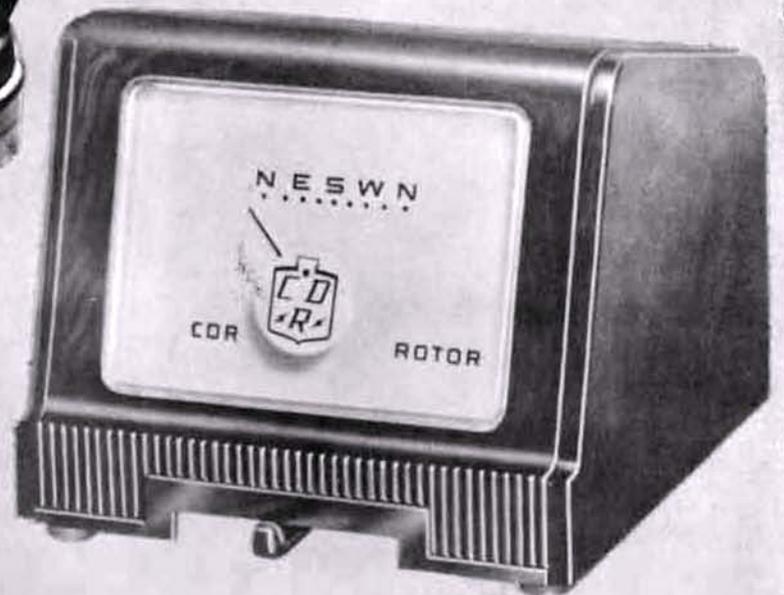


# MODEL TR-4

# ROTOR

# Service Bulletin

LEFT IT  
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SHELLDALE WAY



CONSISTENTLY DEPENDABLE

## CORNELL-DUBILIER

SOUTH PLAINFIELD, NEW JERSEY

• ROTORS

• CAPACITORS

• ANTENNAS

• VIBRATORS

• CONVERTERS



# SERVICING of the CDR CONTROL BOX

## ELECTRICAL SERVICE

Point to point D.C. resistance measurements on Control Unit.

**IMPORTANT:** A.C. power source must be disconnected.

Disconnect cable from control unit and check continuity at terminal strip at the back of the control box, Figure C. Any accurate ohmmeter may be used, provided the current drawn by the instrument does not exceed 50 milliamperes. Damage to the meter in the control unit may result if a less sensitive ohmmeter is used. Check points, switch positions, and approximate D.C. resistance values are indicated below:

Terminals	Switch	Resistance
1-2 (Allow time for cap. to charge)	Center	Above 100-K ohms
1-4	Left	2 ohms
2-4	Right	2 ohms
3-4	Center	190 ohms
Line Plug	Left or Right	14-16 ohms
Line Plug to Chassis	Left or Right	Infinite

After both units have been re-assembled and Rotor unit mounted on mast, it will be necessary to re-calibrate the indicator as follows:

Shift switch lever to right position to turn the Rotor. When the end of rotation is reached, the needle must be on the right North position. To adjust, rotate the rheostat either in a clockwise or counter-clockwise direction until the above condition is obtained.

**NOTE:** This adjustment is best made as the needle approaches the right North position. Upon the end of rotation, the motor current will increase to a locked Rotor value which may lead to incorrect calibration at other compass points.

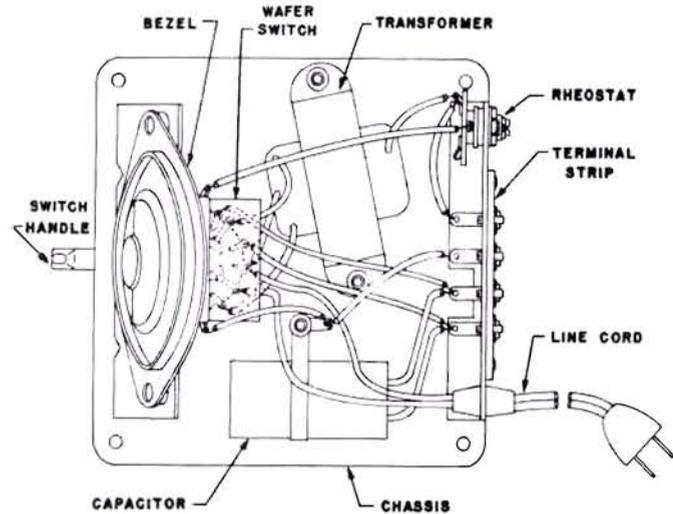


Fig. A

The adjustment is optimum when the needle is at a position at the center of the "N" an instant before Rotor reaches its end of revolution.

