

1146d

TM 11-367

WAR DEPARTMENT TECHNICAL MANUAL

U113
:2
TM 11:367
1944



EQUIPMENTS VULCANIZING

TE-54-A, TE-55-A

TE-54-B, AND TE-55-B

WAR DEPARTMENT • 4 DECEMBER 1944

WAR DEPARTMENT TECHNICAL MANUAL

TM 11-367

This manual supersedes TD 11-366, Vulcanizing Equipments TE-54-A and TE-55-A, 27 January 1943, and TM 11-367, Vulcanizing Equipments TE-54-B and TE-55-B, 13 December 1943.

**EQUIPMENTS
VULCANIZING**

**TE-54-A, TE-55-A
TE-54-B, AND TE-55-B**



WAR DEPARTMENT • 4 DECEMBER 1944

United States Government Printing Office

Washington : 1947

WAR DEPARTMENT,
WASHINGTON 25, D. C., 4 December 1944.

TM 11-367, Vulcanizing Equipments TE-54-A, TE-55-A, TE-54-B, and TE-55-B is published for the information and guidance of all concerned.

[A. G. 300.7 (19 July 1944).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major General,
The Adjutant General.

DISTRIBUTION:

Signal Corps Standard T 11-1

TM 11-367: Vulcanizing Equipments TE-54-A, TE-55-A, TE-54-B and TE-55-B, November 1944.

AAF (5); AGF (5); ASF (5); T of Opn (5); Base Comd (5); Dept (5); Def Comd (2); AAF Comd (2); Arm & Sv Bd (2); Tech Sv (2); SvC (5); Area ASvC (2); WDGS Lib (5); PC&S (2); PE (2); Dep, 11 (2); Gen Overseas SOS Dep (Sig Sec) (2); GH (2); M Conc C (2); Air Base Hosp (2); Gen Sv Sch (5); Sp Sv Sch (10); USMA (2); ROTC (5); Lab, 11 (2); Sig AS (2); Rep Shop, 11 (2); A (5); D (2); AF (2) T/O & E: 1-457T (2); 11-7 (5); 11-15; 11-16 (5); 11-25; 11-26 (5); 11-37 (5); 11-47 (5); 11-57 (5); 11-86S (5); 11-89S (5); 11-95 (2); 11-107 (5); 11-127 (5); 11-217 (5); 11-227 (5); 11-237 (5); 11-247 (5); 11-267 (5); 11-277 (5); 11-287 (5); 11-336 (5); 11-400, Sig AW Orgn — Wire Team (5); 11-517S (5); 11-587 (5); 11-592 (5); 11-597 (5).

(For explanation of symbols see FM 21-6.)

U113
 12
 TM11:367
 ★★

TABLE OF CONTENTS

	<i>Paragraph</i>	<i>Page</i>
SECTION I. Description.		
General	1	1
Vulcanizing Equipment TE-54-(*) ..	2	1
Vulcanizing Equipment TE-55-(*) ..	3	2
List of components of Vulcanizing Equipment TE-54-(*)	4	6
List of components of Vulcanizing Equipment TE-55-(*)	5	8
II. Installation and operation.		
Initial procedure	6	10
Jacket repair of Cables WC-534, WC-535, and WC-548	7	11
Permanent vulcanized splice of Cables WC-534 and WC-535	8	12
Permanent vulcanized splice for spiral- four cable	9	16
Potheadng	10	19
Operating precautions	11	20
Color schedules for splice connections.	12	21
Special operating instructions	13	22
III. Functioning of parts.		
General	14	23
Heater Units	15	23
Thermoswitch	16	23
IV. Maintenance.		
Servicing and repair	17	25
Moistureproofing and fungiproofing ..	18	27
V. Supplementary data.		
Maintenance parts list for Vulcanizing Equipments TE-54-(*)	19	28
Maintenance parts list for Vulcanizing Equipments TE-55-(*)	20	30

M609737

III

LIST OF ILLUSTRATIONS

<i>Fig. No.</i>	<i>Title</i>	<i>Page</i>
1	Vulcanizing Equipment TE-54 (*)	3
2	Vulcanizing Equipment TE-55 (*)	4
3	Kit box and vulcanizer as supplied with Vulcanizing Equipments TE-54-B and TE-55-B	5
4	Method of separating rubber jacket from conductors.....	12
5	Rubber jacket removed from cable to be spliced.....	12
6	Step-by-step procedure in preparing vulcanized splice.....	13
7	Method of preparing the conductors for splicing.....	13
8	Method of splicing conductors with sleeves.....	14
9	Taping gauge for vulcanized splices.....	14
10	Completed splice in Vulcanizing Equipments TE-54-A and TE-55-A	16
11	Completed splice in Vulcanizing Equipments TE-54-B and TE-55-B	17
12	Standard vulcanized splice for Cable WC-548.....	18
13	Spliced conductors for pothead.....	19
14	Assembly of pothead	19
15	Taped pothead	20
16	Vulcanized pothead	20
17	Thermoswitch adjustment on Vulcanizing Equipments TE-54-A and TE-55-A	26
18	Thermoswitch adjustment on Vulcanizing Equipments TE-54-B and TE-55-B	26
19	Vulcanizing Equipments TE-54-A and TE-55-A, wiring diagram	27
20	Vulcanizing Equipments TE-54-B and TE-55-B, wiring diagram	27

DESTRUCTION NOTICE

WHY —To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN—When ordered by your commander.

- HOW**
1. Smash—Use sledges, axes, handaxes, pickaxes, hammers, crow-bars, heavy tools, etc.
 2. Cut —Use axes, handaxes, machetes.
 3. Burn —Use gasoline, kerosene, oil, flame throwers, incendiary grenades, etc.
 4. Explosives—Use firearms, grenades, TNT, etc.
 5. Disposal —Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT

- WHAT**
1. Smash—Vulcanizer kit, thermostitch, heating element, molds, soldering iron, chest, rubber cement containers, all tools.
 2. Cut —Power cords, solder spool.
 3. Burn.—Rubber tape, insulation tubing, instruction card, technical manuals, tool roll, gloves.
 4. Bend or break—Trays.
 5. Bury or scatter—Splicing sleeves, any or all of above pieces after breaking.

DESTROY EVERYTHING

SAFETY NOTICE

**OPERATING TEMPERATURES RANGE FROM 290° TO 315°F.
BE CAREFUL. DO NOT GET BURNED.**

V

This manual supersedes TM 11-366, Vulcanizing Equipments TE-54-A and TE-55-A, 27 January 1943, and TM 11-367, Vulcanizing Equipments TE-54-B and TE-55-B, 13 December 1943.

SECTION I

DESCRIPTION

1. GENERAL

Vulcanizing Equipments TE-54-A and TE-55-A differ only slightly from Vulcanizing Equipments TE-54-B and TE-55-B. In this technical manual, when an asterisk inclosed in parentheses replaces the suffix letter, both models of the vulcanizing equipment are denoted. Where reference is made to a specific model of the equipment, the suffix letter will be used.

2. VULCANIZING EQUIPMENT TE-54-(*).

a. **Use.** Vulcanizing Equipment TE-54-(*) is used for splicing and patching Signal Corps Cables WC-534, WC-535 and WC-548. It is also used for splicing two Cables WC-534 to one Cable WC-535. This latter operation is referred to as potheading.

b. **Chest.** The equipment is contained in a chest made of plywood reinforced with metal edge and corner plates. The lid is hinged at the back of the chest, and is locked in place by two snap catches and a trunk-type lock at the front. Leather strap handles are provided on each end of the chest to facilitate moving and carrying.

c. **Contents of Chest.** The chest contains a vulcanizer kit box and a supply of expendable materials. Expendable materials furnished include the following items:

- (1) Two sizes of bronze splicing sleeves.
- (2) Gray insulating tape.
- (3) Black vulcanizing tape.
- (4) Rubber cement.
- (5) Two sizes of rubber tubing.
- (6) Rosin-core solder.
- (7) Soldering paste.
- (8) Wax mold dressing.

d. **Vulcanizer Kit Box.** The vulcanizer kit box is arranged as follows:

(1) **BOX.** The box which incloses the components of the kit is made of sheet steel with an olive-drab finish. The lid of the box is hinged at the back and is fastened in place by snap catches. Carrying handles are provided on the lid. A receptacle for the power cord and another for a soldering iron are installed on the right side of the box.

(2) **TRAY.** A movable tray is placed under the lid. This tray contains a soldering iron, the various molds, a paper test board for fanning cable, and a spool of rosin-core solder.

(3) **VULCANIZER UNIT.** The vulcanizer unit is installed under the tray in the front part of the box. The vulcanizer has a hinged heat-insulated cover. The unit consists of two heating plates, one fixed and one movable. Any of the various molds may be inserted and locked in the semicircular groove in each of the heating plates.

(4) **MIDDLE COMPARTMENT.** The middle compartment is immediately behind the vulcanizer unit. This compartment contains the power cord for the vulcanizer unit, asbestos gloves for handling the plates and molds while hot, and cable clamps for holding cables in the splicing and repairing positions.

(5) **REAR COMPARTMENT.** The rear compartment is located at the rear of the kit box and is separated from the middle compartment by a sheet steel partition. This compartment contains the kit of tools used in the splicing and repairing operations.

3. VULCANIZING EQUIPMENT TE-55-(*).

Vulcanizing Equipment TE-55-(*) differs from Vulcanizing Equipment TE-54-(*) only in the amount of expendable material furnished and in the size of the chest.

