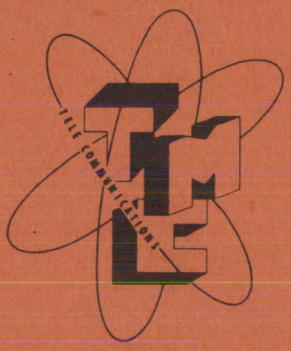
INSTRUCTION BOOK

for

# ANTENNA TUNING UNIT

# MODEL TAC



THE TECHNICAL MATERIEL CORPORATION
Mamaroneck, New York

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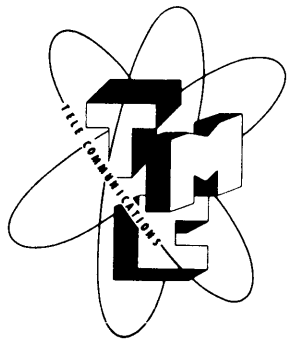


THE TECHNICAL MATERIEL CORPORATION
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# WARNING!

THE VOLTAGES USED IN THIS EQUIPMENT ARE SUFFICIENTLY HIGH TO ENDANGER LIFE: PRECAUTIONS HAVE BEEN OBSERVED IN THE DESIGN TO SAFEGUARD THE OPERATING PERSONNEL. POWER SHOULD BE REMOVED COMPLETELY AND THE HIGH VOLTAGE CAPACITORS IN THE POWER SUPPLY DISCHARGED.

CHANGE NO. 1

# INSTRUCTION BOOK CHANGE NOTICE

Date October 4, 1963

Manual affected: Antenna Tuning Unit Model TAC IN 2024/181

Page 1-3, 2-1 Section 1, paragraph 3h.

Change antenna current thermocouple meter "0 to 5 amp"

Page 4-14 Parts List Change M100 RF meter to read "0-5 amps"

SHOULD ADDITIONAL COPIES OF THIS CHANGE NOTICE BE REQUIRED, PLEASE CONTACT:

THE TECHNICAL MATERIEL CORP., 700 Fenimore Road, Mamaroneck, New York

Attn.: Director of Engineering Services

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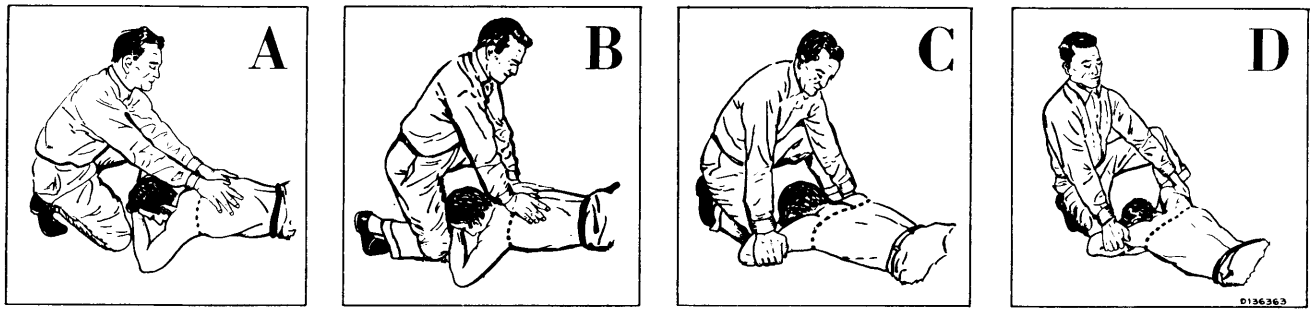
# LIST OF ILLUSTRATIONS

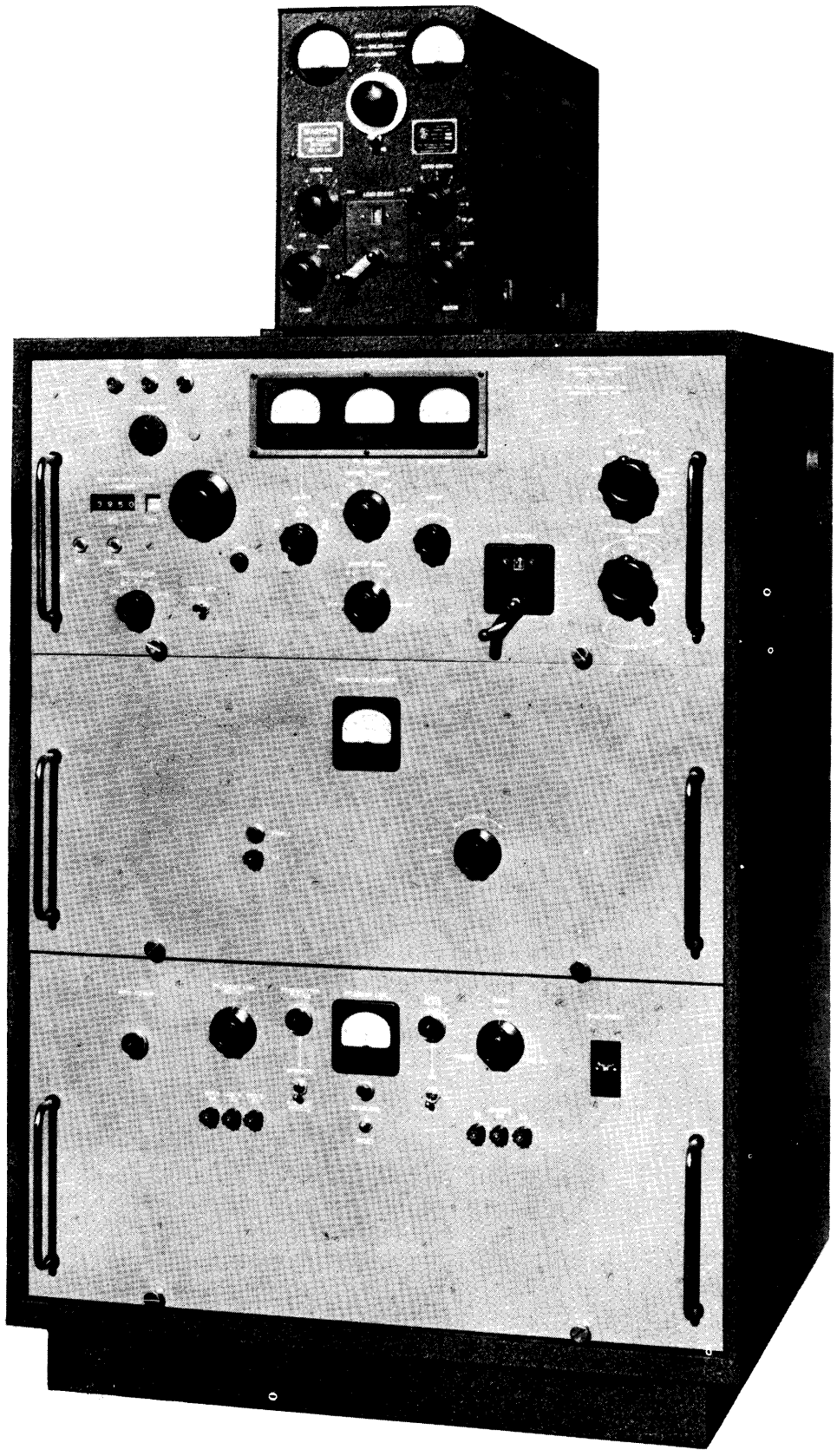
# FIRST AID IN CASE OF ELECTRIC SHOCK

1. PROTECT YOURSELF with dry insulating material.
2. BREAK THE CIRCUIT by opening the power switch or by pulling the victim free of the live conductor. DON'T TOUCH THE VICTIM WITH YOUR BARE HANDS until the circuit is broken.
3. START ARTIFICIAL RESPIRATION IMMEDIATELY, SECONDS COUNT. Do not wait to look for help, to loosen clothing, to warm the victim, or to apply stimulants.




4. LAY VICTIM ON HIS STOMACH, preferably with head downhill.
5. CHECK MOUTH FOR OBSTRUCTIONS, remove foreign objects, pull tongue forward.
6. PLACE VICTIM'S FOREHEAD on his crossed hands, face down.
7. KNEEL AT VICTIM'S HEAD on either knee. See (A)
8. PLACE HANDS, fingers spread with thumbs about two inches apart, heels of hands below line connecting armpits. See (A)
9. WITH ELBOWS STRAIGHT, ROCK FORWARD slowly until arms are vertical. See (B) Do not apply more than 35 pounds pressure.
10. ROCK BACK SLOWLY to release pressure.
11. GRASP VICTIM'S ARMS just above elbows and continue backward. See (C)
12. LIFT ARMS until tension is felt. See (D)
13. LOWER ARMS to complete the cycle.
14. AFTER TWO SECONDS, START AGAIN with step 6.
15. REPEAT THE CYCLE 12 to 15 times per minute.
16. WHILE ARTIFICIAL RESPIRATION IS CONTINUED, HAVE SOMEONE ELSE:
    (a) Loosen the victim's clothing. (b) Summon medical aid.
    (c) Keep the victim warm.
17. DON'T GIVE UP. Continue without interruption until the victim is breathing without help or is certainly dead.
    Four hours or more may be required.
18. REMAIN IN POSITION after victim revives. Be ready to resume artificial respiration if necessary.
19. DO NOT GIVE LIQUIDS WHILE VICTIM IS UNCONSCIOUS.


*Figur 1-1. M d l TAC-1, Ant nna Tuning Unit*



*Figur 1-2. The Ant nna Tuning Unit Mounted n TMC M del GPT-750 Radio Transmitt r*

# SECTI N I
# GENERAL DESCRIPTI N

### 1. PURPOSE AND BASIC PRINCIPLES.

The Antenna Tuning Unit, Model TAC-1 has been designed to couple the output of the GPT-750 transmitter, or any transmitter with a nominal output impedance of 70 ohms, to balanced or unbalanced loads from 50 to 1200 ohms. The unit covers the frequency range of 2 to 18 mcs. with very little insertion loss and will, in addition, cover the range of 18 to 30 mcs. at slightly lower efficiencies. Provisions are also included in the unit which will permit operation down to 1.7 mcs. with a balanced load and 1.5 mcs. with an unbalanced load. These loads are taken to mean antennas or transmission lines.

The unit consists of a tapped inductance tuned by a split stator capacitor. Portions of the inductance are shorted out as the frequency of operation increases. A variable contact on the inductance serves to vary the ratio of inductance in the tank circuit to the inductance in the load circuit hence matching the load to the transmitter.

### 2. DESCRIPTION OF THE UNIT

The entire unit is housed in a steel case with a removable cover. However, the unit is so designed that all connections may be made without removing the cover. The unit is 9⅛ in. wide by 14½ in. high by 22 in. long and weighs approximately 35 pounds.

Mounting channels are provided with holes appropriately spaced to match transmitter studs. All controls, and meters for monitoring the antenna current are located on the front panel. Insulated terminal posts which are easily reached through apertures on the rear of the cover permit connections to balanced or unbalanced loads. Particular care has been taken to insulate the unit from the high voltages which may occur in such a device.

### 3. REFERENCE DATA.

a. FREQUENCY RANGE.

2 to 30 mcs. in seven bands, balanced/unbalanced loads.

1.7 to 2 mcs. balanced load using additional vacuum capacitor furnished.

1.5 to 2 mcs. unbalanced load using shorting bar furnished.

b. INPUT IMPEDANCE.

Nominally 70 ohms.

c. OUTPUT IMPEDANCE.

Continuously adjustable 50 to 1200 ohms.

d. INPUT CONNECTIONS.

UHF series UG-296/U receptacle. (Same as SO-239 but with Teflon insert.)

e. OUTPUT CONNECTIONS.

Insulated stand-offs at rear of unit.

f. EFFICIENCY.

Better than 80% in the range 2 to 18 mcs. Slightly lower efficiency in the range 18 to 30 mcs.

g. POWER.

Designed for 1000 watts continuous carrier.

h. FRONT PANEL CONTROLS.

COUPLING switch
BAND switch
BAL/UNBAL LOAD switch
GND/UNGND ROTOR switch
LOAD ADJUST indicator
TUNING dial
ANTENNA CURRENT thermocouple meters 0 to 3 amp.