The dealer should explain to his customer that the meter is not a compass, but merely an indication of direction.

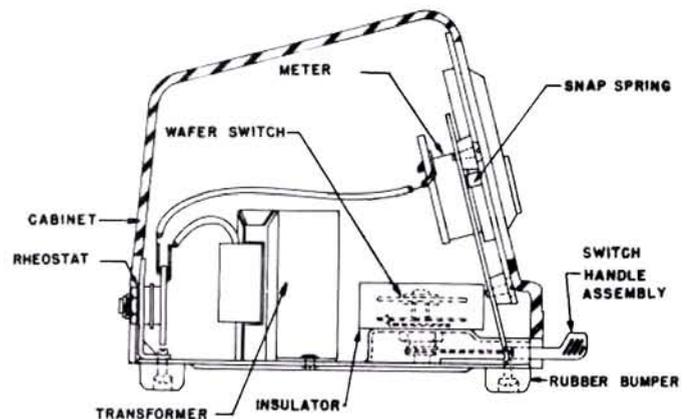


Fig. B

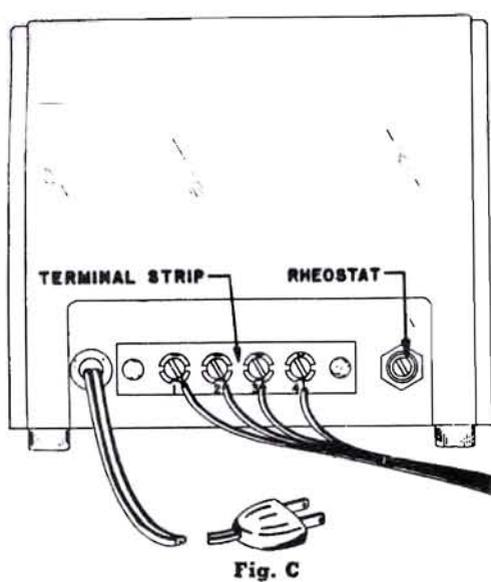
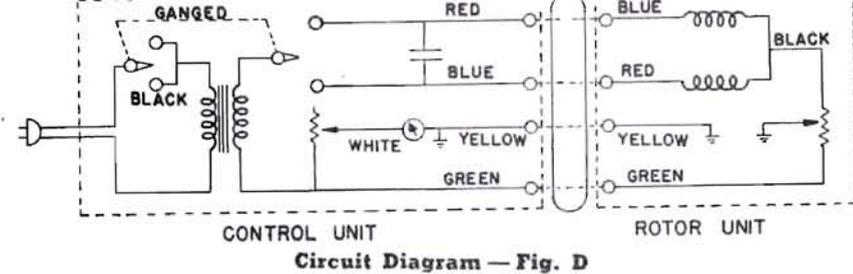