740371 O - 47 - 2

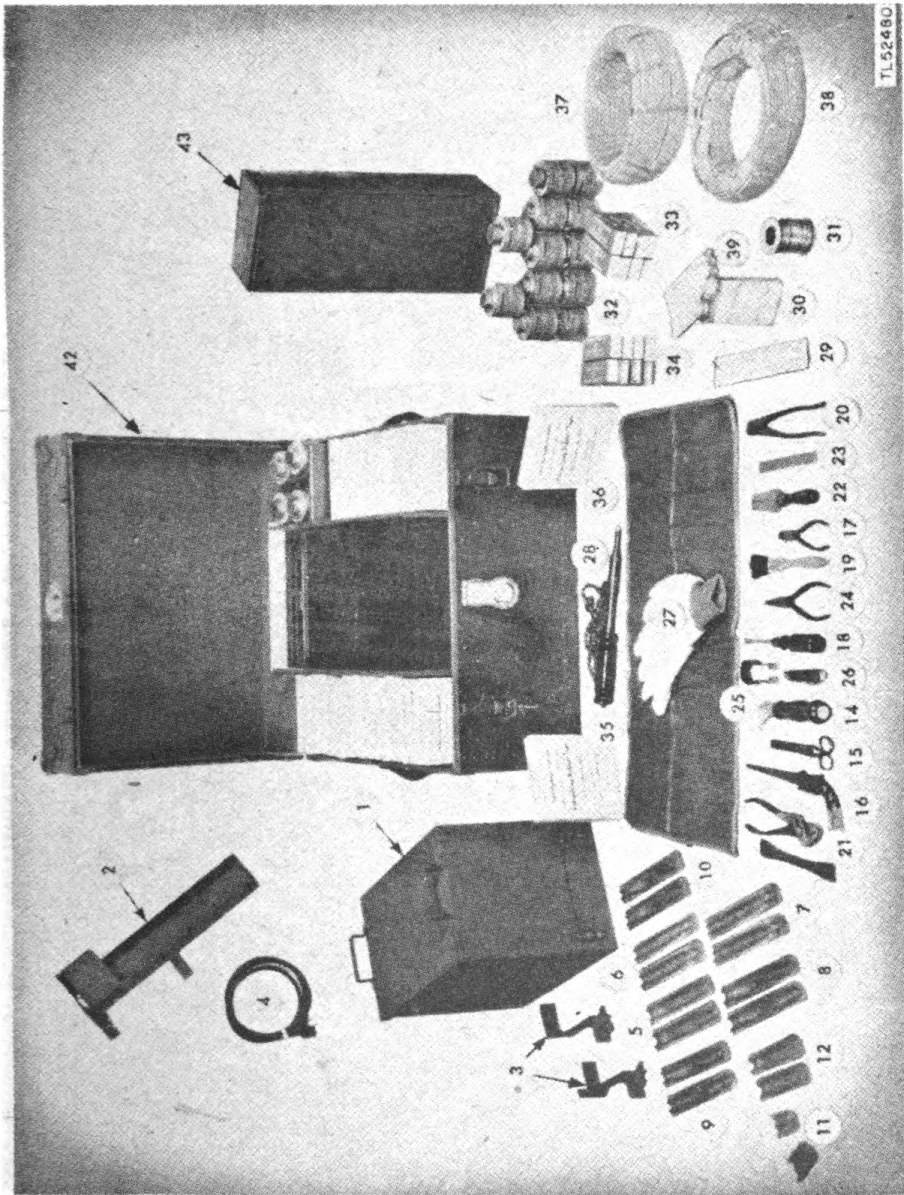


Figure 1. Vulcanizing Equipment TE-54-(*)

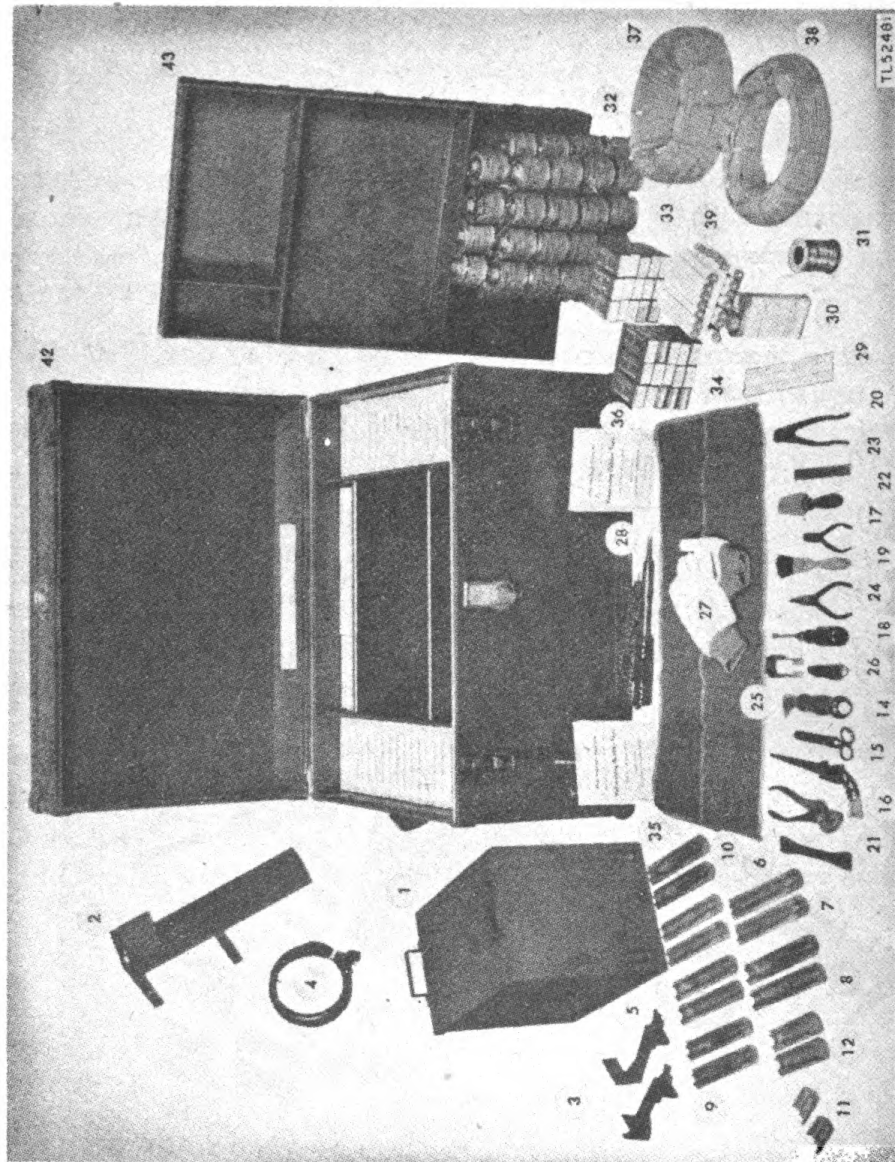


Figure 2. Vulcanizing Equipment TE-55.(*)

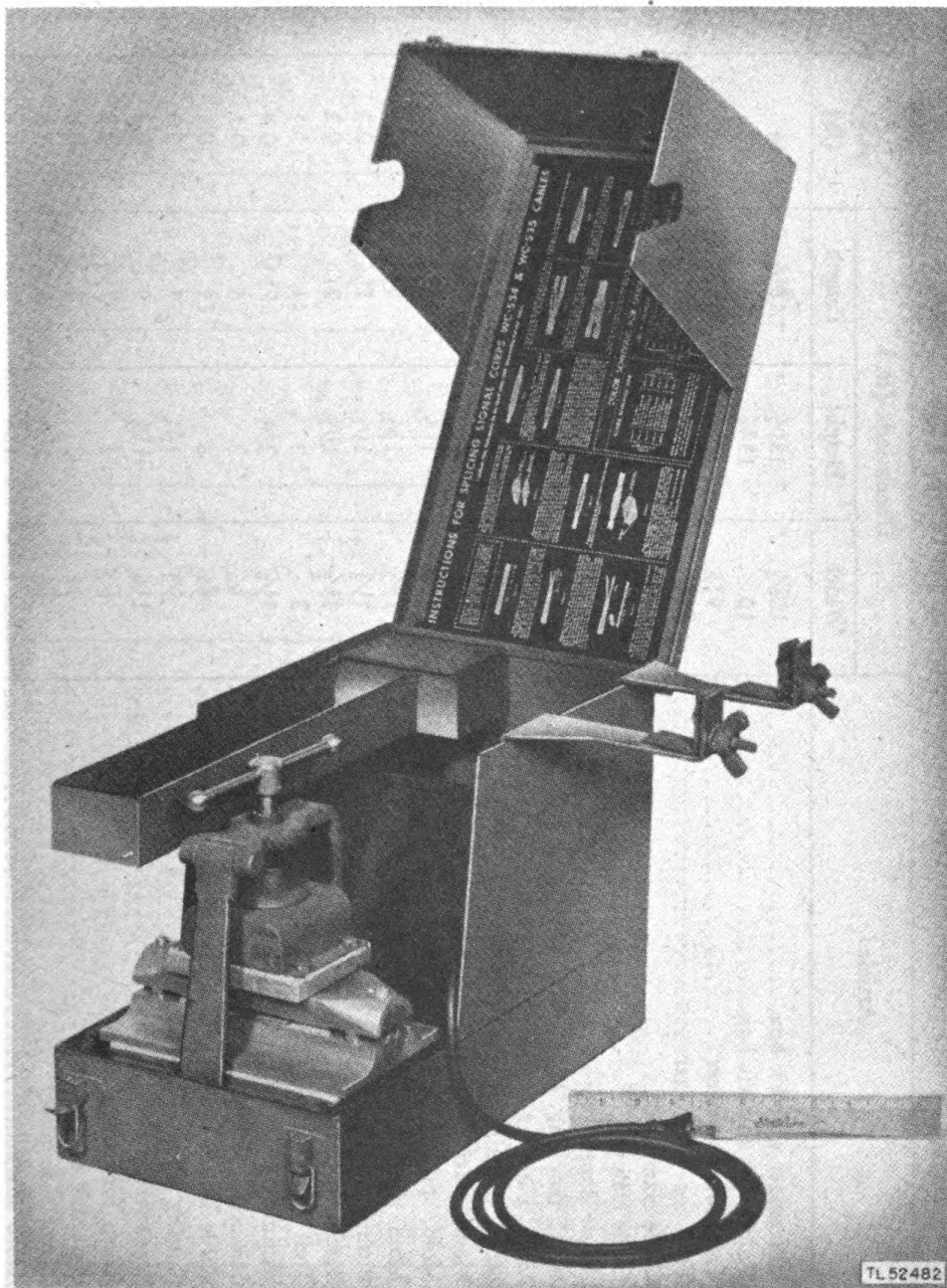


Figure 3. Kit box and vulcanizer as supplied with Vulcanizing Equipments TE-54-B and TE-55-B.