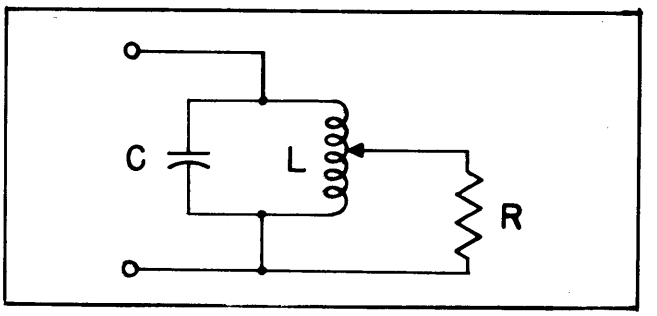
i. COMPONENTS AND CONSTRUCTION.

All parts of the unit are manufactured in accordance with JAN/MIL specifications wherever practicable.

# SECTION II
# THEORY OF OPERATION

### 1. THEORY OF OPERATION.

In coupling a transmitter to a transmission line or antenna, the basic problem is one of impedance matching. The coupling device introduced between the transmitter and the load should be capable of transforming the impedance of the load, so that the transmitter output tube is working into the proper resistance. The tube is working into the proper resistance when the final tank circuit is tuned to resonance, and the loading is such that the tube is drawing rated plate current. The optimum value of load resistance is, therefore, reached




*Figur 2-1*

when the coupling is adjusted to bring the plate current to the normal operating value.

It is the property of a tuned parallel circuit that a resistive load tapped across a portion of the circuit is equivalent to a higher value of resistance tapped across the whole circuit.

Since the unloaded resonant impedance of the L/C combination is considerably higher than the load R, it is possible to match a range of impedances in this manner.

When the transmission line or antenna possesses a reactive component, in addition to the resistive component, the reactive component being either inductive or capacitive, they will appear as a series combination as shown in Figure 2-2.

This series combination may be transformed by analytical methods to it's equivalent parallel combination as in Figure 2-3.

The reactive portion of the load is reflected into the tuned circuit along with the resistive portion. If the load has an equivalent parallel combination of an inductive reactance, it will detune the tank circuit off resonance, and the capacitance of C must be increased to bring the tank back to resonance.

If the load has an equivalent capacitive reactance, C must be decreased to bring the tank back to resonance. Therefore, it is evident that the reactance of the load is balanced out by the tuning condenser in bringing the system to true resonance. When this resonance has been obtained, the load R is transformed to a higher value by the action of the tuned resonant circuit.

Figure 2-4 is a simplified schematic diagram of the Antenna Tuning Unit and a transmitter final. The transmitter final is link coupled to the unit input through a short length of RG-11/U coaxial cable. The coupling coil in the unit electro-magnetically couples to the tank circuit, composed of L1, L2, C1 and C2, which are tuned to the resonant frequency. The load is connected to the unit through a set of wheels which ride on the inside edges of L1 and L2. These wheels are on a common shaft and are positioned by the LOAD ADJUST control. Since the coils L1 and L2 are oppositely wound, the wheels move in or out from the ground point symetrically. It is these wheels which tap the coils properly for the desired impedance transformation. Note that this is a balanced system providing properly phased currents to a balanced load. In the event of an unbalanced load, one half of the system is used.

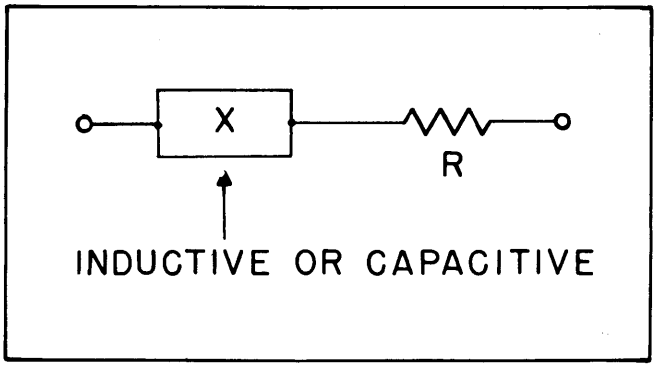



*Figure 2-2*

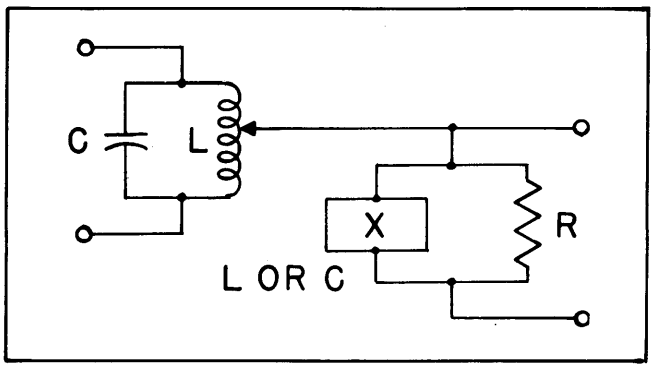
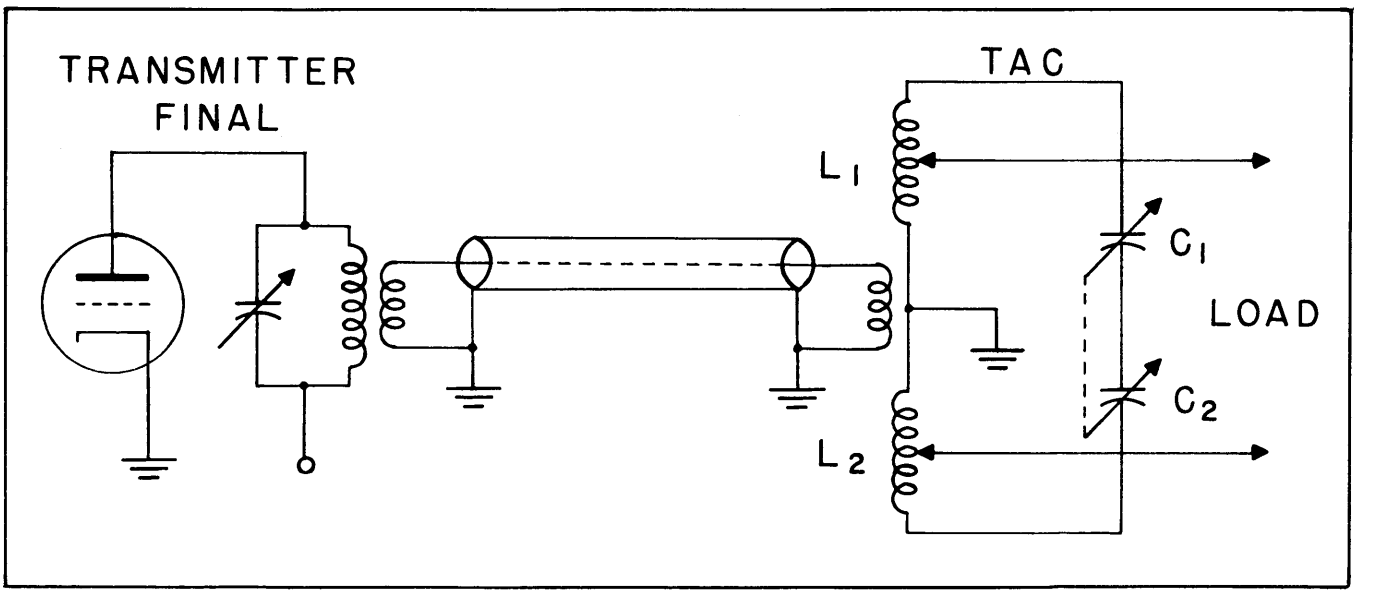



*Figure 2-3*




*Figur 2-4*

# SECTI N III
# INSTALLATI N AND PERATI N

## 1. INSTALLATION.

a. UNPACKING.

The Antenna Tuning Unit is designed for ease of installation and minimum effort in operation. The unit is packed, and preserved when required, in it's individual container. The equipment should be carefully unpacked and a close visual inspection made to ascertain any physical damage due to rough handling during shipment.

A UHF type plug PL-259A has been provided as a loose item, and is packed in a bag attached to the front panel.

b. MOUNTING.

The Antenna Tuning Unit is fastened securely to the top of a transmitter by means of four wing nuts. A short length of RG-11/U coaxial cable serves to connect the output of the transmitter to the input of the unit. The input terminal has been placed on the rear left corner of the unit so that the connecting cable does not interfere with transmitter operation. The input jack is a UG-296/U connector with Teflon insulation capable of withstanding high voltage surges.

## 2. ELECTRICAL CONNECTIONS.

After the unit has been installed on the transmitter, attach the load. The load terminal connections on the rear of the unit are shown in Figure 3-1. It is not necessary to remove the cover to attach the load. Ample holes in the rear of the cover give easy access to the connectors. Note the difference between BALANCED and UNBALANCED load terminals as indicated by arrows. When working into an unbalanced load, CONNECT NOTHING TO THE LEFT HAND MAIN TERMINAL.

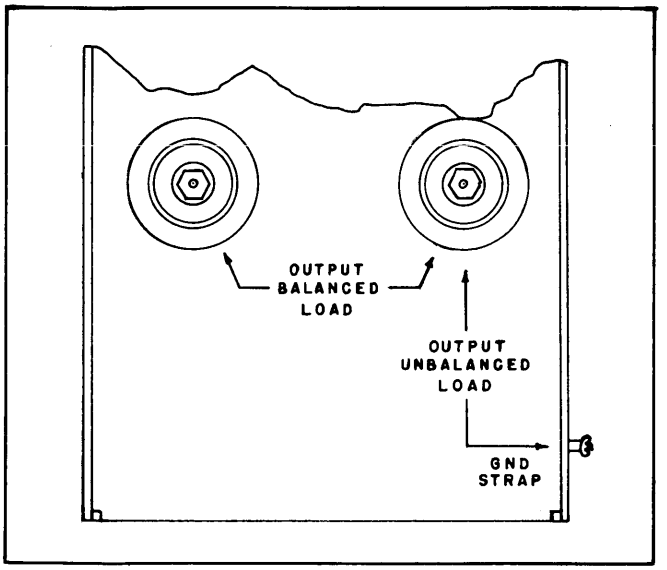



*Figure 3-1*

## 3. OPERATION AND CONTROLS.

All controls are identified by front panel markings for ease of identification. Figure 1-1 clearly shows all controls necessary for operation of the unit.

a. CONTROL FUNCTIONS.

The COUPLING switch allows for selection of the number of turns in the coupling coil. There are 8 positions from MAX to MIN. The proper setting of the COUPLING switch is a function of frequency and may be found in the tuning charts.

In general, a low transmitter plate final current reading indicates insufficient coupling, and the COUPLING switch should be rotated toward MAX in steps of one until plate current has reached it's normal value when the transmitter is tuned to resonance. Conversely, a plate current meter reading which is above normal is an indication of over-coupling, and the COUPLING switch should be rotated toward MIN until the proper plate current is observed when the transmitter is tuned to resonance.

The BAND SWITCH allows for the selection of tank inductance, so that the frequency range is covered by the tuning capacitor. There are seven positions with LO indicating the lowest frequency and HI indicating the highest frequency. Proper positioning of this switch is a function of frequency and may be obtained in the tuning charts.

The TUNING control is a calibrated control which serves to vary the tank capacity of the unit. It tunes to resonance the inductance selected by the BAND switch. Approximate settings for this dial may be obtained by referring to the tuning charts.

The LOAD ADJUST control serves to tap the tank circuit at the proper point for optimum impedance matching. It's associated counter gives the relative position of the wheels with respect to the ground end of the circuit. Approximate settings for the various loads may be found in the tuning charts.

The LOAD switch serves to employ either the total tank for balanced loads or half the tank for unbalanced loads. Set the switch to BAL for balanced loads and UNBAL for unbalanced loads.

The ROTOR switch serves to ground or unground the rotor of the tuning capacitor. In general, set to GND for unbalanced loads and UNGND for balanced loads. However, it may be possible that at the higher frequencies, 24 to 30 mcs., better performance may be obtained if the ROTOR switch is set to UNGND. This is, in effect, placing both halves of the tuning capacitor in series across that portion of the tank coil which is being tuned. This is advantageous at the higher frequencies since the condenser minimum has been halved; hence, the tank inductance may be increased, resulting in a better L/C ratio.