Fig. C

## PARTS & PRICE LIST

### TR-4 CONTROL UNIT

Part No.	Name	Quan.	Price (Each)
MCU-32	Meter Control Unit (Walnut)	1	\$17.45
MCU-32W	Meter Control Unit (Ivory)	1	19.45
MCU-2	Rheostat	1	.75
MCU-5-1	Handle (Walnut)	1	.50
MCU-5-2	Handle (Ivory)	1	.50
MCU-7	Bezel	1	.85
MCU-8-1	Dial Plate and Meter	1	6.50
MCU-8-2			
MCU-10	Spring, Snap	3	.05
MCU-13	Transformer	1	5.00
MCU-17	Insulator, Switch	1	.20
MCU-38	Switch, Wafer	1	1.00
MX-22-1	Cabinet, (Walnut)	1	2.75
MX-22-2	Cabinet, (Ivory)	1	4.75
MX-31	Button, Trademark	1	.10
MX-38	Washer, Ext. Shoulder	1	.03
MX-39	Washer, Flat	1	.03
MX-51	Washer, Plain Fibre	1	.10
	$\frac{1}{2}$ " OD x .205" ID x $\frac{1}{16}$ "	1	.10
RCP-5-2	Strip, 4 Pt. Terminal	1	.35
RP-36	Bumper, Recess	4	.02
SS-63-2	Screw, Rd. Hd. Self Tap	3	.03
	Type 23 #6 x $\frac{3}{8}$ "		
SS-71-2	Screw, Rd. Hd. Th'd Cutting	4	.03
	Type F #6-32 x $\frac{1}{2}$ "		
TRB-4	Capacitor	1	3.00
WM-12-1	Cord and Plug (Brown)	1	.80
WM-19-1	Cord and Plug (Ivory)	1	.80



Circuit Diagram — Fig. D



MX-22-1

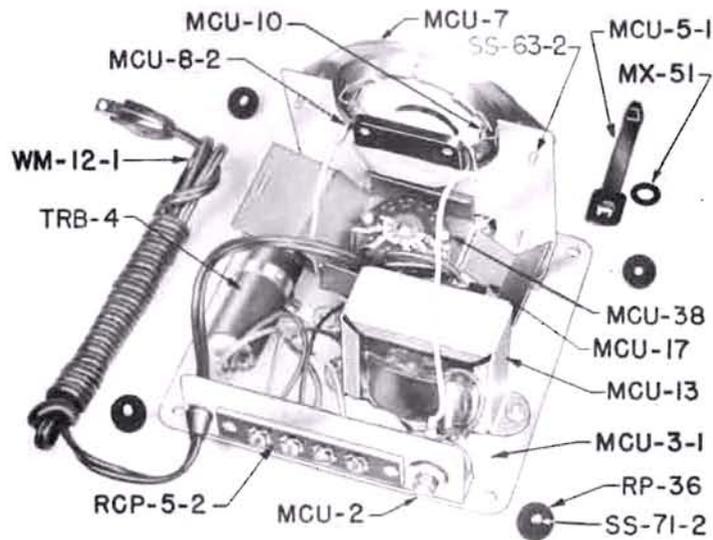


Fig. E

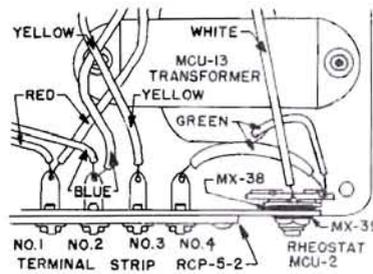


Fig. F

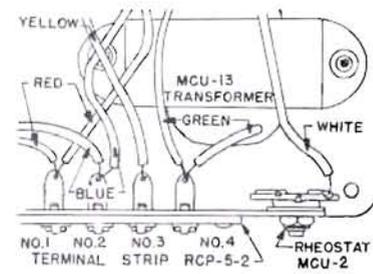
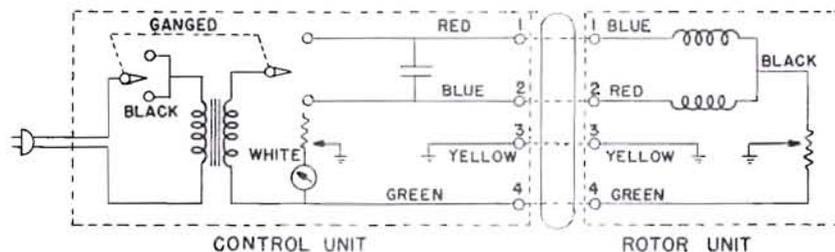


Fig. G

The insulating washers (MX-38 and MX-39) see Fig. F were removed from the rheostat and the new method of wiring is shown in Fig. G. The revised wiring diagram is shown in Fig. H.