4. LIST OF COMPONENTS OF VULCANIZING EQUIPMENT TE-54-(*).

Item No.	Quantity	Article	Dimensions (in.)			Unit weight (lb)	Remarks
			Width	Height	Length		
1	1	Vulcanizer and kit box.....	10 1/2	13 1/2	18 1/2	44	TE-54-A
1	1	Vulcanizer and kit box.....	10	13 3/8	18	50	TE-54-B
2	1	Tray for vulcanizer.....	9 3/4	2 1/2	16 3/4	6.5	TE-54-A
2	1	Tray for vulcanizer.....	3	2	17 1/2	4	TE-54 B
3	2	Cable clamps	5	1 1/4	6	0.5	TE-54-A
3	2	Cable clamps	4 1/2	1	8	0.5	TE-54-B
4	1	Power supply cord			84	0.5	
5	1 pair	Mold, patching, Cable WC-534.....	1 1/2	1 1/2	8 1/4	0.5	
6	1 pair	Mold, patching, Cable WC-535.....	1 1/2	1 1/2	8 1/4	0.5	
7	1 pair	Mold, patching, Cable WC-548.....	1 1/2	1 1/2	8 1/4	0.5	
8	1 pair	Mold, splicing, Cable WC-534.....	1 1/2	1 1/2	8 1/4	0.5	
9	1 pair	Mold, splicing, Cable WC-535.....	1 1/2	1 1/2	8 1/4	0.5	
10	1 pair	Mold, splicing, Cable WC-548.....	1 1/2	1 1/2	8 1/4	0.5	
11	1 pair	Bushing, pothead	1 1/2	1 1/2	5 1/4	0.3	
12	1 pair	Blocks, pothead	1 1/2	1 1/2	2	0.2	
13	1	Tool roll (empty).....	2	4	11	1.5	Folded
14	1	Skinning knife	1 1/2	2 1/2	7 1/2	0.4	
15	1 pair	Scissors	1/4	2	6	0.1	
16	1	Cable jacket rougher, including two extra blades.....	3/4	3	11	0.3	
17	1 pair	Cutting pliers TL-103.....	1/2	1 3/4	5	0.3	
18	1	Screwdriver	1 1/4	1 1/4	9	0.3	
19	1	Brush for cement.....	1/2	1	7 1/2	0.2	
20	1	Crimping tool	3/4	2	8	0.6	
21	1 pair	Parrot-nose pliers	7/8	2 1/2	8	0.6	
22	1	Knife sharpener	1	1 1/2	7 1/2	0.6	

23	1	Steel scale	3/4	.....	6	.....	
24	1	Pliers TL-126	1/2	.....	7	0.3		
25	1	Enamel scraper	3/4	1 1/2	3	0.1		
26	1	Knife TL-29	3/4	1	4	0.2		
27	1 pair	Gloves	2/2	3 1/2	5	0.4		Folded
28	1	Soldering iron TL-120	1 1/2	1 1/2	14	1.5		Cord coiled
29	1	Test board	2	.....	10	.....	
30	1	Carbon tetrachloride	3	3	4	1.1		
31	1	Solder M-31	2 1/2	2 1/4	2 3/8	1.0		Spool
32	20	Rubber cement	2	2	2 1/4	0.4		Can
33	8 boxes	Bronze sleeves No. 3-036A	3/4	1 3/4	4 1/4	0.2		250 per box
34	8 boxes	Sleeves No. 3-045B	3/4	1 3/4	4 1/4	0.5		250 per box
35	15 rolls	Gray inside rubber tape	6	1	6	1.5		Boxed
36	20 rolls	Black outside rubber tape	6	1	6	1.2		Boxed
37	500 ft.	Rubber tubing 3/32" ID				0.01		Coils
38	500 ft.	Rubber tubing 1/8" ID				0.012		Coils
39	5	Wax stick mold dressing	3/4		6	0.06		Stick
40	1	Instruction card	8 7/8	1 1/32	17 1/4	0.2		
41	2	Technical Manual TM 11-367	5 7/8	.....	9	.....	
42	1	Chest CH-94-B	21	16	28	65.0		
43	1	Tray for chest (metai)	6	7 1/4	18 3/4	6.5		

∞ 5. LIST OF COMPONENTS OF VULCANIZING EQUIPMENT TE-55-(*) .

Item No.	Quantity	Article	Dimensions (in.)			Unit weight (lb)	Remarks
			Width	Height	Length		
1	1	Vulcanizer and kit box.....	10 1/2	13 1/2	18 1/2	44	TE-55-A
1	1	Vulcanizer and kit box.....	10	13 3/8	18	50	TE-55-B
2	1	Tray for vulcanizer.....	9 3/4	2 1/2	16 3/4	6.5	TE-55-A
2	1	Tray for vulcanizer.....	3	2	17 1/2	4	TE-55-B
3	2	Cable clamps.....	5	1 1/4	6	0.5	TE-55-A
3	2	Cable clamps.....	4 1/2	1	8	0.5	TE-55-B
4	1	Power supply cord.....	.....	.....	84	0.5	
5	1 pair	Mold, patching, Cable WC-534.....	1 1/2	1 1/2	8 1/4	0.5	
6	1 pair	Mold, patching, Cable WC-535.....	1 1/2	1 1/2	8 1/4	0.5	
7	1 pair	Mold, patching, Cable WC-548.....	1 1/2	1 1/2	8 1/4	0.5	
8	1 pair	Mold, splicing, Cable WC-534.....	1 1/2	1 1/2	8 1/4	0.5	
9	1 pair	Mold, splicing, Cable WC-535.....	1 1/2	1 1/2	8 1/4	0.5	
10	1 pair	Mold, splicing, Cable WC-548.....	1 1/2	1 1/2	8 1/4	0.5	
11	1 pair	Bushings, pothead.....	1 1/2	1 1/2	5 1/2	0.3	
12	1 pair	Blocks, pothead.....	1 1/2	1 1/2	2	0.2	
13	1	Tool roll (empty).....	2	4	11	1.5	Folded
14	1	Skinning knife.....	1 1/2	2 1/2	7 1/2	0.4	
15	1 pair	Scissors.....	1/4	2	6	0.1	
16	1	Cable jacket rougher, including two extra blades.....	3/4	3	11	0.3	
17	1 pair	Cutting pliers TL-103.....	1/2	1 3/4	5	0.3	
18	1	Screwdriver.....	1 1/4	1 1/4	9	0.3	
19	1	Brush for cement.....	1/2	1	7 1/2	0.2	
20	1	Crimping tool.....	3/4	2	8	0.6	
21	1 pair	Parrot-nose pliers.....	7/8	2 1/2	8	0.6	
22	1	Knife sharpener.....	1	1 1/2	7 1/2	0.6	

23	1	Steel scale	3/4	.....	6	f....	
24	1 pair	Pliers TL-126	1/2	2	7	0.3	
25	1	Enamel scraper	3/4	1 1/2	3	0.1	
26	1	Knife TL-29	3/4	1	4	0.2	Folded
27	1 pair	Gloves	2 1/2	3 1/2	5	0.4	Cord coiled
28	1	Soldering Iron TL-120	1 1/2	1 1/2	14	1.5	
29	1	Test board	2	.....	10	.....
30	1	Carbon tetrachloride	3	3	4	1.1	
31	1	Solder M-31	2 1/2	2 1/4	2 3/6	1.0	Can
32	40	Rubber cement	2	2	2 1/4	0.4	250 per box
33	15 boxes	Bronze sleeves No. 3-036-A	3/4	1 3/4	4 1/4	0.2	250 per box
34	15 boxes	Sleeves No. 3-045B	3/4	1 3/4	4 1/4	0.5	Boxed
35	30 rolls	Gray inside rubber tape	6	1	6	1.5	Boxed
36	100 rolls	Black outside rubber tape	6	1	6	1.2	Coils
37	1,000 ft.	Rubber tubing 3/32" ID	3/4	.....	6	0.01	Coils
38	1,000 ft.	Rubber tubing 1/8" ID	8/8	1/32	6	0.012	Stick
39	20	Wax stick mold dressing	5/8	.....	17 1/4	0.06	
40	1	Instruction card	23 1/2	.....	9	.....
41	2	Technical Manual TM 11-367	22	20 1/4	35	82	TE-55 A
42	1	Chest	20 1/2	20	34	91	TE-55 B
42	1	Chest CH-75-C	20 1/2	4 1/2	32	10.8	TE-55 A
43	1	Tray for chest	19	7 1/2	26	5.3	TE-55 B
43	1	Tray for chest (wood)					

SECTION II

INSTALLATION AND OPERATION

6. INITIAL PROCEDURE.

a. To set up Vulcanizing Equipments TE-54-(*) and TE-55-(*), remove the vulcanizer kit box from its carrying chest and place it on the floor or on a bench where the splicing and patching work is to be done.

b. Plug the power cord into a 110-volt a-c socket and allow the vulcanizer unit to heat to the vulcanizing temperature while the cables are being prepared. Close the cover of the unit to prevent heat loss and insure quicker heating.