The ANTENNA CURRENT is monitored by two external thermocouple ammeters, each being in series with the output load connections. As the arrows indicate, both meters are used for balanced loads, each meter indicating the current in it's leg of the load. In a truly balanced load, magnitude being equal, both meters will indicate identical currents. This will seldom happen as a truly balanced load is rarely obtained. As the single arrow indicates, only the left hand meter is used for unbalanced loads. Therefore, for unbalanced loads disregard any deflection of the right hand meter.

It should be noted that these meters are to serve only as indicating devices. Their accuracy is acceptable at the lower frequencies, but little reliance is to be placed on their indications as a measure of absolute load at the higher frequencies. They are not, in any case, a quantitative indication of output.

**4. TUNING PROCERURE.**

**CAUTION**

BEFORE PUTTING FULL POWER ON THE TRANSMITTER, CHECK THAT THE FOLLOWING HAS BEEN DONE CORRECTLY.

a. PROPER TRANSMITTER TUNING ACCORDING TO THE TRANSMITTER TUNING CHARTS.

b. PROPER ANTENNA TUNING UNIT CONTROL SETTINGS AS OBTAINED FROM THE UNIT TUNING CHARTS.

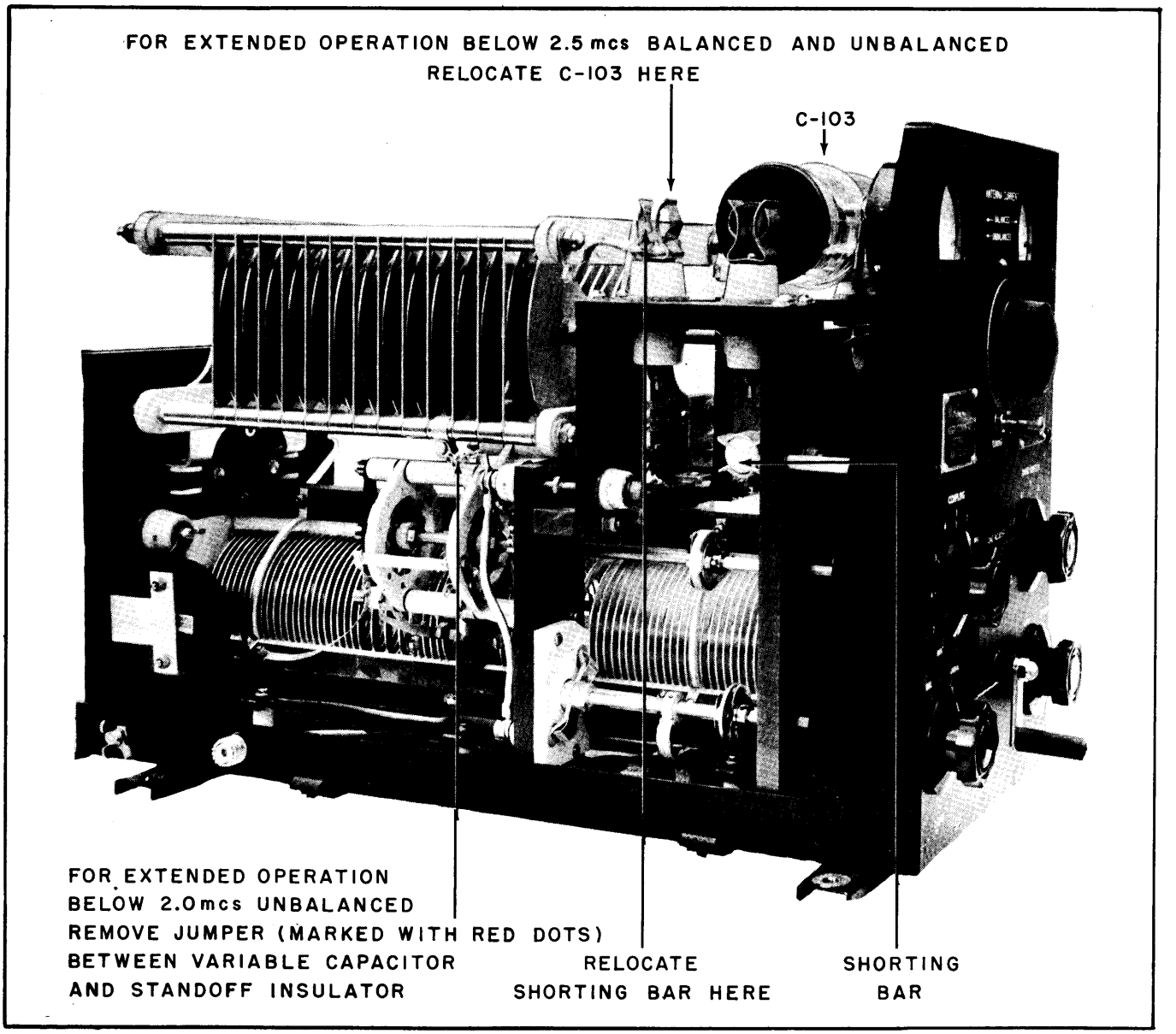



*Figure 3-2. Extended Fr quency Range Operati n*

In any operation of the Antenna Tuning Unit, the frequency of operation and nature of the load are known.

For a balanced load, set
LOAD switch to BAL
ROTOR switch to UNGND

For an unbalanced load, set
LOAD switch to UNBAL
ROTOR switch to GND
(except as noted in 3.a.)

The tuning charts contain information for the approximate settings of the BAND, TUNING, LOAD ADJUST and COUPLING controls.

The charts are set up in 1000 kc. steps from 2000 to 30,000 kcs. and for loads of 70, 300, 600 and 1200 ohms.

Any variation from chart frequency and load will require an interpolation of the tables for the desired frequency and load. To achieve this, set controls to the chart frequency nearest to the desired frequency. Then alter the TUNING and LOAD ADJUST controls for optimum output.

### 5. EXAMPLE.

To set up the Antenna Tuning Unit at a frequency of 5000 kcs. to work into a balanced transmission line of a nominal 600 ohm impedance.

Connect transmission line to BALANCED terminals on rear of unit.

Set LOAD switch to BAL.
Set ROTOR switch to UNGND.

Refer to tuning charts, Figure 1-11, for approximate control settings for a frequency of 5000 kcs. and a balanced load of 600 ohms.

Set TUNING control to 34
Set COUPLING switch to 2
Set BAND switch to 2
Set LOAD ADJUST to 147

When these settings have been made, tune both the transmitter and the Antenna Tuning Unit to optimum output on LOW POWER.

Switch transmitter to HIGH POWER. Readjust TUNING and LOAD ADJUST controls as required. If the transmitter plate current is above normal when tuned to resonance, rotate the COUPLING switch toward MIN. If the transmitter plate current is below normal when tuned to resonance, rotate the COUPLING switch toward MAX. Remember, if the load is not truly balanced the ANTENNA CURRENT meters will not read identically.

**CAUTION**

Most transmitters have output coupling networks which can be varied. An excessive deviation from optimum coupling will result in large reactive currents in the transmitter output-TAC input circuit.

If one does not already exist, it is recommended that an R.F. Ammeter be installed at the transmitter output terminals.

An excessive transmitter R.F. output current results in increased losses in the coupling networks and lower transmission efficiency. If this condition appears to exist, adjustments should be made to the transmitter OUTPUT COUPLING network and the TAC COUPLING, TUNING and LOAD ADJUST controls to reduce the TRANSMITTER OUTPUT CURRENT to a minimum while maintaining proper transmitter loading.

### 6. EXTENDED FREQUENCY RANGE OPERATION.

The Antenna Tuning Unit is basically designed for a frequency range of 2 to 18 mcs. but will operate up to 30 mcs. Keep transmitter on LOW POWER when tuning above 18 mcs. The unit will tune and put out appreciable power at these higher frequencies, but variation of the control settings may be considerable.

A "horn gap", set to ¼ in. spacing, on the rear of the unit, is provided to prevent damage to the unit in the event of improper adjustment.

For operation below 2.5 mcs. with both balanced and unbalanced loads, remove vacuum capacitor C103 from it's storage clips in the upper front portion of the unit. Place it in those operating clips which are connected to the stator plates of the tuning condenser C100. (See Figure 3-2.) This lowers the operating range of the unit to below 2 mcs.

For further reduction of the operating range, in the unbalanced condition only, replace the vacuum capacitor C103 with the metal shorting bar E116, and disconnect the jumper (marked with red dots) between the tuning capacitor C100 and the stand-off insulator on the upper left hand portion of the unit. (See Figure 3-2.)

# SECTI N IV
# MAINTENANCE

## 1. MAINTENANCE INSTRUCTIONS.

a. TOOLS FURNISHED.

1 TP-102 Punch, drive pin, to remove or replace roll pins.

1 WR-100-3 Wrench, Allen, for #5 and #6 set screws.

1 WR-100-5 Wrench, Allen, for #10 and #12 set screws.

1 WR-100-18 Wrench, Allen, for #8 set screws.

b. GENERAL.

Keep interior of the unit thoroughly clean and dust free.

Material Required.

Sandpaper #0000.

Dry brush or lint free cloth.

Carbon Tetrachloride for electrical connection.

Dry Cleaning Solvent for other parts.

Compressed air may be used to remove dust from inaccessible areas.

c. PREVENTIVE.

Materials Required.

Lubricating Compound, Silicone.

Insulating Compound. MIL-I-17384A, Type PR.

Monthly.

Lubricate all sliding contacts connected with the wheel assembly (LOAD ADJUST) with Lubricating Compound, Silicone.

Check and tighten hardware and set screws where necessary. (Tighten nuts and screws carefully. Fittings tightened beyond the pressure for which they are intended will be damaged or broken.)

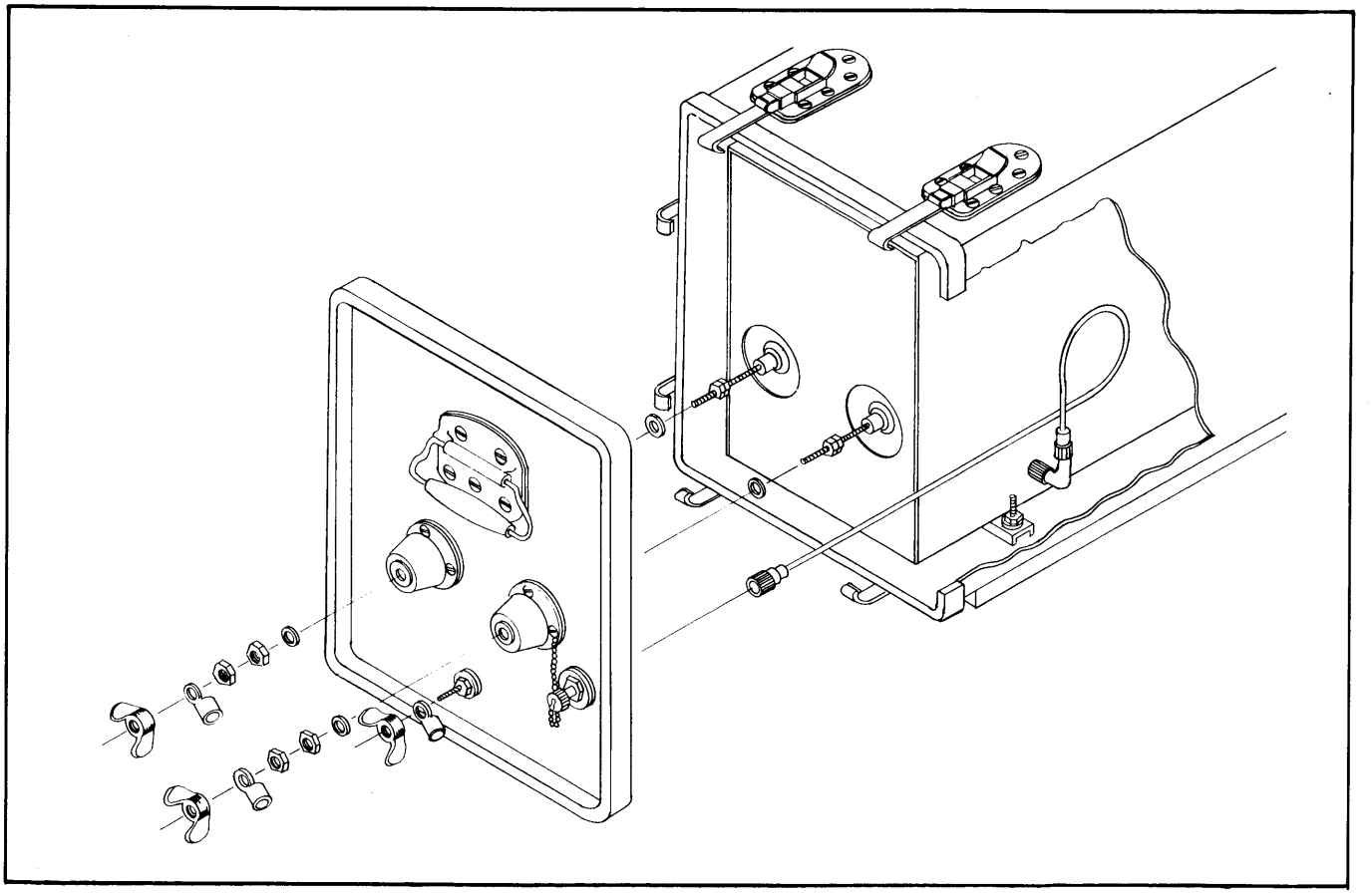
Quarterly.