Previous method of wiring the rheostat is shown in Fig. D and Fig. F.



Circuit Diagram — Fig. H

# SERVICING the CDR

## TR-4 ROTOR

### GENERAL

To service the Rotor, first remove the cable from the terminal connections and then the Rotor from its mounting mast.

Check for your difficulty by using the trouble shooting chart included in this bulletin. In the exploded view (Fig. 4) the individual parts of the Rotor with their part numbers are shown. Use this reference to order parts by the proper part number.

### DISASSEMBLY

To disassemble the Rotor follow the steps given below:

1. The lower mast support casting is removed by removing the four hex head screws at the bottom of rotor.
2. To remove the upper mast support or bell housing remove the four round head screws which hold the rotor base to the bell housing with a retaining ring. Hold the retaining ring to the bell housing and place the rotor in an upright position on any flat surface being used as a working area. The bell housing can now be removed without disturbing the retaining ring from its position on the rotor base.
3. Remove the bell housing carefully so as not to bend or distort the potentiometer contact which is located in the bell housing. The rotor parts are now accessible.
4. The entire electrical system of the rotor can be removed without unsoldering any connections. First remove the screws (SS-63-2) that hold the terminal strip (TRA-50) to the rotor base. (Check exploded view Fig. 4). Shift the terminal strip until it can be slipped through the hole in the rotor base. Remove the screw that holds the small terminal strip (IT-69) to the motor mounting plate. Remove the two hex nuts and shoulder

washers from the mounting plate studs. The potentiometer can now be removed from the mounting plate studs. Next remove the insulator paper ring then remove the spacers and nuts, and slide the motor off the mounting studs. The completely wired electrical assembly is now free of the base plate.

5. The three screws that hold the motor mounting plate are removed and the plate can be lifted from its position. The gears and their spacers are now accessible and can be removed. The stop can be removed by removing the spring grip lockwasher that locks it in place.

### TO ASSEMBLE THE ROTOR

1. Using the gear train diagram (Fig. 3) replace the gears and their spacers. Then place the motor mounting plate in its position and replace only two screws, leaving out the screw that holds the ground terminal strip to the motor mounting plate.
2. Place the rotor base so that the terminal connecting strip hole at the bottom of the base is toward the repairman. The motor is then placed so that the slotted mounting hole of the motor is over the mounting stud that is to the left side of the repairman. The motor lead wires will be pointing toward the terminal connecting strip. Now adjust the motor pinion gear with the gear train. Move the motor back and forth along the slotted hole at the same time turn the gear train with the other hand until the best position of the motor is obtained. In the proper position the gear will run quietly without binding, then tighten the motor with the two nuts.
3. Replace the flat washers and the fiber spacer. The insulator paper ring is placed on the motor. Next position the potentiometer on the mounting

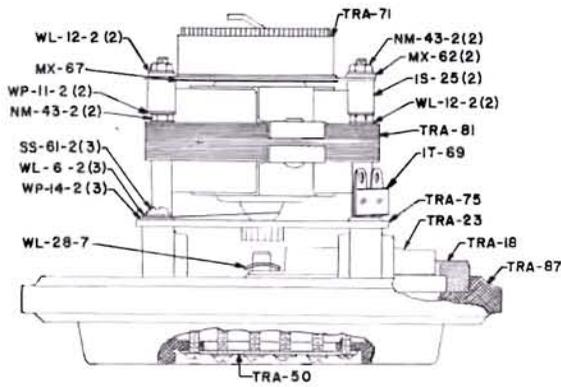


Fig. 1

studs. Place it so the lift cam which is the finger like projection of the potentiometer strip is away from the terminal strip hole of the rotor base. The shoulder washers are designed to keep the potentiometer from grounding against the studs. Place them through the potentiometer holes and tighten the potentiometer in place with the nuts.

4. Now the small terminal ground strip can be put in place with the remaining motor mounting plate screw (SS-473-2). The terminal connecting strip is then slipped through the rotor base hole and held in place with the screws (SS-63-2).