NOTE: Vulcanizing Equipments TE-54-B and TE-55-B are equipped with a pilot lamp which lights when the power cord is connected, and stays lighted until the heater units have reached the vulcanizing temperature. After the proper temperature is reached, the light flashes on and off until the power cord is disconnected.

c. Select a mold according to the table below, and insert the two halves of the mold in the semicircular grooves in the heating plates. Lock the mold halves in place with the locking screws at the ends of the heating plates. A table of molds used for the various operations follows:

Purpose	Signal Corps No.	TE-54-A TE-55-A	TE-54-B TE-55-B
Patching mold for Cable WC-534	M-425	VD-230	WP 1230-1
Patching mold for Cable WC-535	M-426	VD-231	WP 1231-1
Patching mold for Cable WC-548	M-429	VD-332	WP 1332-1
Splicing mold for Cable WC-534	M-427	VD-232	WP 1232-1
Splicing mold for Cable WC-535	M-428	VD-233	WP 1233-1
Splicing mold for Cable WC-548	M-430	VD-333	WP 1333-1
Bushings for potheading	M-424	VD-234	WP 1234-1
Blocks for potheading	M-423	VD-235	WP 1235-1

d. When the mold has reached the proper temperature, coat it thoroughly with wax mold dressing as instructed on the wax stick. This is done to insure that the vulcanized cables will strip cleanly from the mold after curing.

e. Insert the cable clamps from the middle compartment in the clamp holders at the corners of the right side of the kit box (figs. 1 and 2). Clamp the cable or cable ends to be processed in the clamps, and process as explained in the following paragraphs.

7. JACKET REPAIR OF CABLES WC-534, WC-535 AND WC-548.

a. Clean the area of the cable to be repaired with carbon tetrachloride to remove dirt or oil film.

b. Roughen the entire area where rubber is to be applied, using the jacket rougher.

c. Apply a coating of rubber cement over the roughened area and allow it to dry.

d. If the insulation of the individual conductors of the cable has been broken, wrap the damaged portion of the cable with gray insulating tape.

e. Wrap the roughened area of the cable with black outside tape. Wrap it tightly to exclude air. Build up the tape, wrapping to the approximate shape of the mold. Make the finished patch slightly larger than the mold. A taping gauge (if available, or a drawing of the taping gauge (fig. 9) may be used to gauge the size of the prepared patch.

f. Fit the wrapped cable into the hot mold. Make sure that the cable at the ends of the patch slips into the mold ends.

g. Lower the upper half of the vulcanizer unit to bring the two mold halves together, and lock it in position.

NOTE: The heater plates are locked together in Vulcanizing Equipments TE-54-A and TE-55-A by swinging two bolts into engagement with two U-shaped projections on the upper plate and tightening the associated nuts. In the case of Vulcanizing Equipments TE-54-B and TE-55-B, the upper plate is fitted into place and secured by engaging a bolt with a single U shaped projection.

h. After the two heater plates are locked together, tighten them until they are separated by 1/16 inch. The plates on Vulcanizing Equipments TE-54-A and TE-55-A are tightened by tightening the two locking bolts with the socket wrench supplied with the equipment. The plates on Vulcanizing Equipments TE-54-B and TE-55-B are tightened by rotating a ball crank attached to the locking bar. When the mold is tightened to a separation of 1/16 inch, excess rubber will be squeezed out. This excess rubber is called *rubber flash*.

i. At the end of 5 minutes with the molds separated 1/16 inch, completely close the molds. Do not use an extension handle for tightening lever or crank. Allow the patch to vulcanize for 30 minutes.

j. At the end of the 30-minute period, remove the splice from the mold. A rubber fin should appear along the full length of the vulcanized splice. This fin is composed of the small amount of excess rubber tape forced out by the pressure which heat produces during the vulcanizing period and by the pressure of the mold. Cut a slit crosswise in the fin next to the patch (fig. 6 (G)). If the edges of the cut tend to stick together at a point next to the patch, the splice is undercured and should be put back in the mold for additional curing. Overcuring a patch will do no harm. **IT IS BETTER TO OVERCURE**

THAN UNDERCURE. When the patch is found to be completely cured, that is, when the two edges of the fin show no tendency to stick together, trim off the entire fin with scissors. Do not attempt to tear off the fin.

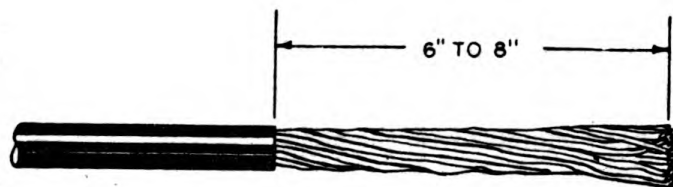
8. PERMANENT VULCANIZED SPLICE OF CABLES WC-534 AND WC-535.

Vulcanizing Equipments TE-54(*) and TE-55(*) are made available to those organizations responsible for the construction and maintenance of cable lines and the repair of cable assemblies. Splicing of lengths of cable is accomplished by joining the conductors with individual bronze sleeves, insulating each splice with rubber tubing, and vulcanizing a rubber covering over the sleeves. Each of the vulcanizing equipments includes all the parts, tools and materials necessary for preparing a splice and vulcanizing a patch or a complete jacket on both sizes of cable.

a. Preparation of splices. (1) Separate the rubber jacket insulation from the conductors by 6 inches (fig. 4). Pliers may be used to facilitate this operation. Cut off the rubber jacket (fig. 5) and separate the pairs from the jute (the string used as a filler. Do not cut off the jute string (fig. 7).



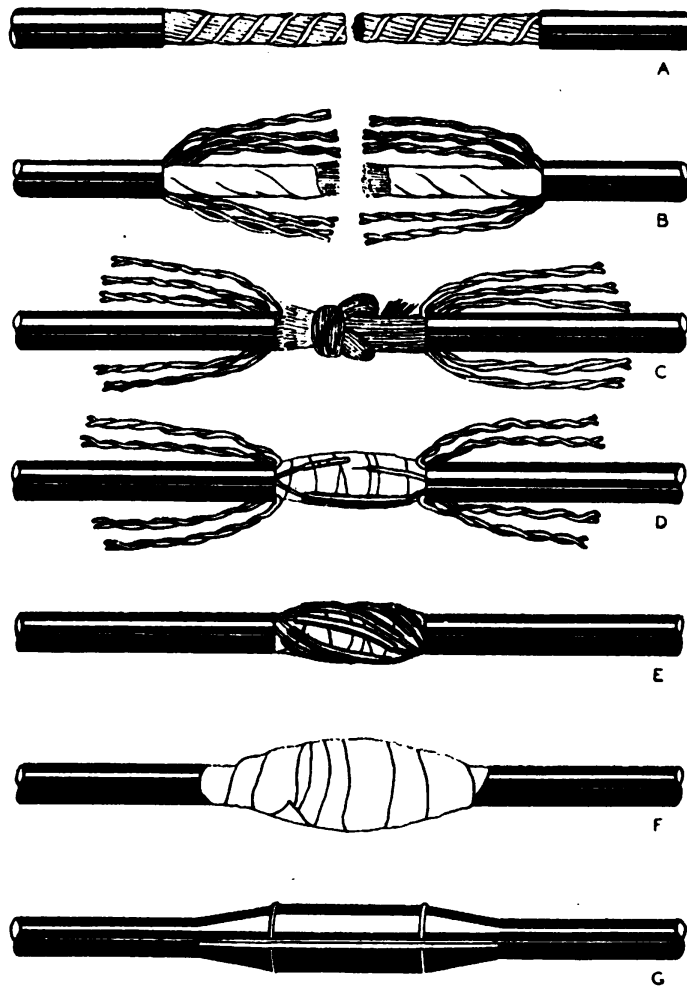
Figure 4. Method of separating rubber jacket from conductor.



TL 52484

Figure 5. Rubber jacket removed from cable to be spliced.

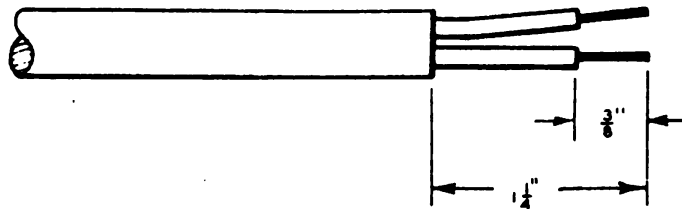
(2) Separate the conductors from the jute core (fig. 6 (B)). Lay the conductors back along the cable. Twist the jute strands into a cord and tie a square knot in the two ends of the jute. When the square knot is pulled tight, the distance between the ends of the cable jacket should be approximately $2\frac{1}{2}$ inches. Apply one layer of prevulcanized gray rubber tape over the knotted jute core (fig. 6 (D)).



TL 52485

Figure 6. Step-by-step procedure in preparing vulcanized splice.