Check switches for dirt, corrosion or loose contacts.

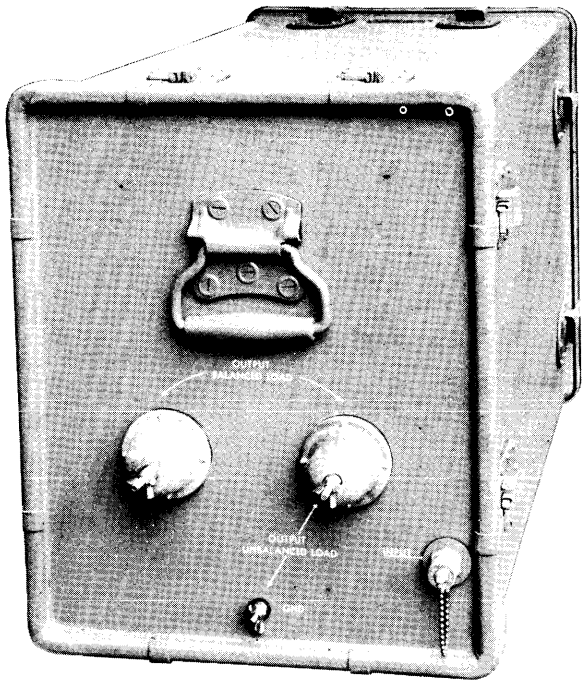
Check variable condenser and coils for dirt, corrosion, bent plates or damaged turns.

Abnormal Conditions.

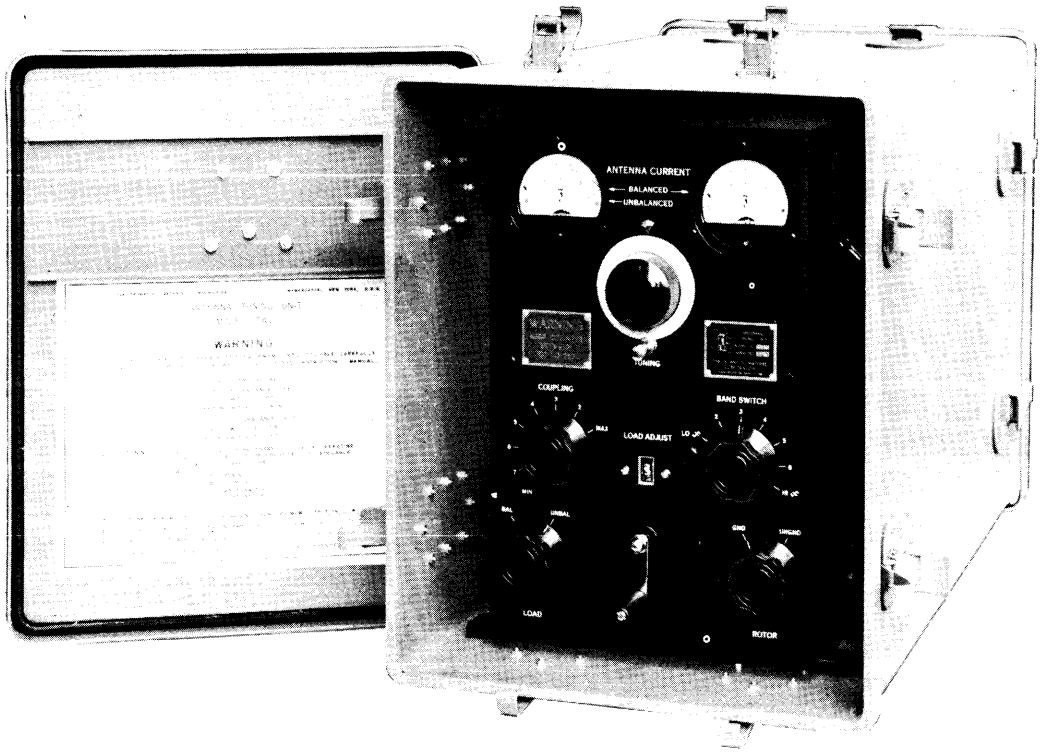
In the event of excessive power input or of switching the unit with POWER ON, an arc-over may occur, usually in the ROTOR or LOAD switch or both. Should this happen, clean the affected area, sand away all carbon deposits, coat area lightly with Insulating Compound.



*Figur 4-1. Fr nt and R ar Vi ws, Mod l TAC-1 with Prot ctiv case, Mod l CTAC*

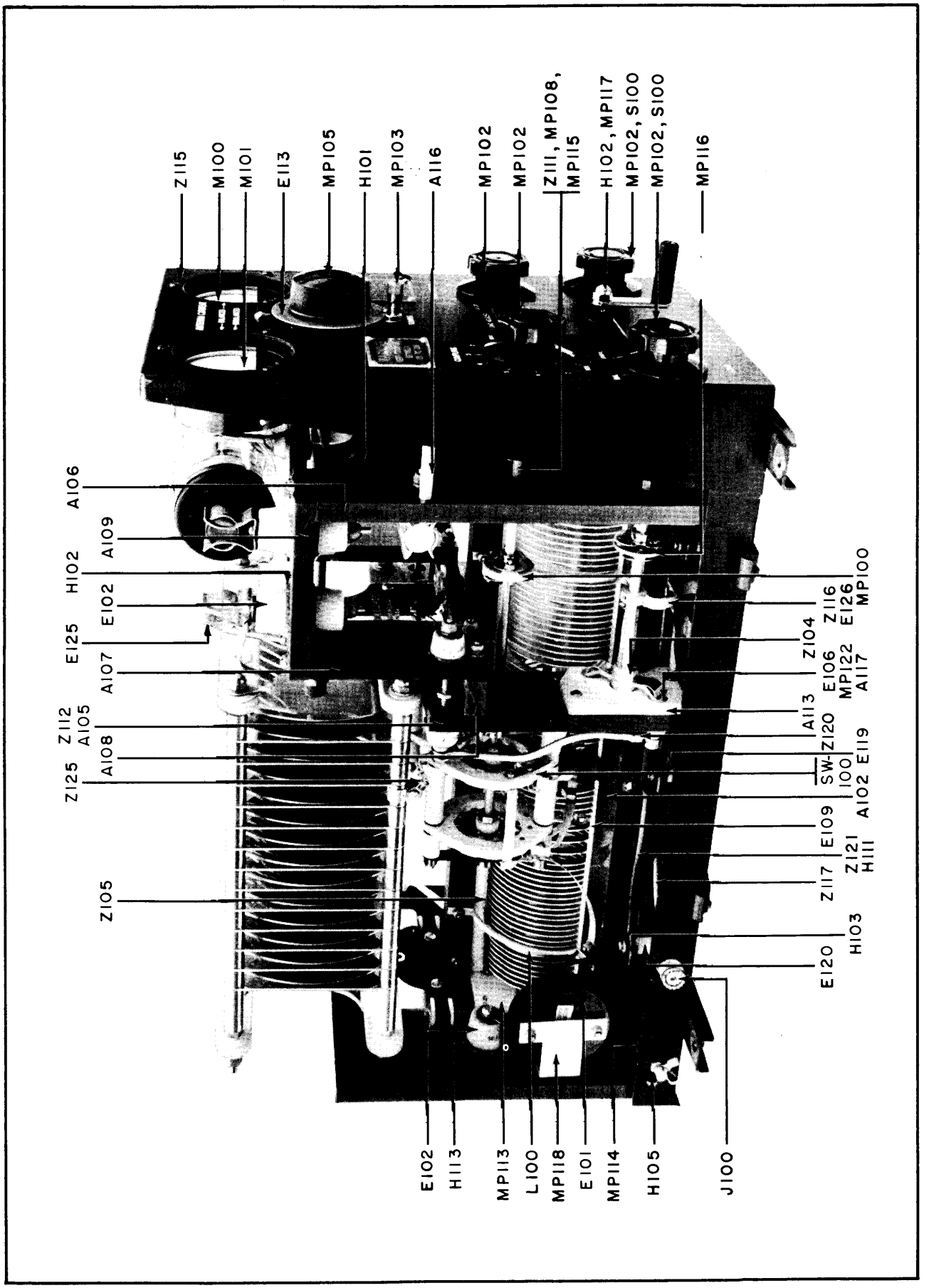


As illustrated, the Antenna Tuning Unit can be furnished with and shipped in a protective case, Model CTAC. The case is constructed of fiberglass reinforced plastic, and is both waterproof and weatherproof.

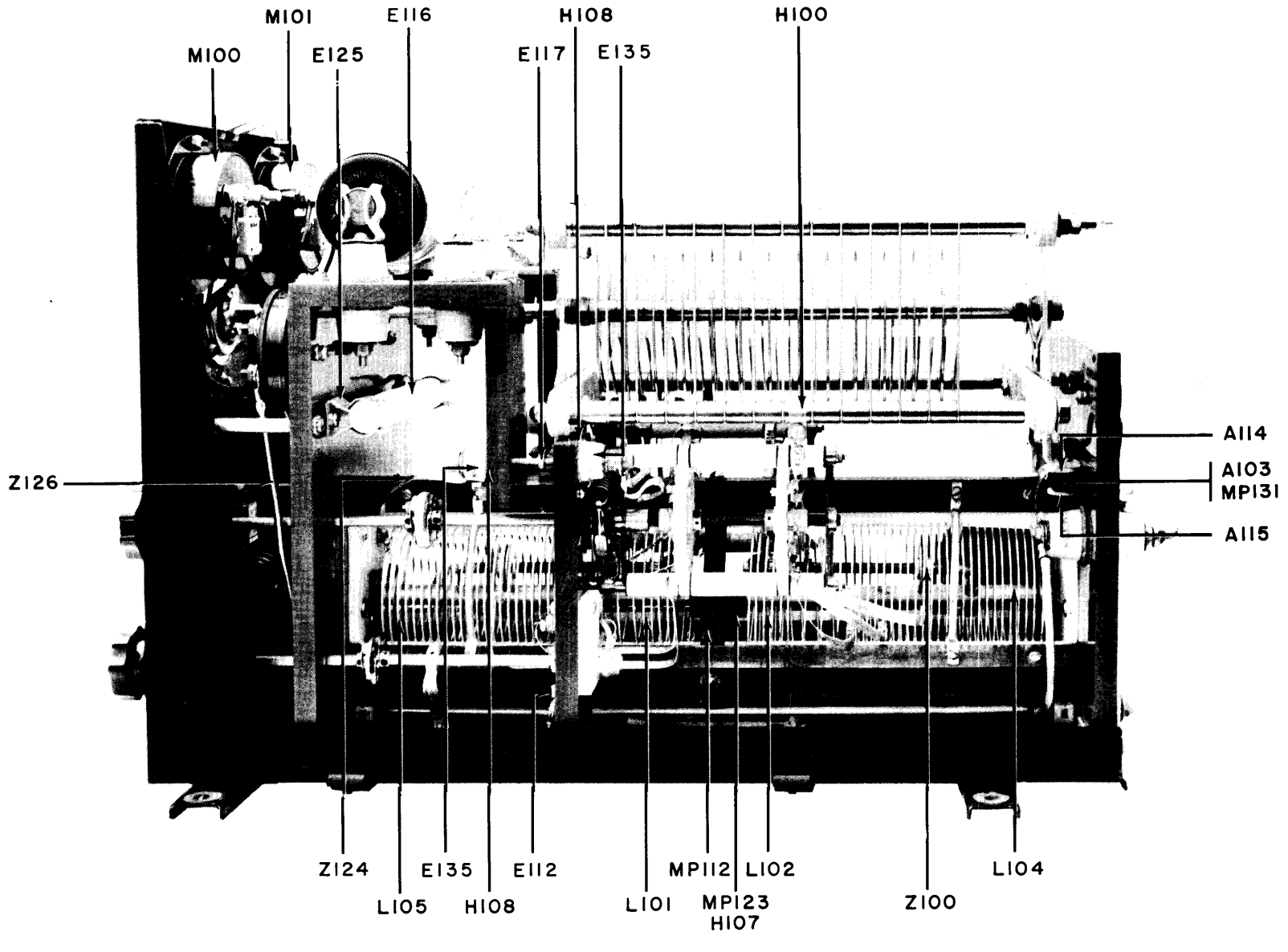



The unit will mount on the transmitter and operate either with or without this protective case. Special studs, which mount the unit in the case, are furnished for mounting the case to the transmitter in the event that the transmitter mounting studs are too short.