5. **IMPORTANT: To replace the bell housing run the rotor clockwise by hand to the end of rotation.** By observing the stop on the driving gear the correct position can be obtained. The rotor should be rotated clockwise until the stop boss on the driving gear is against the stop angle. The rotor base is placed in a position so that the terminal strip is away from the person repairing the unit and the lift cam of the potentiometer assembly is facing the repairman. The bell housing is lifted by the right hand with the contact inside the bell housing pointing toward the repairman. The bell housing is tilted away from the terminal strip of the Rotor base and placed so that the contact will

rest on the lift cam of the potentiometer assembly. Then the bell housing is shifted carefully until the slots fit into the lugs of the driving gear. Replace the four round head screws of the housing retainer ring which holds the bell housing to the rotor base and replace the lower mast support.

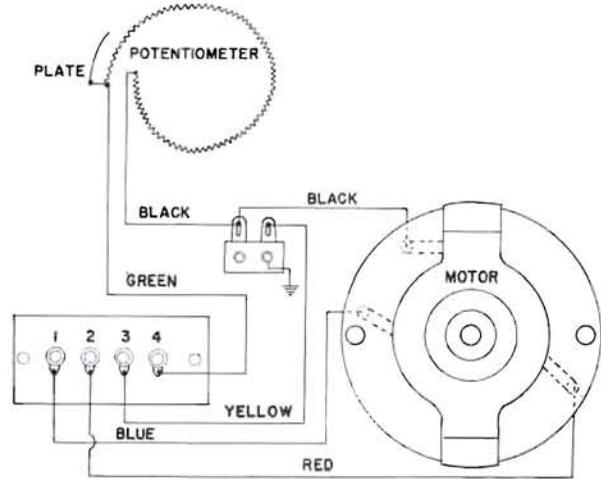
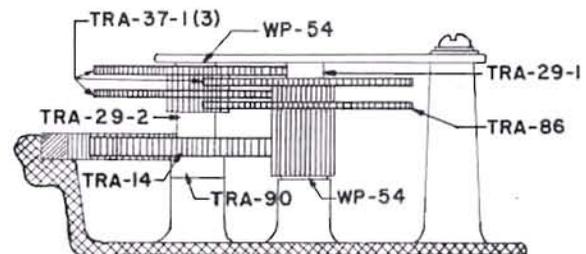


Fig. 2

Part No.	Name	Quan.	Price (Each)
AK-83	Gear Train Accessory Kit	1	\$ 4.00
Consists of the following:			
TRA-29-1	Spacer, $\frac{3}{8}$ " dia. x .125"	1	.05
TRA-29-2	Spacer, $\frac{3}{8}$ " dia. x .188"	1	.10
TRA-37-1	Ass'y, Gear and Pinion	3	.75
TRA-37-2	Ass'y, Gear and Pinion	1	.90
TRA-14	Gear, Large Spur	1	1.00
TRA-86	Ass'y, Gear and Pinion	1	.90
TRA-90	Bushing	1	.10
WP-54	Washer, Thrust Brass	4	.03



NOTE: TRA-39 REPLACED THE SPUR GEAR TRA-14 IN LATER SERIES.