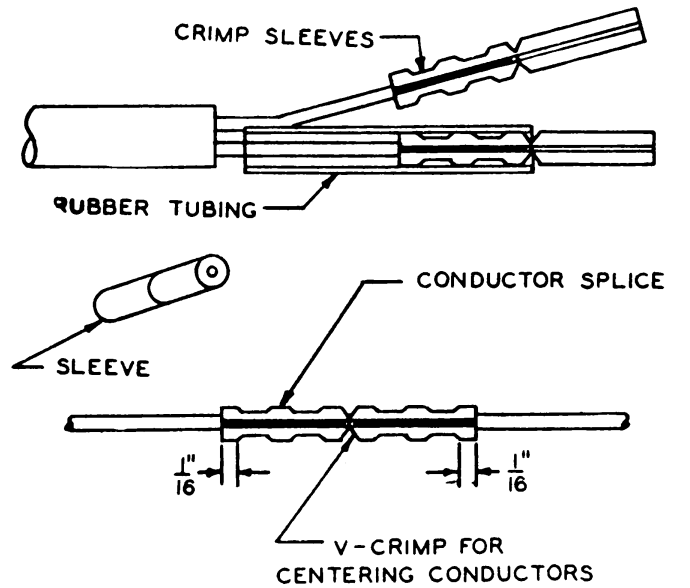
(3) Cut off the conductors so that $1\frac{1}{4}$ inches of the conductor remain. Remove $\frac{3}{8}$ inch of the insulation from each conductor (fig. 7).



TL 52486

Figure 7. Method of preparing the conductors for splicing.

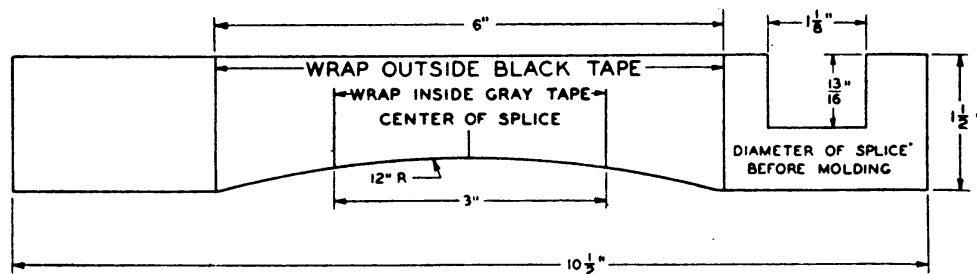
(4) To fasten the conductors together with bronze splicing sleeves (No. O36-A, 19-20 B&S gauge), place a sleeve on a conductor by inserting the conductor halfway into the sleeve and crimping the sleeve with crimping pliers No. 17-2 (fig. 8). Do not crimp the sleeve closer than $\frac{1}{16}$ inch from the end, or the conductor will be weakened (fig. 8). Cut a length of pre-vulcanized rubber tubing $1\frac{1}{4}$ inches long, slip it over the conductor, and crimp half of the sleeve. Insert the matching conductor from the opposite end of the cable and crimp the sleeve on this conductor. Center the rubber tubing on the splicing sleeve and press the spliced conductor against the taped jute core (fig. 6 (E)). Repeat this procedure until all the conductors have been spliced and insulated.



TL 52487

Figure 8. Method of splicing conductors with sleeves.

(5) Bind the entire assembly of insulated conductors in place with a thin layer of gray vulcanizing tape. Follow dimensions shown in figure 9.



TL 52488

Figure 9. Taping gauge for vulcanized splices.

(6) Scrape the rubber jackets of the two cables for $2\frac{1}{2}$ inches on both sides of the splice with the roughing tool. Apply vulcanizing rubber cement freely to the clean scraped portions of the cable jacket, and allow it to dry. Do not put this cement over the gray tape.

(7) Wrap black vulcanizing tape around the entire splice to a distance as indicated on the taping gauge (fig. 9). Do not wrap tape on the unscraped part of the jacket or where there is no rubber cement. The tape should be wrapped tightly, lapping one half the width of the tape, in enough layers to fill the mold completely for the particular size of cable. The use of the $1\frac{1}{8}$ -inch slot in the end of the taping gauge will assure this. Also, the length to which the tape is wrapped must be great enough to fill the mold lengthwise. Use the large radius indicated on the taping gauge (fig. 9). The mold must be filled so that sufficient pressure will be built up to vulcanize the rubber properly. Because the mold tapers, fewer layers will be needed as the distance from the center of the splice increases (fig. 6 (F)).

(8) The taping gauge illustrated in figure 9 was designed and dimensioned to allow only the correct amount of tape to be applied to the splice to make a good vulcanized splice. If the pressure on the splice is great enough and evenly distributed, air holes will be prevented and the splice will be symmetrical enough to prevent the conductors from being too close to the surface of the vulcanized jacket. Figure 6 (F) illustrates a splice prepared for vulcanizing.

NOTE: If the taping gauge illustrated in figure 7 is not supplied with the vulcanizing equipment, one may be made by following the dimensions shown in the figure. Sheet metal, fiberboard, plywood, or heavy cardboard may be used.

(9) If a patch on the rubber jacket is being made, scrape all surfaces clean, brush on the rubber cement, allow it to dry, and apply enough black vulcanizing tape to fill the upper mold. The use of the taping gauge will facilitate this procedure.

b. Vulcanizing. (1) The vulcanizer made available to a particular organization may be one of several types. The operation of vulcanizing is very much the same with all units, although they vary in appearance and in the location of the heating element (figs. 10 and 11).

(2) Before completing the preparation of the splice, place the proper molds in the vulcanizer and heat the vulcanizing equipment for 30 minutes. Just before placing the splice in the mold, apply the mold dressing, furnished with the vulcanizing equipment, sparingly to all surfaces of the mold. The use of the mold dressing aids in the removal of the vulcanized splice from the mold.

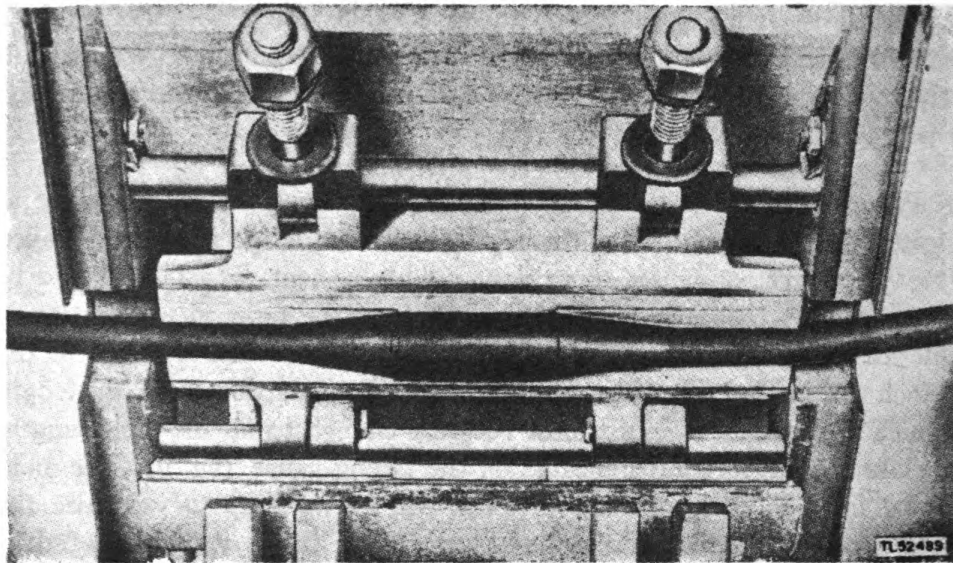


Figure 10. Completed splice in Vulcanizing Equipment TE-54-A or TE-55-A.

(3) Place the splice in the mold, and tighten the mold evenly until the two halves of the mold are separated by 1/16 inch. Allow the mold to remain in this position for about 5 minutes. This will allow the rubber to soften. Then close the mold until the two halves touch and let the splice vulcanize for 30 minutes. Remove the vulcanized splice and cut a slit crosswise in the fin on the edge of the vulcanized splice (fig. 6 (G)). This fin should appear along the full length of the vulcanized splice, and consists of the small amount of excess rubber tape forced out by the pressure exerted on the mold during the vulcanizing operation. If the rubber fin tends to stick together when cut, the splice is undervulcanized and should be put back into the mold for additional vulcanizing. Complete the vulcanized splice by trimming off the fin with scissors. Do not attempt to tear off the fin.

(4) The splice will not be harmed if left in the vulcanizer longer than 30 minutes. Cooking the splice longer than necessary is preferable to not curing the rubber properly.

9. PERMANENT VULCANIZED SPLICE FOR SPIRAL-FOUR CABLE.

a. Preparing Cable for Splicing. (1) Remove approximately 4 inches of the outer rubber or neoprene jacket from each of the two ends of the cable to be spliced. Be careful in removing this outer jacket not to nick or otherwise damage the steel braid strands.

(2) Divide the 16 steel strands of the braid into three groups, two of 5 strands and one of 6 strands. Twist each of the groups in such a way that a splicing sleeve No. 3-045B may be placed over each of the three groups.

