of Sheets 5
May 20, 1931.

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-106385	Bushing	1 - P-219043	Coil
2 - P-136389	Bushing	1 - P-142985	Armature
15 - 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 4 & 5 (RELAY ASSEMBLY TEST GROUP)
IN THE ASSEMBLY OF FLAT TYPE RELAY R-1498



Note: - Oper. 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-139159 in the space marked "C", and about six armatures, P-142985 in the space marked "Y". 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.

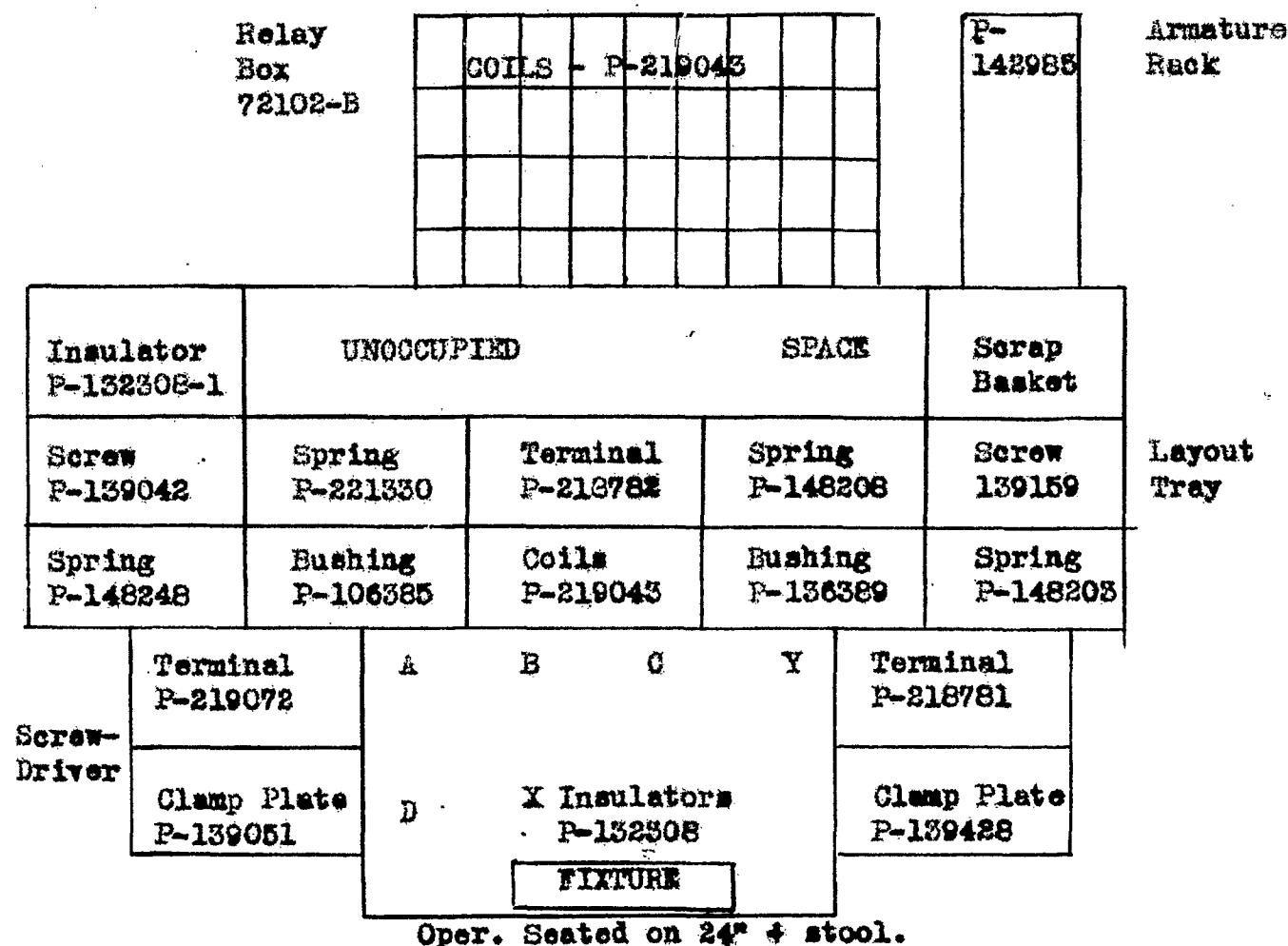
STOCK LIST AND BENCH LAYOUT USED IN ASSEMBLING R-1498 RELAY
(RELAY TEST GROUP)

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 - 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	Terminal	1 - P-221330	Contact Spring
1 - P-219072	Terminal		

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



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-139159 in the space marked "C", and about six armatures, P-142985 in the space marked "Y". 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-RR

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

(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)