Fig. 3

# TR-4 ROTOR

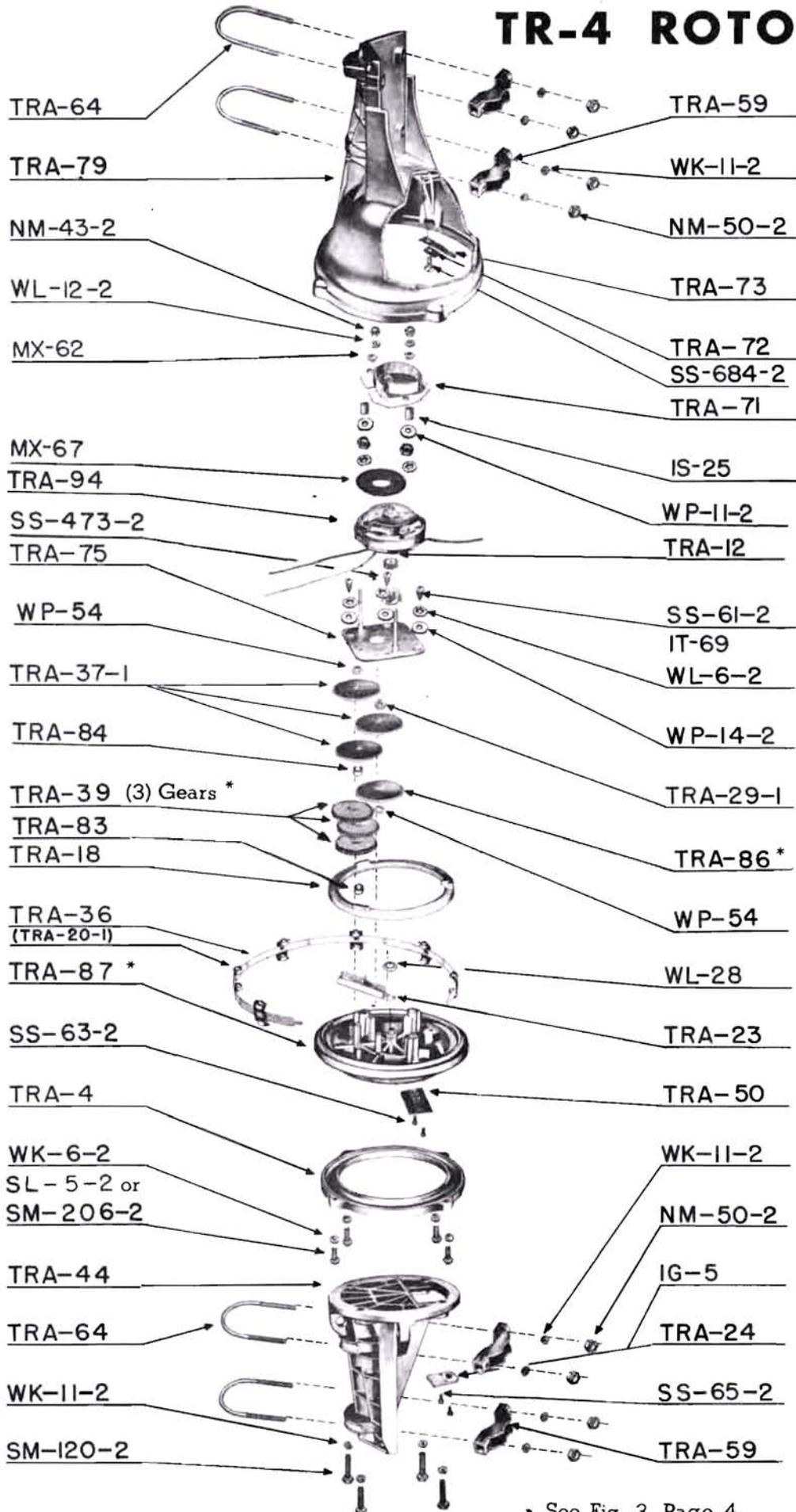


Fig. 4

\* See Fig. 3 Page 4.