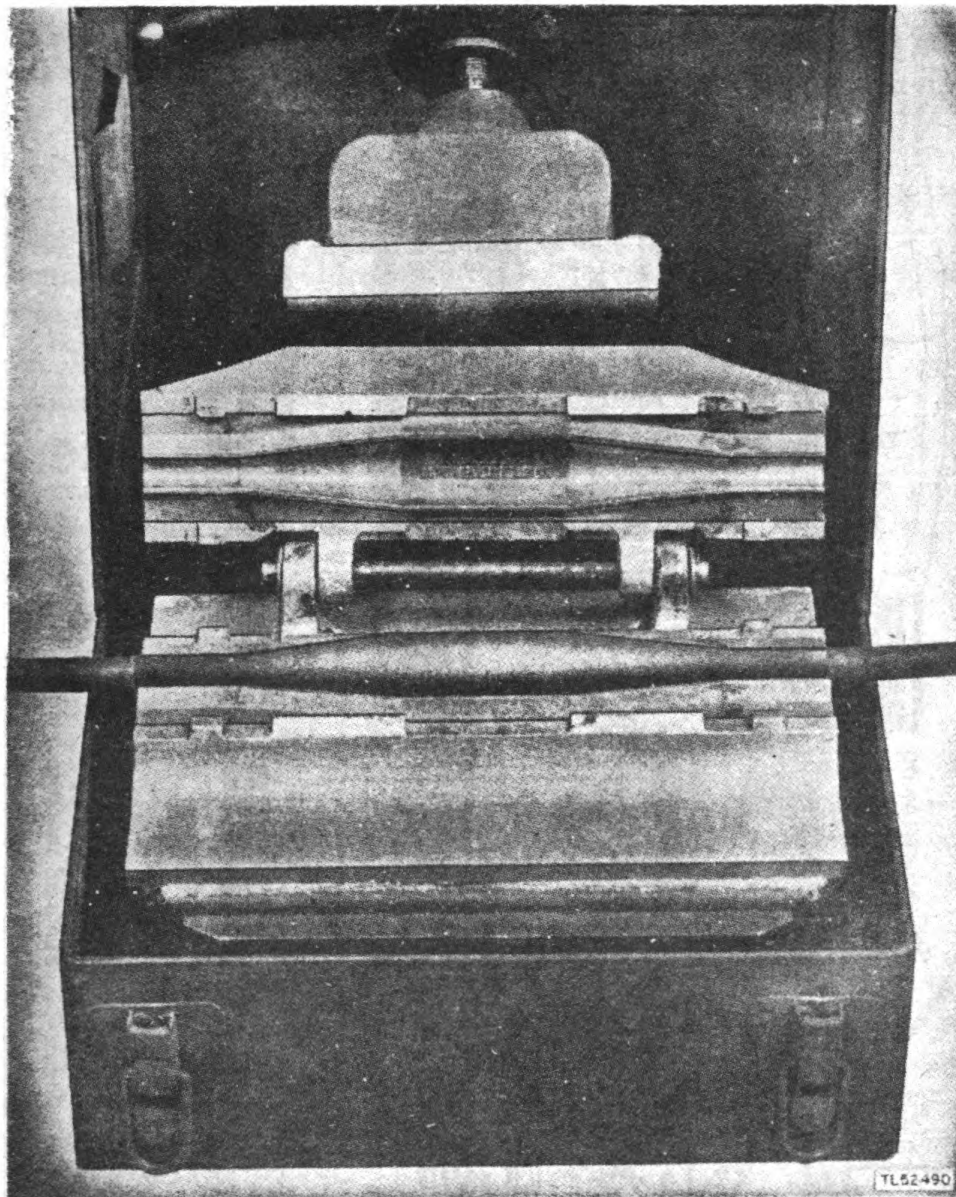
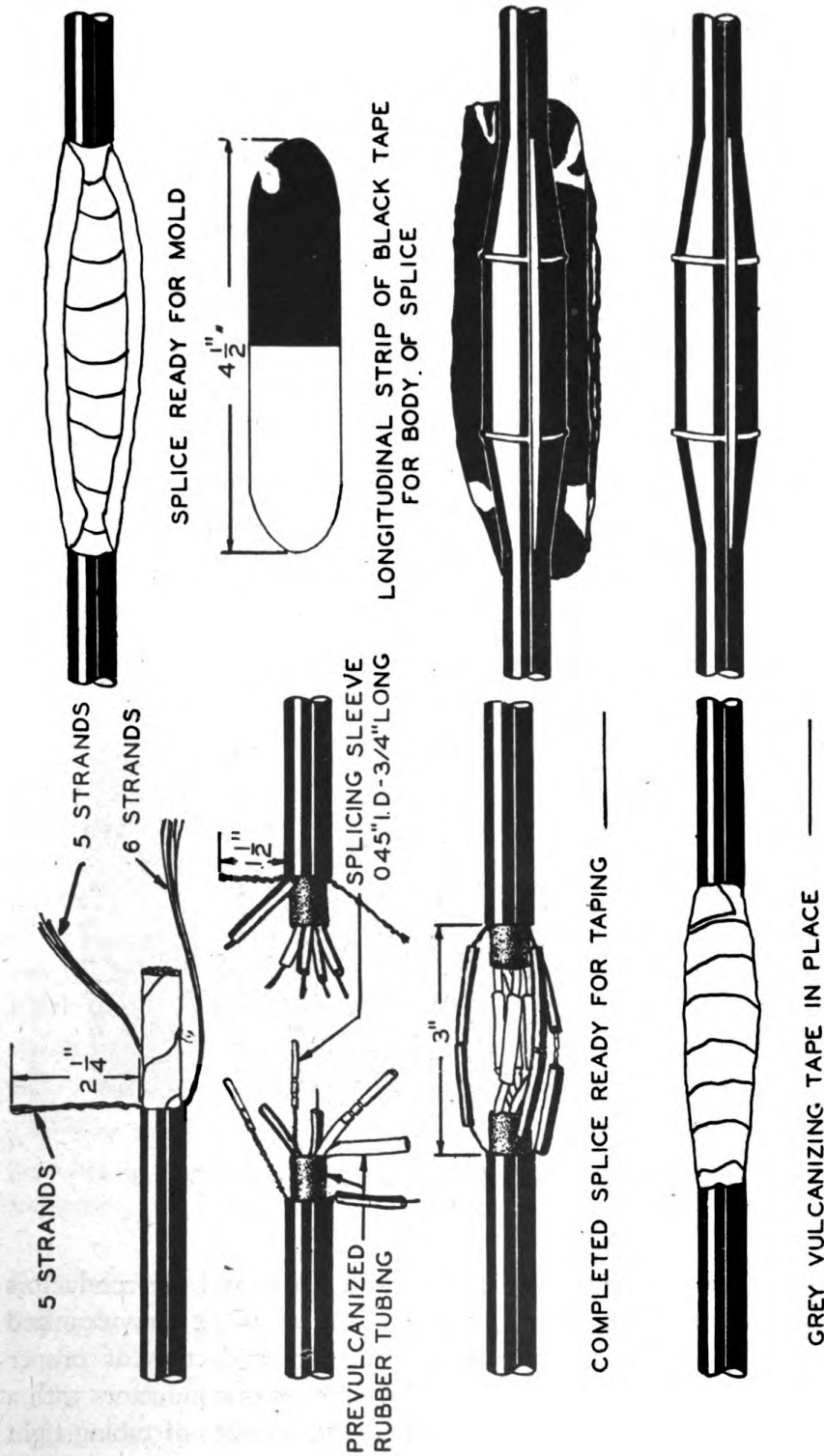


Figure 11. Completed splice in Vulcanizing Equipment **TE-54-B** or **TE-55-B**.

(3) Remove the bedding between the steel braid wires and the conductors flush with the jacket. Place two $\frac{1}{2}$ -inch sections of white prevulcanized rubber tubing over each of the two groups of four conductors. If proper size rubber tubing is not available, wrap the two groups of conductors with a double thickness of gray rubber tape. Butt these two sections of tubing tight against the outer jacket of the cable. These two tubes protect the insulation of the conductors against damage from the steel strands of the braid wire.

b. Splicing Conductors. Splice through each of the four conductors with a Nicopress sleeve No. 3-045B insulated with a rubber tube of proper



TL 52491

Figure 12. Standard vulcanized splice for Cable WC-548.

size. Do not disturb the normal lay of the conductors or fail to arrange the rubber tubing in such a way as to extend beyond the ends of the splicing sleeve and over the insulation of the conductors.

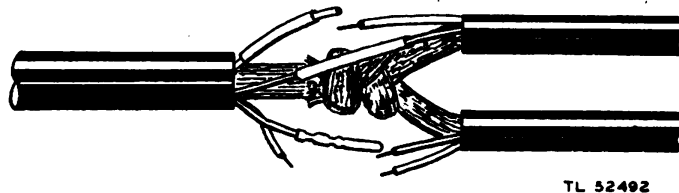
c. **Splicing Steel Braid Strands.** Splice the three groups of twisted steel braid through with the Nicopress sleeve No. 3-045B insulated with a rubber tube of the proper size. Make certain that when tension is applied to the splices no strain will be placed on the conductors and that all strain will be equal on the steel braid strands. The body of the completed splice should not be over 3 inches in length.

d. **Vulcanizing Splice.** (1) Clean and buff the cable jacket and apply vulcanizing cement as prescribed for Cables WC-534 and WC-535.

(2) Tape the splice with gray insulating tape and black vulcanizing tape in the same manner that is prescribed for Cables WC-534 and WC-535, using the mold designed for Cable WC-548 as a guide to determine the amount of tape to apply.

(3) Vulcanize as prescribed for Cable WC-534.

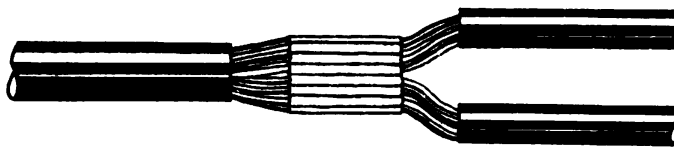
10. POTHEADING.



TL 52492

Figure 13. Spliced conductors for potheading.

a. Figure 13 illustrates the assembly of wires for potheading two 5-pair cables to a 10-pair cable. Complete the splicing of one 5-pair cable, and assemble it in insulating tubings before starting the other.

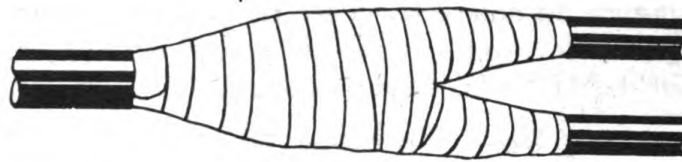


TL 52493

Figure 14. Assembly of pothead.

b. Figure 14 shows the tubing insulated sleeves assembled in the pothead. Bind the whole assembly with gray inside insulating rubber tape, leaving no conductor wires or insulation exposed.