***Figure 4-2. Rear View, Input and Output Connections Between Unit and Case***




*Figur 4-3. Front and L ft Sid Vi w*




*Figur 4-4. Right Side View*

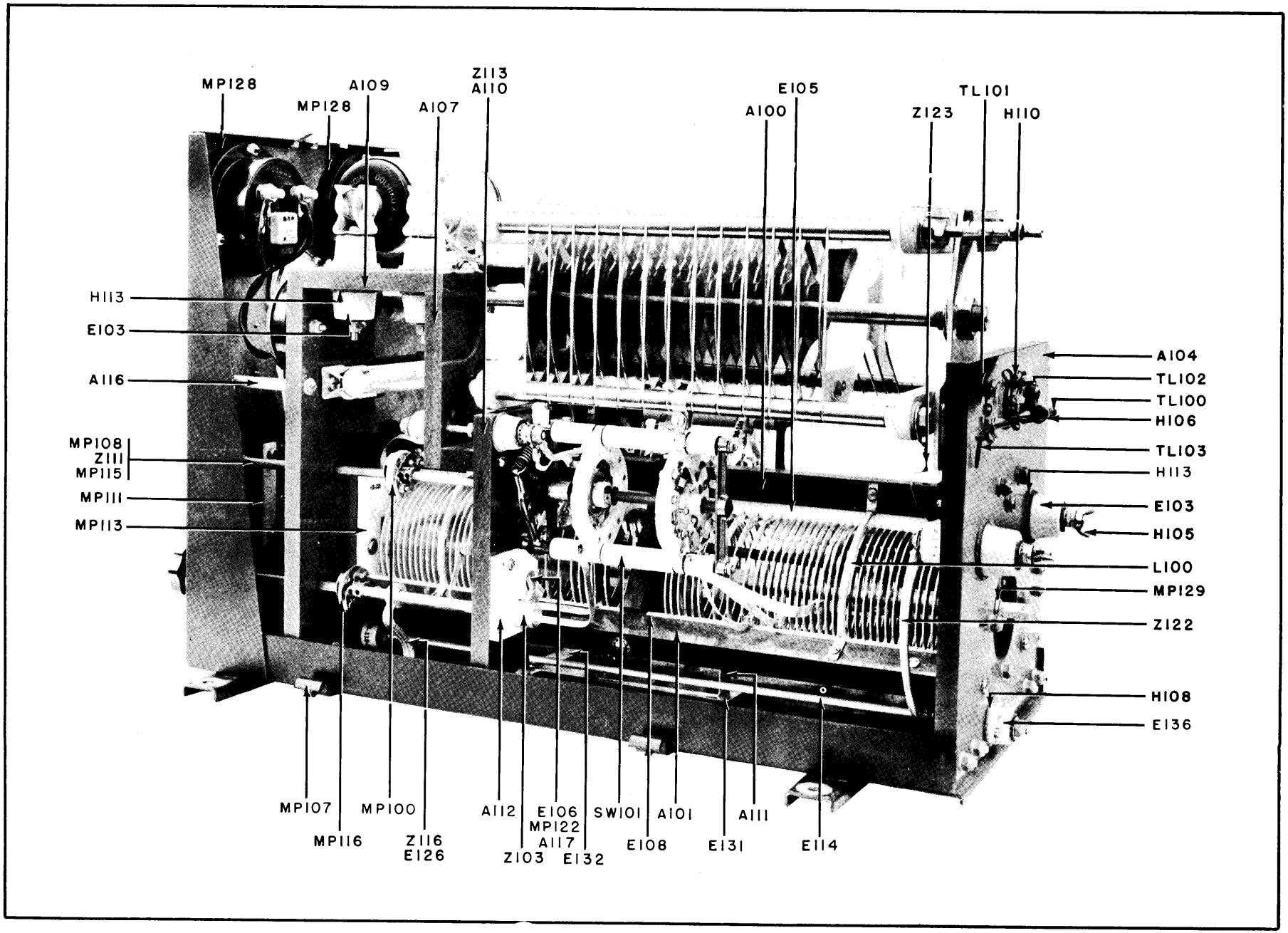
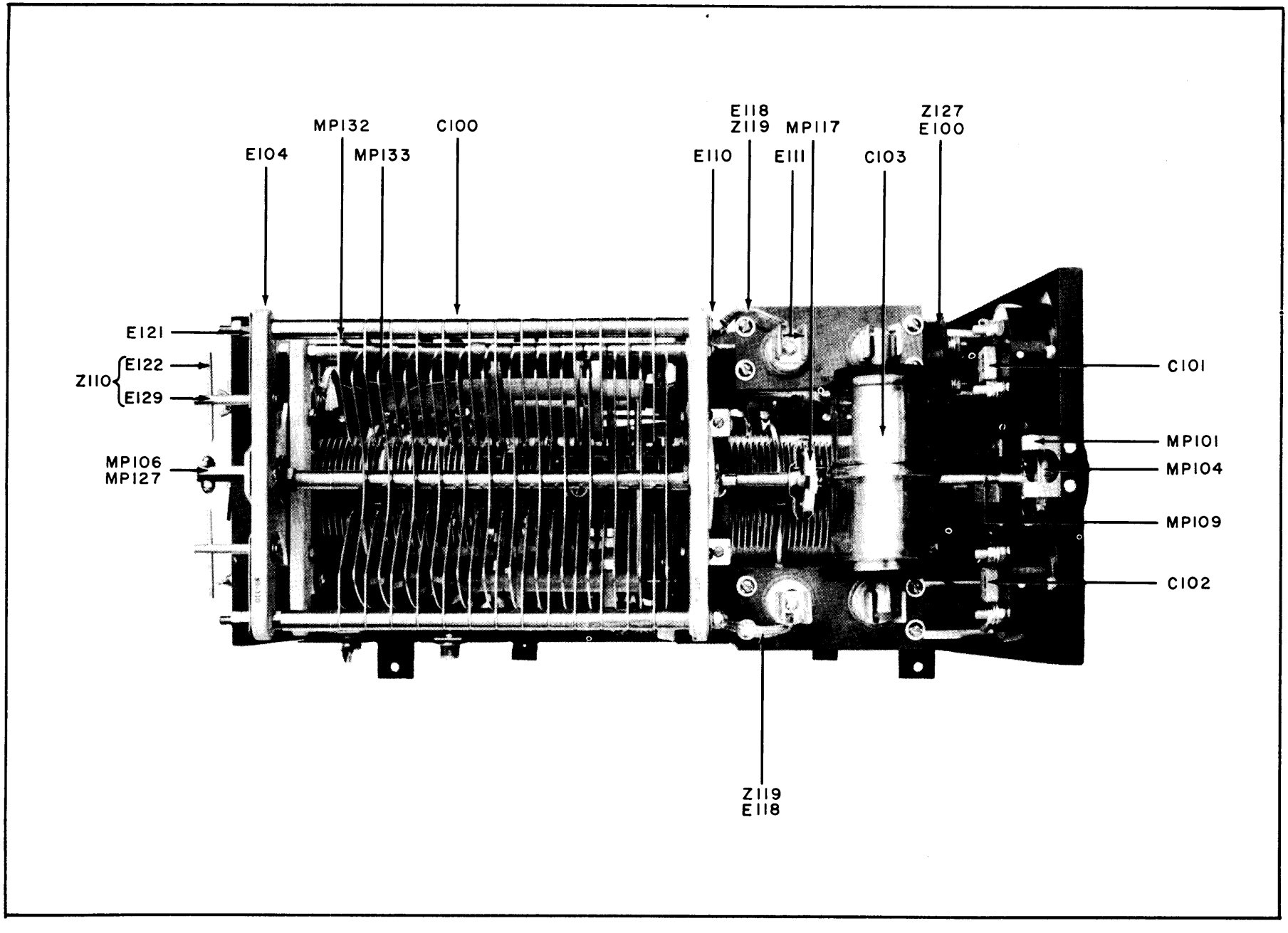
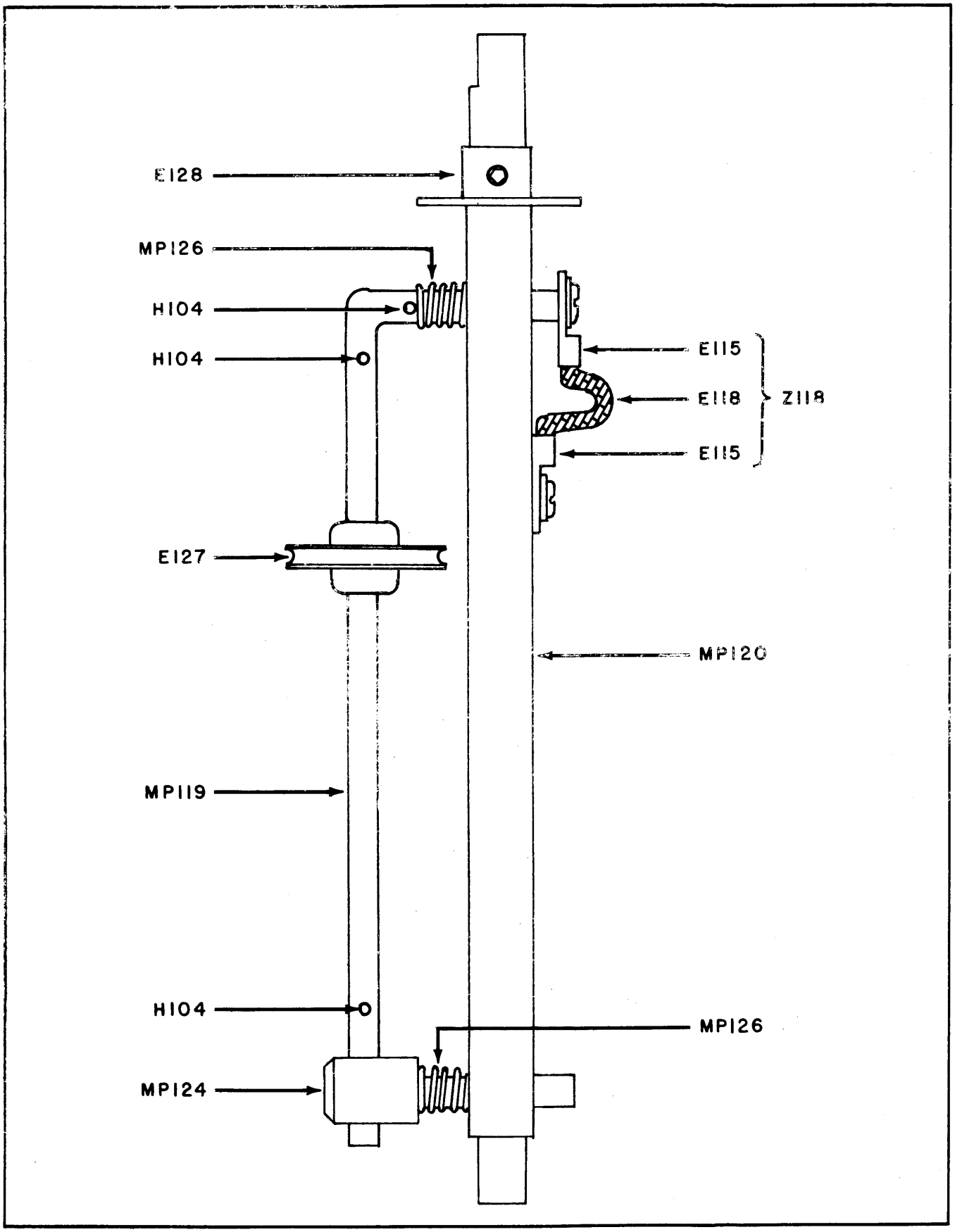