# LIST

## TR-4 ROTOR UNIT SERIES 7 & 11

Part No.	Name	No. Req'd.	Price (Each)
TRA-82	Rotor, Assembly	1	\$32.50
IG-5	Grommet, Rubber	1	.05
IS-25	Spacer	2	.10
IT-69	Strip, Terminal	1	.10
MX-62	Washer, Shoulder	2	.03
MX-67	Ring, Insulator	1	.06
NM-43-2	Nut, Hex (# 8-32 x 1 1/32")	4	.03
SL-5-2	Screw, Sems	4	.03
SM-206-2	Screw, Rd. Hd. Mach. (# 12-28 x 5/8")	4	.03
SS-473-2	Screw, Rd. Hd. Thread Cutting (# 10-24 x 1/2") Type F	1	.03
SS-61-2	Screw, Rd. Hd. Thread Cutting (# 10-24 x 3/8") Type F	2	.03
SS-63-2 or	Screw, Rd. Hd. Self Tap (# 6-32 x 3/8") Type 23	2	.03
SS-65-2 or	Screw, Rd. Hd. Self Tap (# 6-32 x 3/8") Type I		.03
SS-67-2	Screw, Rd. Hd. Self Tap (# 6-32 x 3/8") Type F		.03
SS-684-2	Screw, Rd. Hd. Self Tap (# 8-32 x 3/8") Type F	1	.03
TRA-4	Ring, Retaining	1	1.25
TRA-12	Pinion, Motor	1	.40
TRA-14	Gear, Spur	1	1.00
TRA-17	Washer, Thrust	1	.03
TRA-18	Gear, Driving	1	1.25
TRA-20-1	Bearing, Ball	12	.05
TRA-23	Assembly, Pivot, Arm and Stop Angle	1	.20
TRA-24	Cover, Terminal	1	.10
TRA-29-1	Spacer	1	.05
TRA-29-2	Spacer	1	.10
TRA-36	Assembly, Strap and Bearing Retainer	1	.50
TRA-37-1	Assembly, Gear and Pinion	3	.75
TRA-39	Gear, Spur	3	.30
TRA-44	Assembly, Lower Mast Support and Terminal Cover	1	3.00
TRA-50 <sup>†</sup>	Strip, Terminal	1	.50
TRA-71	Assembly, Potentiometer	1	3.50
TRA-72	Retainer, Contactor	1	.03
TRA-73	Contacto	1	.05
TRA-75	Assembly, Mounting Plate and Stud	1	.50
TRA-79	Assembly, Upper Mast Support and Contactor	1	6.00
TRA-81	Assembly, Motor and Pinion	1	8.75
TRA-83	Bushing, Shoulder	1	.15
TRA-84	Spacer	1	.10
TRA-86	Assembly, Gear and Pinion	1	.90
TRA-87	Assembly, Base and Gear Shaft	1	3.00
TRA-94	Motor	1	8.25
WK-6-2	Lockwasher, (Split # 12)	4	.03
WP-11-2	Washer, Flat	2	.03
WP-14-2	Washer, Flat (1/2" O.D. x .203" I.D.)	3	.03
WL-6-2	Lockwasher, Int. (# 10)	3	.03
WL-12-2	Lockwasher, Ext. (# 8)	4	.03
WL-28	Lockwasher (Spring Grip)	1	.05
WP-54	Washer, Thrust	1	.03
AK-97	Kit Accessory	1	3.50
NM-50-2	Nut, Hex (1/4"-20)	8	.03
TRA-59	Clamp, Mast Mount	4	.50
TRA-64	Bolt, "U" Type	4	.25
SM-120-2	Screw, Hex. Hd. Mach. (1/4"-20 x 1")	4	.05
WK-11-2	Lockwasher (Split 1/4")	12	.03