Left Hand	Right Hand
1. Move hand to container and with T.& I., grasp, pick up, transport, and place clamp plate, P-139051, into nest farther from the operator, simultaneously,	move hand to container and with T.& I., grasp, pick up, transport, and place second clamp plate, P-139051, into nest nearer the operator, simultaneously,
2. Reach, and with T.& I. grasp, 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 farther away from the operator.
3. Reach, and with T.& I. grasp, pick up, transport and insert (1) pin through clamp plate hole 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 nearer the operator.
4. Move hand to container and with T.& I. grasp and pick up (2) bushings P-136389; simultaneously,	move hand to container and with T.& I., grasp and pick up (2) bushings P-106385.
5. Transport (2) bushings held in T.& I., to position over fixture and place over pins nearer the operator; simultaneously,	transport (2) bushings held in T.& I., to position over fixture and place over pins farther from the operator.
6. Reach, and with T.& I., grasp, pick up, transport, and place (1) insulator, P-132308, over pins nearer the operator; simultaneously,	reach, and with T.& I., grasp, pick up, transport, and place (1) insulator, P-132308, over pins farther from the operator.
7. Move hand to container and with T.& I., grasp and pick up (1) terminal, P-218782, simultaneously,	reach and with T.& I., grasp, and pick up (1) insulator P-132308.
8. Transport hand to position over fixture and place terminal over pins farther from the operator, simultaneously,	transport and place insulator over pins on terminal P-218782, farther from the operator. (See motions under Left Hand column.)
9. Move hand to container and with T.& I., grasp and pick up, transport and place (1) spring, P-221330, over pins nearer the operator, simultaneously	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.

Left Hand	Right Hand
10. Reach and with T. & I., grasp, pick up, transport and place (1) insulator, P-132308, over pins nearer the operator, simultaneously,	reach and with T. & I., grasp, pick up and transport and place (2) insulators over pins farther from operator.
11. Reach and with T. & I., grasp, pick up and transport and place (1) terminal, P-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 Hand 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.
13. Straighten lead-out wires with fingers of hand.	Continue to hold coil over fixture.
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) armature 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 armature assembly, (1/2) turn) toward the operator.
17. Lower coil and armature assembly over (4) pins in fixture.	Hand assists in this motion.
18. Reach, and with T. & I., grasp, pick up, transport, and place (1) insulator, P-132308, 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. reach, and with T. & I., grasp, pick up, transport, and place (1) insulator over pins on terminal, P-218781, nearer the operator.	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.)

Left Hand	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,	move hand to container and with T. & I., grasp, pick up, transport, and place spring, P-148203, over pins farther from the operator.
21. Reach, and with T. & I., grasp, pick up, and place (1) insulator P-132308, over pins nearer the operator, simultaneously,	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.
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	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.
23. Lower hand and with T. & I., hold pile-up nearer the operator in position; simultaneously,	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.
24. Reach, and with T. & I., hold pile-up farther from the operator in position; simultaneously,	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.
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,	reach and with T. & I., grasp, pick up, transport, and place (1) screw, P-139042, into right hole of pile-up farther from the operator.
26. Move hand to container and with T. & I., grasp, pick up, transport, and place (1) screw, P-139159, into left hole of pile-up nearer the operator; simultaneously,	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.
27. Reach and with fingers, grasp the lower portion of the screw-driver, pick up and transport to position over pile-up,	reach and grip the handle of the screw-driver with the hand.
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	drive screw down into clamp plate, P-139051, with the screw-driver by muscular exertion of the arm.

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	Same motions as for right hand-28.
31. Same motions as for left hand - 29, except screw is in the left side of pile-up farther from the operator, and	Same motions as for right hand-28.
32. 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 - DRAWINGS
RELAY TEST

<u>Relay</u> <u>Type</u>	<u>Stock</u> <u>List</u>	<u>Spring</u> <u>Fileup</u>	<u>Relay</u> <u>Type</u>	<u>Stock</u> <u>List</u>	<u>Spring</u> <u>Fileups</u>
B-1	A135009-101-3	A-109500	E-804	A-122086	A-121297-1008 121411-2007
B-9	"	109962	E-805	122037	121164-1111 121373-2110
B-10	"	109961	E-901	122607	121443-1003 121116-2001
B-15	"	111170	E-1187	124245	121215-1102 121416-2102
B-17	"	111665	E-6494	146044	146042-10210 146043-20211
B-56	"	114560	E-503	139458	121630-1010R 121631-2002
E-167	135363-1143	122491	R-913	142651	121440-1101-R 121154-2101
E-260	135009-101-3	126234	R-1246	143839	121153-1103R 121154-2101
E-456	135427-106-3	138813	R-1316	144258	121440-1101-F 144257-21191
G-28	135740-102-3	131242	R-1317	144224	121630-1010-R 121631-2002
G-30	"	131670	R-1496	146037	146035-10203-R 146036-20209
G-32	"	131672	R-1498	146138- 2138	146137-11213-R 146036-20209

DAC-FH