*Figure 4-5. Right Side and Rear View*




*Figur 4-6. Top Vi w*




*Figur 4-7. C ntact Wheel and Shaft Assembly Z101*

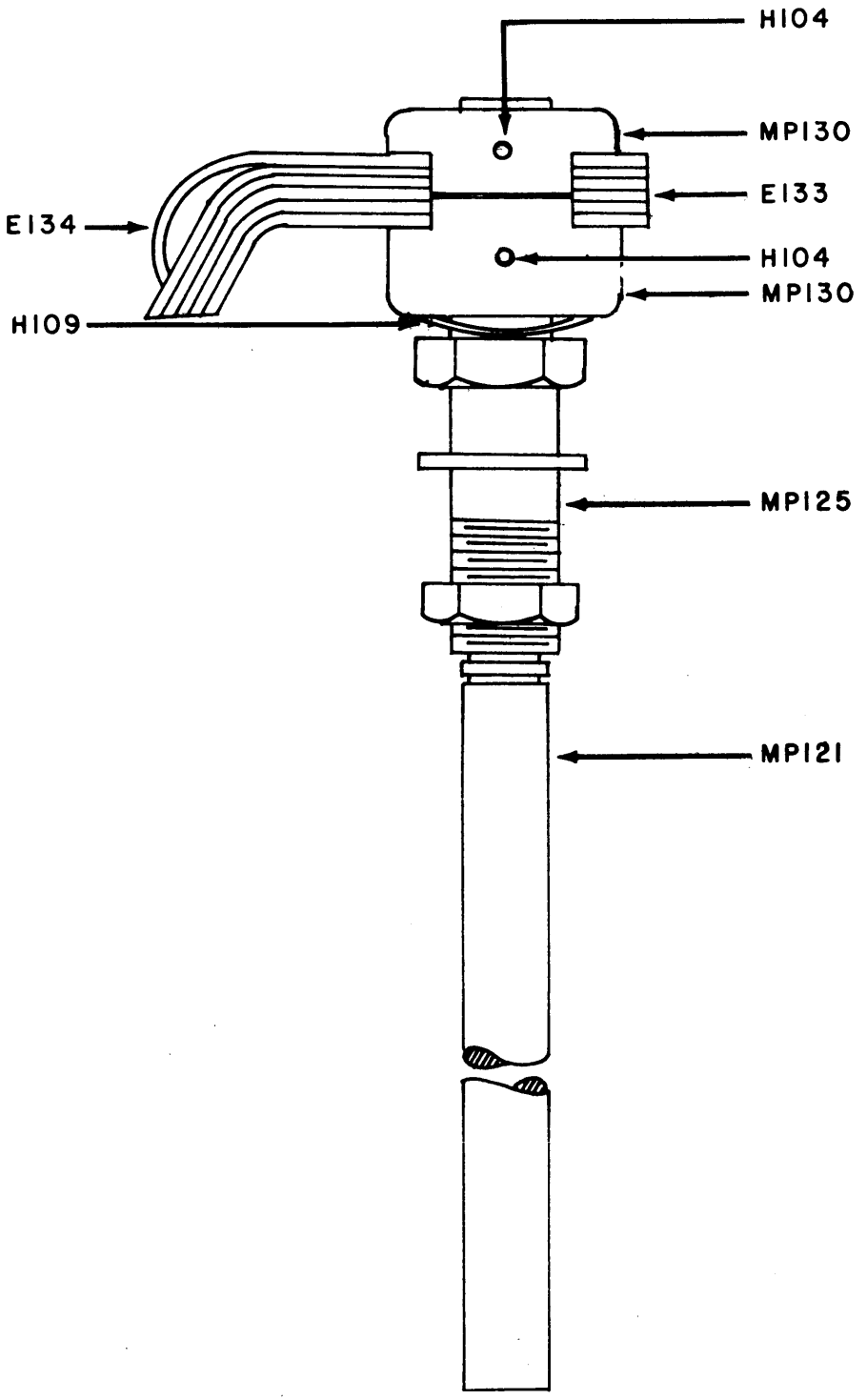



*Figure 4-8. Single Leaf Switch Assembly Z103*

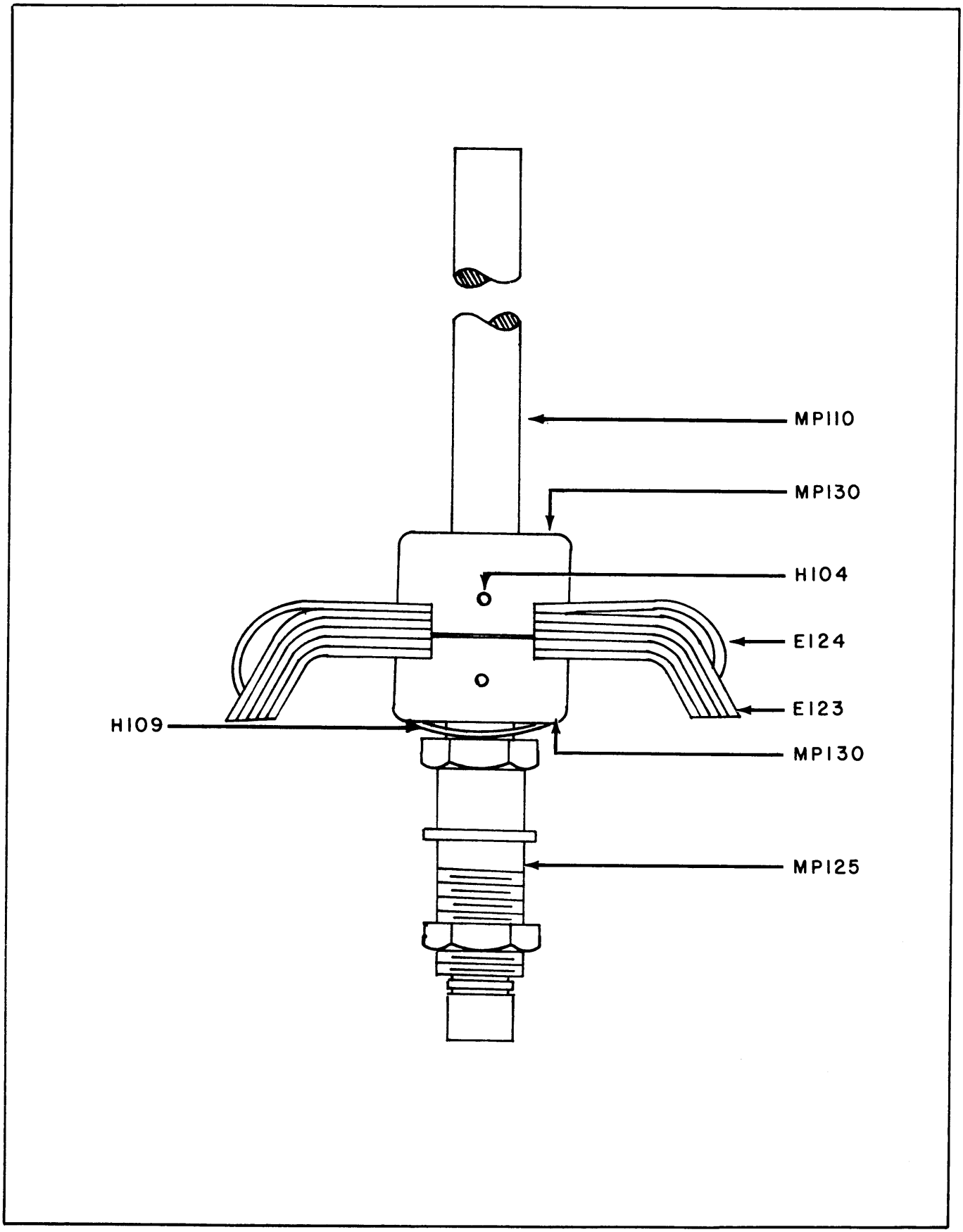



*Figure 4-9. Double Leaf Switch Assembly Z104*

## 2. PARTS LIST

| SYM. | DESCRIPTION | FIGURE NO. | TMC DWG OR PART NO. |
|---|---|---|---|
| A100 | SUPPORT, phenolic: 16-9/16 x 3/4 x 3/4 in. o/a. | 4-5 | A-712 |
| A101 | SUPPORT, phenolic: 16-9/16 x 3/4 x 3/4 in. o/a. | 4-5 | A-711 |
| A102 | SUPPORT, phenolic: 16-9/16 x 3/4 x 3/4 in. o/a. | 4-3 | A-713 |
| A103 | SUPPORT, phenolic: 4-1/2 x 5/8 x 1/2 in. o/a. | 4-4, 4-5 | PX-190 |
| A104 | SUPPORT, phenolic: 10 x 8-1/2 x 1/2 in. o/a. | 4-5 | PX-198 |
| A105 | SUPPORT, phenolic: 7-1/16 x 2-1/16 x 1/2 in. o/a. | 4-3 | PX-200 |
| A106 | SUPPORT, phenolic: 10 x 8-1/2 x 1/2 in. o/a. | 4-3 | PX-199 |
| A107 | SUPPORT, phenolic: 4-1/4 x 2-1/16 x 1/2 in. o/a. | 4-5 | PX-202 |
| A108 | SUPPORT, phenolic: 8-1/2 x 15/16 x 1/2 in. o/a. | 4-3 | PX-189 |
| A109 | SUPPORT, phenolic: 4-5/8 x 2-1/16 x 1/2 in. o/a. | 4-3, 4-5 | PX-191 |
| A110 | SUPPORT, phenolic: 7-1/16 x 2-1/16 x 1/2 in. o/a. | 4-5 | PX-201 |
| A111 | BRACKET, brass: silver plated; .032 x 1-17/32 x 3/4 x 3-7/16 in. o/a. | 4-5 | MS-489 |
| A112 | PLATE, teflon: 2 x 1-7/8 x 1/4 in. o/a. | 4-5 | PX-236 |
| A113 | PLATE, teflon: 2-15/16 x 1-7/8 x 1/4 in. o/a. | 4-3 | PX-237 |
| A114 | WASHER, teflon: 3/4 od x 7/32 id x 1/8 in. thick. | 4-4 | PX-224-2 |
| A115 | WASHER, teflon: 3/4 od x 7/32 id x 1/8 in. thick; flatted. | 4-4 | PX-224-1 |
| A116 | SPACER, brass: cadmuim plated; 3 in. lg. x 5/16 in. diam. | 4-3, 4-5 | PM-276 |
| A117 | WASHER, teflon: 1/2 in. od x 13/64 id. x 1/8 in. thick. | 4-3, 4-5 | PX-222 |
| C100 A,B | CAPACITOR, variable: air; two section; 42-208 mmfd; each section. .250 in air gap. | 4-6 | CB-115 |
| C101 | CAPACITOR, fixed: mica; .01 mfd, ±10%, 300 wvdc; char. B. | 4-6 | CM35B103K |
| C102 | CAPACITOR, fixed: mica; .01 mfd, ±10%, 300 wvdc; char. B. Same as C101. | 4-6 | CM35B103K |