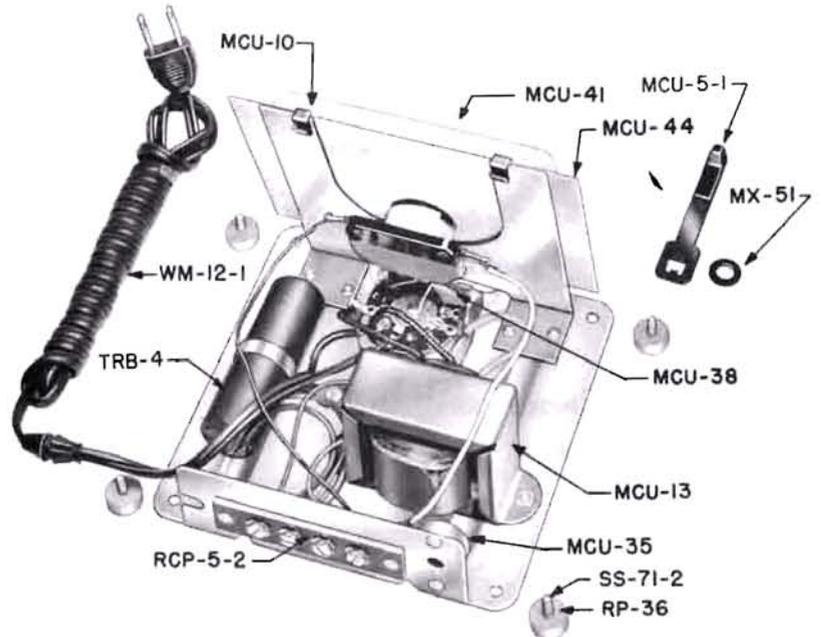
# PARTS & PRICE

## LIST TR-4 CONTROL UNIT SERIES 11

The latest TR-4 control unit incorporated a new dial face and a change in the cabinet. The complete control unit is interchangeable with pervious series TR-4 control units.

### PARTS AND PRICE LIST

Part No.	Name	Quan-	Price Each
MCU-43	Meter Control Unit (Walnut)	1	\$17.45
MCU-43-W	Meter Control Unit (Ivory)	1	19.45
MCU-5-1	Handle (Walnut)	1	.50
MCU-5-2	Handle (Ivory)	1	.50
MCU-10	Spring, Snap	2	.05
MCU-13	Transformer	1	5.00
MCU-35	Rheostat	1	40
MCU-36	Button, Trademark	1	.10
MCU-38	Switch, Wafer	1	1.00
MCU-41	Crystal, Dial	1	25
MCU-44	Dial, Face & Meter	1	6.95
MX-51	Washer, Plain Fibre 1/2" O.D. x .205" I.D.	1	.10
MX-68-1	Cabinet, (Walnut)	1	2.75
MX-68-2	Cabinet, (Ivory)	1	4.75
RCP-5-2	Strip, 4 Pt. Terminal	1	.35
RP-36	Bumper, Recess	4	.02
SS-63-2	Screw, Rd. Hd. Self-Tap. #6 x 3/8" Type 23	3	.03
SS-71-2	Screw, Rd. Hd. Th'd. Cutting #6-32 x 1/2" Type F	4	.03
TRB-4	Capacitor	1	3.00
WM-12-1	Cord and Plug (Brown)	1	.80
WM-19-1	Cord and Plug (Ivory)	1	.80



## DIFFICULTY

## CHECK:

1. Rotor inoperative.  
No meter indication.
  - a. Control box line cord to A.C. outlet.
  - b. Cable connections for correct sequence.
  - c. For open circuit in potentiometer strip in Rotor.
  - d. Switch (S-1) in control box.
  - e. For defective transformer (T).
  
2. Rotor inoperative but meter indicates.
  - a. Capacitor (c) by substitution. If defective, replace with non-polarized type only of the same value.
  - b. Defective transformer.
  - c. Incorrect cable sequence wiring or open line — particularly lead No. 4.
  - d. Gear train for binding. Broken gear teeth or loose pinions.
  - e. Motor (m), for shaft binding, also check for opened or shorted field coils.
  
3. Rotor operates normally.  
Meter inoperative.
  - a. No. 3 lead open.
  - b. Defective meter. Shorted potentiometer strip.
  - c. Broken or bent contact arm.
  - d. Open adjusting control in control box.
  
4. Rotor operates normally.  
Meter indicates at some positions only.
  - a. Poor lead contact in cable.
  - b. Shorted potentiometer strip.
  - c. Bent or broken contact arm in Rotor.
  
5. Meter indicates incorrectly.
  - a. Incorrect initial adjustment.
  - b. Defective meter.
  - c. Defective potentiometer strip.
  - d. Defective capacitor.
  - e. Defective motor.
  - f. Poor lead connection, or broken transmission line.
  - g. Transmission line too long. See our Engineering Bulletin No. 9, Aug. 1953.
  - h. Defective adjustment control on control box.
  
6. Rotor runs in one direction only.
  - a. Up against the stop, try reversing direction.
  - b. Defective Control Box switch.
  
7. Rotor runs but lacks power.
  - a. Defective motor.
  - b. Defective capacitor.
  - c. Low line voltage.
  
8. Rotor motor operates, meter indicates, but rotor housing does not turn.
  - a. Stripped gears.