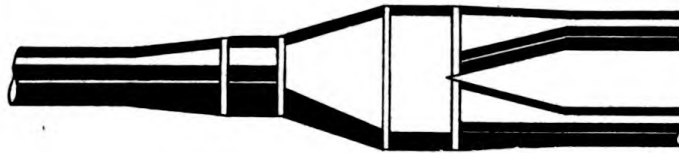
c. Refer to color schedule No. 3, paragraph 12c.



TL 52494

Figure 15. Taped pothead.

d. Apply rubber cement to roughened part of cable jackets and allow it to dry (fig. 15). Apply black outside vulcanizing rubber tape. Wrap it tightly to keep out air, and build it up to approximately the shape of the mold.



TL 52495

Figure 16. Vulcanized pothead.

e. Figure 16 shows the completed pothead splice. Vulcanizing procedure is the same as that described in paragraph 8b.

11. OPERATING PRECAUTIONS.

- a.** Check conductors for good mechanical and electrical connection.
- b.** Apply rubber tape so that the wrap is smooth and compact.
- c.** There must be a complete fusion of the old and new rubber.
- d.** Trim the fins of excess rubber flash with scissors or a sharp knife. **DO NOT TEAR OFF FINS.**
- e.** Allow the splice to cool before trimming the fins away.
- f.** Carefully trim away end flashes, if any.
- g.** Do not flex the splice until it is thoroughly cool.

12. COLOR SCHEDULES FOR SPLICE CONNECTIONS.

a. Color Schedule No. 1.

Cable 1	Splice	Cable 2
CABLE WC-534 (5-PAIR)	Pair 1 { Red to red..... } { Natural to natural..... }	CABLE WC-534 (5-PAIR)
	Pair 2 { White to white..... } { Natural to natural..... }	
	Pair 3 { Blue to blue..... } { Natural to natural..... }	
	Pair 4 { Black to black..... } { Natural to natural..... }	
	Pair 5 { Green to green..... } { Natural to natural..... }	

NOTE: When old style cables (with one pair red-natural and all other pairs white-natural) are used, trace each wire for proper pairing before splicing.

b. Color Schedule No. 2.

Cable 1	Splice	Cable 2
CABLE WC-535 (10-PAIR)	Pair 1 { Red to red..... } { Natural to natural..... }	CABLE WC-535 (10-PAIR)
	Pair 2 { White to white..... } { Natural to natural..... }	
	Pair 3 { Blue to blue..... } { Natural to natural..... }	
	Pair 4 { Black to black..... } { Natural to natural..... }	
	Pair 5 { Green to green..... } { Natural to natural..... }	
	Pair 6 { Red to red..... } { White to white..... }	
	Pair 7 { Red to red..... } { Green to green..... }	
	Pair 8 { Blue to blue..... } { White to white..... }	
	Pair 9 { Black to black..... } { Green to green..... }	
	Pair 10 { Green to green..... } { White to white..... }	

c. Color Schedule No. 3.

Cable 1		• Splice	Cable 2		
CABLE WC-534 (5-PAIR)	Pair 1	{ Red to red..... Natural to natural..... }	Pair 1	CABLE WC-535 (10-PAIR)	
	Pair 2	{ White to white..... Natural to natural..... }	Pair 2		
	Pair 3	{ Blue to blue..... Natural to natural..... }	Pair 3		
	Pair 4	{ Black to black..... Natural to natural..... }	Pair 4		
	Pair 5	{ Green to green..... Natural to natural..... }	Pair 5		
Cable 2		Splice			
CABLE WC-534 (5-PAIR)	Pair 1	{ Red to red..... Natural to natural..... }	Pair 6		
	Pair 2	{ White to red..... Natural to green..... }	Pair 7		
	Pair 3	{ Blue to blue..... Natural to white..... }	Pair 8		
	Pair 4	{ Black to black..... Natural to green..... }	Pair 9		
	Pair 5	{ Green to green..... Natural to white..... }	Pair 10		

13. SPECIAL OPERATING INSTRUCTIONS.

a. When using the cable repair and splicing kit in cold climates, observe the following precautions:

- (1) Keep the vulcanizer unit covered to reduce heat loss during both the preparatory heating period and the vulcanizing period.
- (2) Place rubber tapes and rubber cement in the vulcanizer kit box to keep them soft and pliable for working.
- (3) In extreme cold, preheat the cable to minimize heat loss down the cable leads.

b. Always operate the vulcanizer in a **dry** spot. Moisture entering the unit may cause a short circuit.

SECTION III

FUNCTIONING OF PARTS

14. GENERAL.

The purpose of the vulcanizer is to produce a waterproof splice or jacket repair on a cable by applying vulcanizing heat to a raw rubber wrapping at the splice or area to be repaired. The vulcanizer is set for an operating temperature of 305° F. This produces sufficient heat for proper curing of the rubber provided the curing times specified are followed.

15. HEATER UNITS.

a. **Vulcanizing Equipments TE-54-A and TE-55-A.** These equipments are fitted with 250-watt cartridge-type heaters for 115-volt operation. One heater unit is installed in each half of the vulcanizer unit, making the total power consumption 500 watts. Each heater unit is $\frac{5}{8}$ inch in diameter and $5\frac{1}{2}$ inches long. The resistance winding is of asbestos-insulated, No. 16-gauge, stranded, nickel-manganese wire. The winding is completely surrounded and firmly packed with insulating heat-resistant ceramic material. The entire cartridge is surrounded by a brass sheath.

b. **Vulcanizing Equipments TE-54-B and TE-55-B.** These equipments are provided with two disk-type heaters, one installed in each half of the vulcanizing unit. The bottom heater unit has a dissipation of 450 watts at 115 volts, and the top unit dissipates 250 watts at 115 volts. The units are in the form of flat disks, each $3\frac{1}{2}$ inches in diameter and $\frac{3}{8}$ inch thick. The heater winding consists of chromalox units of nichrome wire embedded in insulating heat-resistant ceramics. The bottoms, sides, and edges are incased in metal sheathing. The unsheathed portion of the unit is placed in contact with the heater plate of the vulcanizer.

16. THERMOSWITCH.

a. **Vulcanizing Equipments TE-54-A and TE-55-A.** Two thermostats are installed in the vulcanizing units of these equipments, one in each vulcanizer plate. The purpose of these switches is to keep the curing temperature constant during the curing period. The switches consist of a bimetallic strip and a pair of contacts. One contact is attached to the free end of the bimetallic strip, and the other is solidly mounted on the supporting frame of the switch. The switch may be adjusted for different temperatures by a screw at one end of the unit.

b. Vulcanizing Equipments TE-54-B and TE-55-B. Only one thermoswitch is provided in these equipments. This thermoswitch is mounted under the lower heating plate. It is similar to the thermoswitch described in subparagraph **a** above. Adjustment for this switch is made through a hole in the right side of the bottom heater unit.

SECTION IV

MAINTENANCE

NOTE: Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Service Forces will be reported on W.D., A.G.O. Form No. 468 (Unsatisfactory Equipment Report). If Form No. 468 is not available, see TM 38-250. Failure or unsatisfactory performance of equipment used by Army Air Forces will be reported on Army Air Forces Form No. 54 (unsatisfactory report).

17. SERVICING AND REPAIR.

a. Heating Units and Control. (1) When heater units fail while being used in the field, the equipment should be sent to a higher echelon repair unit. Make no attempt to replace the unit in the field.

(2) When thermostitch controls fail in the field, the equipment should be sent to a higher echelon repair unit. Make no attempt to replace the unit in the field.

b. Temperature Adjustment. (1) VULCANIZING EQUIPMENTS TE-54-A AND TE-55-A. To adjust the thermostitches on these equipments, proceed as follows:

(a) Remove the cotter pins from the upper support bar on which the clamp bolts hinge.

(b) Slide the upper support bar out through the hole in the side of the case, and raise the lower vulcanizer half.

(c) Remove the wiring shields on the upper and lower halves of the vulcanizer unit, exposing the thermostitch adjusting screws.

(d) The proper setting for a temperature of 300° F is midway between the two extremes to which the screw may be adjusted.

(e) To lower the operating temperature, turn the screw on the two switches in a counterclockwise direction. To raise the operating temperature, turn the screws in a clockwise direction. Make identical adjustments on both halves of the vulcanizer unit to keep a temperature balance.

(2) VULCANIZING EQUIPMENTS TE-54-B AND TE-55-B. Temperature adjustment is made on these equipments as follows:

(a) The thermostitch adjusting screw is reached through a small hole on the right side of the heater unit. Use a small screwdriver to adjust the screw through this hole.