| SYM. | DESCRIPTION | FIGURE NO. | TMC DWG. OR PART NO. |
|---|---|---|---|
| C103 | CAPACITOR, fixed: vacuum, 50 mmfd, 32 Kv peak; 65 amps max current. | 4-6 | CB-109-4 |
| E100 | THERMOCOUPLE, vertical mount: 2-5/8" o.d. x 1-1/2" wide overall. | 4-6 | MR-103-4 |
| E101 | THERMOCOUPLE, vertical mount: 2-5/8" o.d. x 1-1/2" wide overall. | 4-3 | MR-103-4 |
| E102 | INSULATOR, feed thru: female; white glazed steatite; 3/4 in. lg. o/a x 1-1/8 in. diam. tapered flange; 3/4 in. diam. x 9/16 in. deep well; 13/64 in. diam. hole. | 4-3, 4-5 | NS-108-1 |
| E103 | INSULATOR, feed thru: male; white glazed steatite; 1-1/2 in. lg. o/a x 1-1/8 in. diam. tapered flange; 3/4 in. diam. x 3/4 in. lg. insert; 13/64 in. diam. hole. | 4-5 | NS-108-2 |
| E104 | INSULATOR, ceramic: 8-3/4 x 3/4 x 3/8 in. o/a. | 4-6 | p/o CB-115 |
| E105 | INSULATOR, teflon: 7-25/32 x 19/32 x 1/4 in. o/a. | 4-3, 4-5 | PX-217 |
| E106 | CONTACT, brass: silver plated; 1/2 in. diam. x 1-1/8 in. o/a; 10-32 thd. | 4-3, 4-5 | SM-125 |
| E107 | LUG, terminal: brass; hot tin dipped; 51/64 x 3/8 x .020 in. o/a; 1/4 in. id hole. | 4-3 | TE-132 |
| E108 | INSULATOR, teflon: 7-25/32 x 19/32 x 1/4 in. o/a. | 4-3, 4-5 | PX-218 |
| E109 | INSULATOR, teflon: 7-25/32 x 19/32 x 1/4 in. o/a. | 4-3 | PX-219 |
| E110 | LUG, terminal: copper; electro tinned 1 in. lg. x 1/4 id hole. | 4-6 | TE-141-4 |
| E111 | LUG, terminal: copper; electro tinned; 49/64 in. lg.; 3/16 in. id hole. | 4-6 | TE-141-3 |
| E112 | BAR, shorting: brass; silver plated; 6-1/2 in. lg. x 3/4 in. diam. | 4-4 | MS-454 |
| E113 | PLATE, dial: aluminum; etched; 2-3/4 in. diam.; 0-50 scale. | 4-3 | LD-186 |
| E114 | ROD, brass: silver plated; 19-5/8 in. lg. x 3/16 in. diam. 10-32 x 2-1/2 in. lg. thd each end. | 4-5 | PM-257 |
| E115 | LUG, terminal: copper; electro tinned; 49/64 in. lg; 5/32 in. id hole. | 4-7 | TE-141-1 |
| E116 | LUG, terminal: copper; electro tinned; 1-1/8 in. lg; 3/8 in. id. hole. | 4-4 | TE-141-6 |

| SYM. | DESCRIPTION | FIGURE NO. | TMC DWG. OR PART NO. |
|---|---|---|---|
| E117 | ROD, threaded: brass; silver plated; 10-32 x 4 in. lg. w/brased nut at center. | 4-4 | A-785 |
| E118 | SHIELD, flexible: copper: tinned; 3/16 in. wd. | 4-6, 4-7 | WL-103-4 |
| E119 | INSULATOR, pillar: round; white glazed steatite; 3/4 in. lg. x 1/2 in. diam; tapped 8-32 x 1/4 in. deep each end. | 4-3 | NS5W0206 |
| E120 | INSULATOR, pillar: round; white glazed steatite; 1-1/4 in. lg. x 1/2 in. diam; tapped 8-32 x 3/8 in. deep each end. | 4-3 | NS5W0210 |
| E121 | STRAP, brass: silver plated; 2-7/16 x 5/8 x 1/32 in. o/a. | 4-6 | MS-502 |
| E122 | ROD, brass, nickel plated; 2-1/4 in. lg. x 1/8 in. diam. | 4-6 | PM-103 |
| E123 | LEAF, contact: nickel silver: 2-3/16 x 7/16 x .014 in. o/a. | 4-9 | MS-490 |
| E124 | LEAF, pressure: nickel silver; 1-9/16 x 3/8 x 7/16 in. o/a. | 4-9 | MS-492 |
| E125 | CLIP, electrical: phosphor bronze; silver plated; accomodates 3/4 in. diam. | 4-3, 4-4 | FH-102 |
| E126 | COLLAR, brass: silver plated; 5/8 in. diam. x 1/4 in. wd. | 4-3 | PM-271 |
| E127 | WHEEL, brass: silver plated; 1/4 in. id. x 1-1/8 in. o.d. | 4-7 | PM-251 |
| E128 | BUSHING, brass: silver plated; 1-1/4 in. diam. x 3/8 in. wd. w/ 3/8 in. diam hole. | 4-7 | PM-254 |
| E129 | POST, brass: cadmium plated; 1-3/8 in. lg. x 1/4 in. diam. | 4-6 | PM-273 |
| E130 | PLATE, brass: silver plated; 4-1/8 x 1-7/8 x .032 in. o/a. | --- | MS-443 |
| E131 | STRAP, brass: silver plated; 6 x 7/8 x .032 in. o/a. | 4-5 | MS-452 |
| E132 | STRAP, brass: silver plated; 8-1/2 x 5/8 x .032 in. o/a. | 4-5 | MS-453 |
| E133 | LEAF, contact: nickel silver; 1-5/32 x 7/16 x 1014 in. o/a. | 4-8 | MS-493 |
| E134 | LEAF, pressure: nickel silver; 25/32 x 3/8 x 1/16 in. o/a. | 4-8 | MS-494 |
| E135 | INSULATOR, feed thru: male; white glazed steatite; 7/8 in. lg. o/a x 7/8 in. diam. tapered flange; 1/2 in. diam. x 3/8 in. lg. insert; 3/16 in. diam. hole. | 4-4 | NS-112-1 |

| SYM. | DESCRIPTION | FIGURE NO. | TMC DWG. OR PART NO. |
|---|---|---|---|
| E136 | INSULATOR, feed thru: female; white glazed steatite; 1/2 in. lg. o/a x 7/8 in. diam. tapered flange; 1/2 in. diam. x 3/8 in. deep well; 3/16 in. diam. hole. | 4-5 | NS-112-2 |
| H100 | CLAMP, "U" type: nickel silver; 3/4 x 3/8 in. o/a; .025 thk. | 4-4 | MS-510 |
| H101 | CLAMP, "G" type: plastic; 7/8 x 1/2 in. o/a; 5/16 in. i.d. | 4-3 | CU-102-4 |
| H102 | COUNTER: C.C.W. rotation to incr.; 000-999. | 4-3 | PO-113 |
| H103 | CLAMP, "G" type: plastic; 11/16 x 1/2 in. o/a; .188 in. i.d. | 4-3 | CU-102-3 |
| H104 | PIN, roll: steel; 5/8 in. lg. x 1/16 in. diam. | 4-7,4-8,4-9 | PN-109-3 |
| H105 | NUT, wing: brass; nickel plated; 10-32 thd. | 4-3, 4-5 | NT-110-1032BN |
| H106 | CLAMP, "G" type: plastic; 3/4 x 1/2 in. o/a; .375 in. i.d. | 4-5 | CU-102-5 |
| H107 | PIN, roll: steel; 15/16 in. lg. x 1/16 in. diam. | 4-4 | PN-109-4 |
| H108 | GASKET, cushion: cork; 15/16 in. o.d. x 1/2 in. i.d. x 1/16 in. tk. | 4-4, 4-5 | GA-118 |
| H109 | WASHER, spring: phosphur bronze; silver plated; 9/16 in. o.d. x 1/4 in. i.d. x .010 in. thk. | 4-8, 4-9 | WA-119 |
| H110 | CLIP, spring: double unit; brass nickel plated; 1-1/2 x 5/8 x 3/8 in. o/a. | 4-5, 4-9 | CU-103-3 |
| H111 | SPACER, stand off: brass; cadmium plated; 1/4 in. lg. x 1/4 in. diam.; 5/16 in. hole. | 4-3 | TE-117-1 |
| H112 | GASKET, cushion: cork; 1-5/16 in. o.d. x 3/4 in. i.d. x 3/32 in. thk. | 4-3 | GA-117 |
| J100 | CONNECTOR, receptacle: coaxial; female; VHF series; teflon insulation. | 4-3 | UG-296/U |
| L100 | COIL, link:copper;silver plated; 4-1/2 in. lg. x 1/4 in. diam. o/a three 1/3 turn. p/o A-674. | 4-3, 4-5 | CL-116 |
| L101 | COIL, link: copper; silver plated; 3 in. i.d. x 3-1/2 in. o.d.; 5-1/4 turns. p/o A-678. | 4-4 | CL-115-2 |
| L102, 105 | COIL, sub-assembly: copper; silver plated; 3 in. i.d. x 3-1/2 in. o.d.; 34 turns. p/o A-677. | 4-4 | CL-114-1 |
| L103 | COIL, link: copper; silver plated; 4-1/2 in. lg. x 1/4 in. diam. o/a; three 1/3 turns; p/o A-674. | 4-4 | CL-116 |

| SYM. | DESCRIPTION | FIGURE NO. | TMC DWG. OR PART NO. |
|---|---|---|---|
| L104 | COIL, tank: copper; silver plated; 3 in. i.d. x 3-1/2 in. o.d.; 28-3/4 turns. p/o A-676. | 4-4 | CL-114-2 |
| L105 | PART, of L102 | 4-4 | |
| M100 | METER, RF: 0-3 amps; molded case; 3-1/2 in. diam. x 2 in. o/a. | 4-3, 4-4 | MR-103-3 |
| M101 | METER, RF: 0-3 amps; molded case; 3-1/2 in. diam. x 2 in. o/a. | 4-3, 4-4 | MR-103-3 |
| MP100 | COUPLING, flexible: brass, steatite insulation 1-1/4 x 13/16 in. o/a; 1/4 in. hole. | 4-3 | MC-121 |
| MP101 | SPRING, contact: phosphor bronze, silver plated 1-1/2 x 1-3/8 x .025 in. o/a. | 4-3, 4-5 | MS-457 |
| MP102 | KNOB, instrument: skirt type; white indicator line 2-1/16 in. dia. x 7/8 in. deep o/a; for 1/4 in. shaft. | 4-3 | MP-106-2 |
| MP103 | LOCK, dial: brass, nickel plated; 1-3/8 in. lg. x 3/8 in. dia. o/a. | 4-3 | PO-128 |
| MP104 | COUPLING, vernier: 5 to 1 reduction 2-9/16 x 1-49/64 in. o.a. | 4-6 | DI-100 |
| MP105 | KNOB, instrument type: black bakelite, 1 in. x 2 in. dia. o/a. | 4-3 | MP-105 |
| MP106 | HOLDER, spark gap: brass 3/4 in. lg. x 8-32 NC2 threads. | 4-6 | SM-129 |
| MP107 | STRIKE, case: steel 2-13/16 in. lg. x 13/16 in. wide. | 4-5 | PO-127 |
| MP108 | SHAFT, extension: brass 6-1/16 in. lg. x 1/4 in. dia. | 4-3, 4-5 | PM-278 |
| MP109 | SHAFT, extension: brass 5-1/16 in. lg. x 1/4 in. dia. | 4-6 | PM-279 |
| MP110 | SHAFT, double switch: brass; cadmium plated 8-1/4 in. long x 1/4 in. dia. | 4-9 | PM-275 |
| MP111 | SUPPORT, counter: aluminum 2-7/8 x 1/2 x .081 in. o/a. | 4-5 | MS-509 |
| MP112 | SUPPORT, coil center: phenolic, 2 in. OD x 1/2 in. thick o/a. | 4-4 | PX-187 |
| MP113 | SUPPORT, contact shaft: teflon; 3-9/16 x 3-11/16 x 1/4 in. o/a. | 4-3, 4-5 | PX-229 |
| MP114 | BRACKET, center support: aluminum, 1-15/16 x 1/2 x .081 in. o/a. | 4-3 | MS-458 |