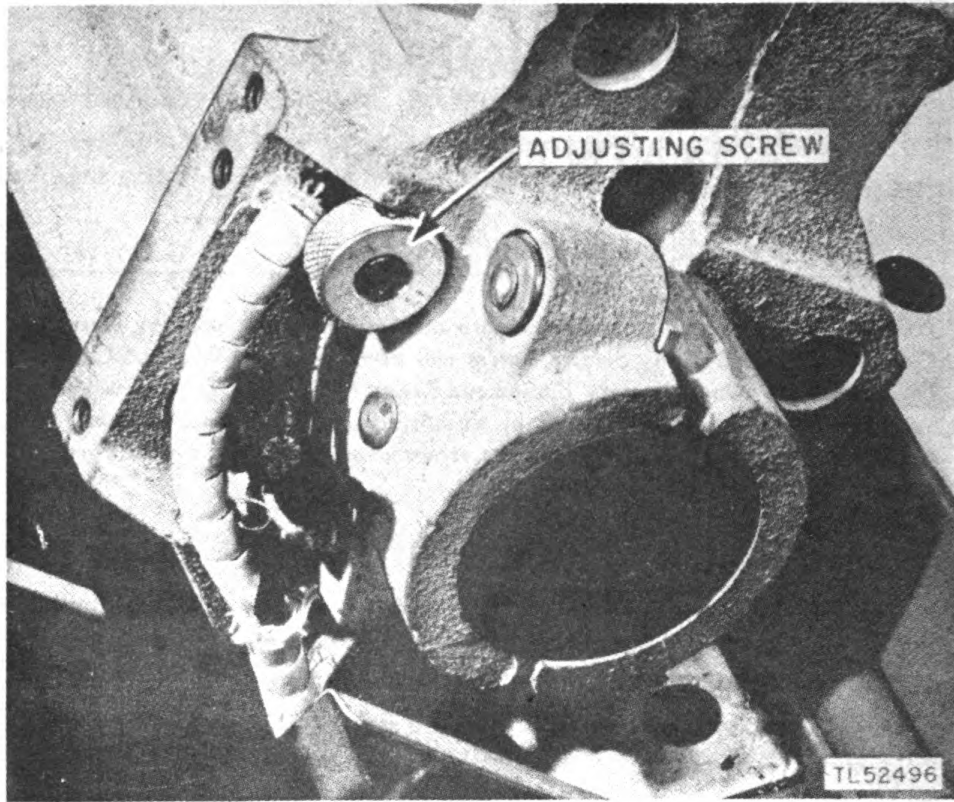


Figure 17. Thermoswitch adjustment on Vulcanizing Equipments TE-54-A and TE-55-A.

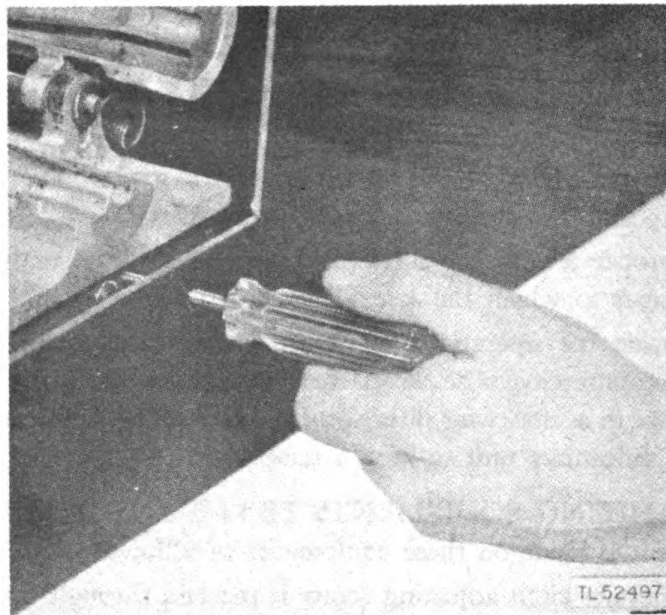


Figure 18. Thermoswitch adjustment on Vulcanizing Equipments TE-54-B and TE 55 B.

(b) Turn the adjusting screw clockwise to lower the operating temperature and counterclockwise to raise the operating temperature. The adjusting screw regulates the temperature of both the top and bottom plates. The available temperature range is from 250° F to 350° F.

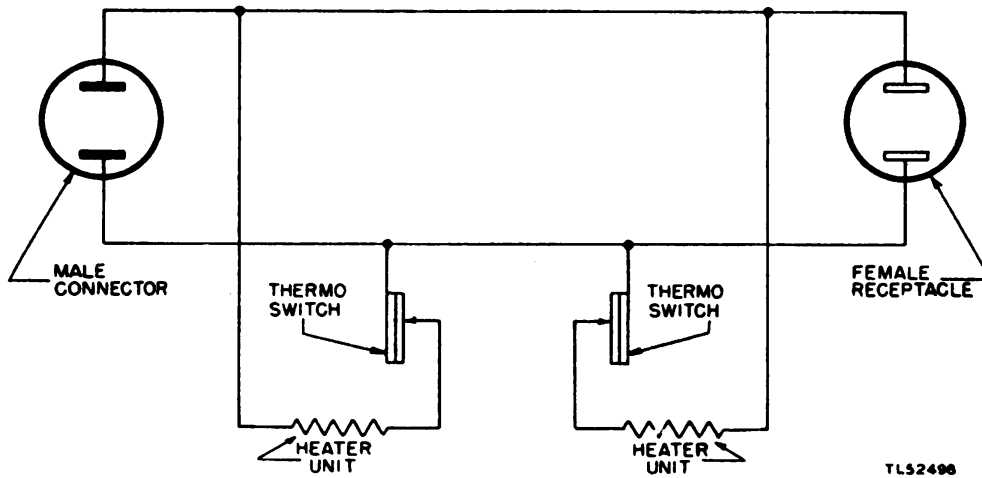


Figure 19. Vulcanizing Equipments TE-54-A and TE-55-A, wiring diagram.



Figure 20. Vulcanizing Equipments TE-54-B and TE-55-B, wiring diagram.

18. MOISTUREPROOFING AND FUNGIPROOFING.

Moistureproofing and fungiproofing treatment of this equipment is not required.

28 19. MAINTENANCE PARTS LIST FOR VULCANIZING EQUIPMENT TE-54 (*).

Ref symbol	Signal Corps stock No	Name of part and description	Quan per unit	Run-ning spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
42	6F794	CHEST CH-94.	1						*
31	6N7531	SOLDER M-31.	1						*
18	6R15650	SCREWDRIVER TL-16.	1						*
26	6Q60229	KNIFE TL-29.	1						*
28	6R24620	SOLDERING IRON TL-120.	1						*
24	6R4626	PLIERS TL-126.	1						*
	6R39217	TOOL TL-190.	1						*
29	6Q10051.1	BOARD, test: linen.	1						*
19	6Z1558	BRUSH, varnishing: 1" wide.	1						*
30	6G184.1	CARBON TETRACHLORIDE: 8 oz.	1						*
32	6G200.1	CEMENT: 1/4 pt container.	20						*
39	6G355.1	DRESSING, mold.	5						*
27	6Z4837	GLOVES, leather: welding.	1						*
14	6Q60616	KNIFE, skinning.	1						*
	6R1078	MOLD.	1						*
17	6R4730-6	PLIERS, diagonal.	1						*
21	6R4798	PLIERS, parrot-nose.	1						*
	6R38355	ROLL, tool: canvas.	1						*
37	6Z8040	TUBING, rubber.	500						*
38	6Z8042	TUBING, rubber.	500						*
23	6R9906	RULE, steel: 6".	1						*
15	6R13514	SCISSORS: 6".	1						*
25	6R14015	SCRAPER, enamel.	1						*
22	6R21005	SHARPENER, knife.	1						*

33	6N5617	SLEEVE, splicing.	5							
34	6N5619	SLEEVE, splicing: copper.	10							
35	6N8596	TAPE, inside: 1/2 lb rolls.	15							
36	6N8597	TAPE, outside: 1 lb rolls.	20							
16	6R3600	TOOL, roughing.	1							
	6R47329	VULCANIZER.	1							
4	6R47329/2	CORD: with plug.	1							
	6Q51206	HANDLE, socket wrench.	1							
2	6R44502	TRAY, steel.	1							
1	6R47252	VULCANIZER ASSEMBLY.	1							
	6R47329/4	WRENCH, socket.	1							

* Indicates stock available.

20. MAINTENANCE PARTS LIST FOR VULCANIZING EQUIPMENT TE-55-(*) .

Ref symbol	Signal Corps stock No	Name of part and description	Quan per unit	Run-ning spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
42	6F775	CHEST CH-75.	1						*
31	6N7531	SOLDER M-31.	1						*
18	6R15650	SCREWDRIVER TL-16.	1						*
26	6Q60229	KNIFE TL-29.	1						*
28	6R24620	SOLDERING IRON TL-120.	1						*
24	6R4626	PLIERS TL-126.	1						*
	6R39217	TOOL TL-190.	1						*
29	6Q10051.1	BOARD, test: linen.	1						*
19	6Z1558	BRUSH, varnishing: 1" wide.	1						*
30	6G184.1	CARBON TETRACHLORIDE: 8 oz.	1						*
32	6G200.1	CEMENT: 1/4 pt container.	40						*
39	6G355.1	DRESSING, mold.	20						*
27	6Z4837	GLOVES, leather: welding.	1						*
14	6Q60616	KNIFE, skinning.	1						*
	6R1078	MOLD.	1						*
17	6R4730-6	PLIERS, diagonal.	1						*
21	6R4798	PLIERS, parrot-nose.	1						*
	6R38355	ROLL, tool: canvas.	1						*
37	6Z8040	TUBING, rubber.	1000						*
38	6Z8042	TUBING, rubber.	1000						*
23	6R9906	RULE, steel: 6".	1						*
15	6R13514	SCISSORS: 6".	1						*
25	6R14015	SCRAPER, enamel.	1						*
22	6R21005	SHARPENER, knife.	1						*

33	6N5617	SLEEVE, splicing.	10				
34	6N5619	SLEEVE, splicing: copper.	20				
35	6N8596	TAPE, inside: 1½ lb rolls.	20				
36	6N8597	TAPE, outside: 1 lb rolls.	100				
16	6R3600	TOOL, roughing.	1				
	6R47329	VULCANIZER.	1				
4	6R47329/2	CORD: with plug.	1				
	6Q51206	HANDLE, socket wrench.	1				
2	6R44502	TRAY, steel.	1				
1	6R47252	VULCANIZER ASSEMBLY.	1				
	6R47329/4	WRENCH, socket.	1				

* Indicates stock available.

23719-P-44

4160

29 December 1944