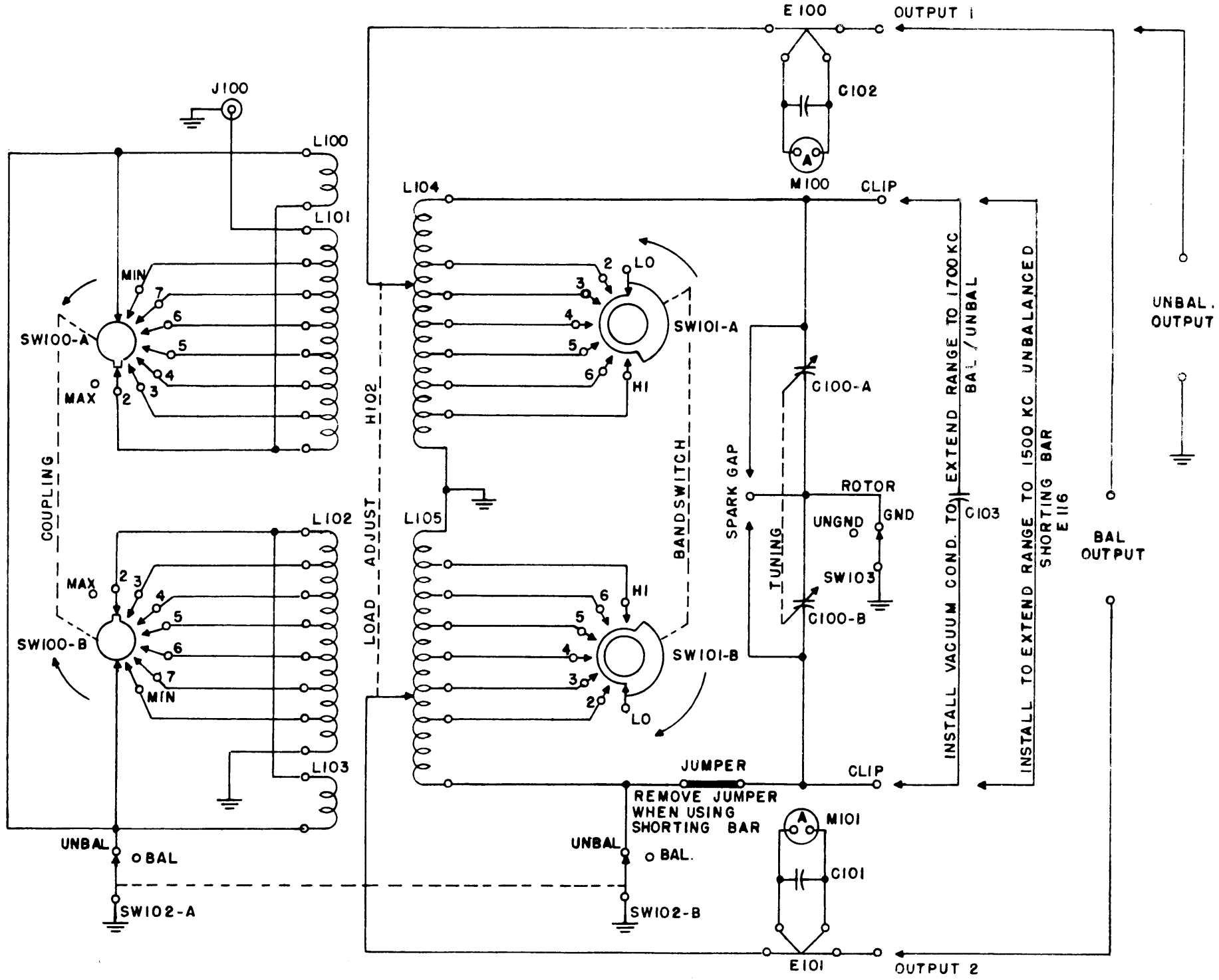
| SYM. | DESCRIPTION | FIGURE NO. | TMC DWG. OR PART NO. |
|---|---|---|---|
| MP115 | BEARING, panel: brass; nickel plated 1/2 in. lg. x 3/8 in. dia. 1/4 in. ID hole. | 4-3, 4-5 | BB-101 |
| MP116 | COUPLING, flexible: non-insulated; brass 1-1/4 in. dia. x 23/32 in. thick o/a. | 4-3, 4-5 | MC-119 |
| MP117 | COUPLING, flexible: steatite; 9000 V peak flashover, 2-1/16 x 1-1/16 in. o/a. | 4-3, 4-6 | MC-118 |
| MP118 | BRACKET, thermocouple, aluminum 2-15/16 x 5/8 x .064 in. o/a. | 4-3 | MS-495 |
| MP119 | SHAFT, wheel: brass; silver plated, 5-1/4 x 1-11/16 x 1/4 in. dia. o/a. | 4-7 | PM-255 |
| MP120 | COUNTER SHAFT, brass, silver plated 9-1/8 in. lg. x 1/2 in. dia. | 4-7 | PM-256 |
| MP121 | ROD, switch connecting: brass 8-5/8 in. lg. x 1/4 in. dia. | 4-8 | PM-268 |
| MP122 | BUSHING, contact: teflon, 7/16 in. OD x 13/64 in ID x 15/32 in. wide. | 4-3, 4-5 | PX-223 |
| MP123 | BUSHING, connecting: phenolic, 1-5/16 x 1 x 3/8 in. ID o/a. | 4-4 | A-716 |
| MP124 | ROD, connecting: phenolic, 1-3/16 x 1/2 in. o/a. | 4-7 | PX-197 |
| MP125 | BEARING, panel: brass, nickel plated, 7/8 in. long x 3/8 -32 NC2 threads x 1/4 in. ID hole. | 4-8, 4-9 | SM-124 |
| MP126 | SPRING, copper, 7/16 in. lg. x 3/8 in. OD. | 4-7 | SP-116-S |
| MP127 | BASE, spark gap: brass, nickel plated, 1-3/16 in. lg. x 3/8 in. dia. | 4-6 | PM-277 |
| MP128 | RING, meter spacing: phenolic, 3-1/2 in. OD x 2-3/4 in. ID x 5/16 in. thick. | 4-5 | PX-216 |
| MP129 | BUSHING, connecting: brass; w/lockwasher and nut 11/16 in. lg. x 5/8-18 NC2 threads x 7/8 in. hex head. | 4-5 | PM-247 |
| MP130 | BUSHING, switch: brass, 5/8 in. dia. x 5/16 in. thick. | 4-8, 4-9 | PM-266 |
| MP131 | BUSHING, capacitor support: teflon, 3/8 in. OD x 3/16 in. ID x 5/16 in. lg. | 4-4 | PX-225 |
| MP132 | STATOR PLATE, capacitor. | 4-6 | SX-100 |
| MP133 | ROTOR PLATE, capacitor. | 4-6 | SX-101 |
| N100 | TUNING CHART. | --- | CH-124 |
| P100 | CONNECTOR, plug: coaxial; male; UHF series; teflon insulation, 1-9/16 in. lg. x 3/4 in. dia. o/a. | Loose Item | PL-259A |

| SYM. | DESCRIPTION | FIGURE NO. | TMC DWG. OR PART NO. |
|---|---|---|---|
| S100 | SWITCH INDEX, 60 degree throw: steel 5-1/4 x 2-5/32 x 1-9/16 in. o/a, 1/4 in, flatted shaft. | 4-3 | SW-143 |
| SW100 | SWITCH, rotary: two sections; one pole; eight positions each section; steatite insulation. | 4-3 | SW-144 |
| SW101 | SWITCH, rotary: two sections; one pole; seven positions each section; steatite insulation. | 4-5 | SW-145 |
| TL100 | PUNCH, drive pin: steel, 4 in. lg. x 3/8 in. dia., tapered. | 4-5 | TP-102 |
| TL101 | WRENCH, hex: steel, 1-34/ in. lg. for #5,6 Allen head set screws. | 4-5 | WR-100-3 |
| TL102 | WRENCH, hex: steel, 2 in. lg. for #10, 12 Allen head set screws. | 4-5 | WR-100-5 |
| TL103 | WRENCH, hex: steel, 6 in. lg. for #8 Allen head set screws. | 4-5 | WR-100-18 |
| Z100 | DOUBLE LEAF SWITCH SUB ASSEMBLY: Consisting of: E112, E117, H104, MP110 and MP130. | 4-4 | A-667 |
| Z101 | CONTACT WHEEL AND SHAFT ASSEMBLY: Consisting of: E127, E128, H104, MP119, MP120, MP124, MP126 and Z118. | 4-7 | A-646 |
| Z102 | SINGLE LEAF SWITCH SUB ASSEMBLY: Consisting of: E133, E134, H104, MP121 and MP130. | 4-8 | A-666 |
| Z103 | SINGLE LEAF SWITCH ASSEMBLY: Consisting of: H109, MP125 and Z102. | 4-8 | A-672 |
| Z104 | DOUBLE LEAF SWITCH ASSEMBLY: Consisting of: H109, MP125 and Z100. | 4-9 | A-673 |
| Z105 | COIL ASSEMBLY: Consisting of: A100, A101, A103, A111, E105, E108, E109, E115, L100, MP112, MP132, Z106, Z107 and Z109. | 4-3 | A-674 |
| Z106 | TANK COIL SUB ASSEMBLY (clockwise) | 4-3 | A-675-677 |
| Z107 | TANK COIL SUB ASSEMBLY (counterclockwise) | 4-3 | A-676 |
| Z108 | NOT USED. | | |
| Z109 | LINK COIL SUB ASSEMBLY (counterclockwise) | 4-3 | A-678 |
| Z110 | SPARK ROD ASSEMBLY: Consisting of: E122 and E129. | 4-6 | A-688 |

| SYM. | DESCRIPTION | FIGURE NO. | TMC DWG. OR PART NO. |
|---|---|---|---|
| Z111 | EXTENSION SHAFT ASSEMBLY: coupling and band switch. Consisting of: MP108 and MP115. | 4-3, 4-5 | A-714 |
| Z112 | COUPLING SWITCH BRACKET SUB ASSEMBLY: Consisting of: A105, A117, E106 and MP122. | 4-3 | A-720 |
| Z113 | BAND SWITCH BRACKET SUB ASSEMBLY: Consisting of: A110, A117, MP122 and Z103. | 4-5 | A-722 |
| Z114 | COVER ASSEMBLY. | 1-1 | A-644 |
| Z115 | CHASSIS SUB ASSEMBLY. | 4-3 | A-645 |
| Z116 | GROUND STRAP ASSEMBLY: Consisting of: E111, E118 amd E126. | 4-3, 4-5 | A-721 |
| Z117 | INPUT CONNECTOR ASSEMBLY: 5 in. lg. x 1-1/4 in. wide o/a. | 4-3, 4-7 | A-1353 |
| Z118 | GROUND LEAD ASSEMBLY: Consisting of: E115 and E118. | 4-7 | A-647 |
| Z119 | FUSEHOLDER STRAP ASSEMBLY: Consisting of: E110, E111 and E118. | 4-6 | A-731 |
| Z120 | FEED THRU CONNECTOR ASSEMBLY: 8-1/2 in. lg. x 1-3/8 in. wide o/a. | 4-3 | A-726 |
| Z121 | CONNECTOR ASSEMBLY: coil to coil, 5-1/8 in. lg. x 7/8 in. wide o/a. | 4-3 | A-732 |
| Z122 | OUTPUT CONNECTOR ASSEMBLY: 6 in. straight length, 2 in. radius. | 4-5 | A-733 |
| Z123 | CONDENSER STRAP ASSEMBLY: rear; 4-7/8 in. lg. x 1/2 in. | 4-5 | A-734 |
| Z124 | FEED THRU STRAP ASSEMBLY: 4-7/8 in. lg. x 1/2 in. wide o/a. | 4-4 | A-735 |
| Z125 | CONNECTOR ASSEMBLY: condenser to feed-thru; 2-3/8 in. lg. o/a. | 4-3 | A-736 |
| Z126 | CONNECTOR ASSEMBLY: thermocouple to wiper rod; 8-3/4 in. lg. o/a. | 4-4 | A-727 |
| Z127 | CONNECTOR ASSEMBLY: thermocouple to coil; 5-3/8 in. lg. o/a. | 4-6 | A-729-1 |

NOTE: IN CASES WHERE A PART IS USED SEVERAL TIMES THROUGHOUT THE UNIT IT IS ONLY LISTED ONCE.

ALL HARDWARE ARE STANDARD COMMERCIAL ITEMS EXCEPT AS LISTED.

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*Figur 4-10. Schematic Diagram, Ant nna Tuning Unit, M d l TAC-1*