

Flesher Corporation

TU-300 KIT ASSEMBLY MANUAL

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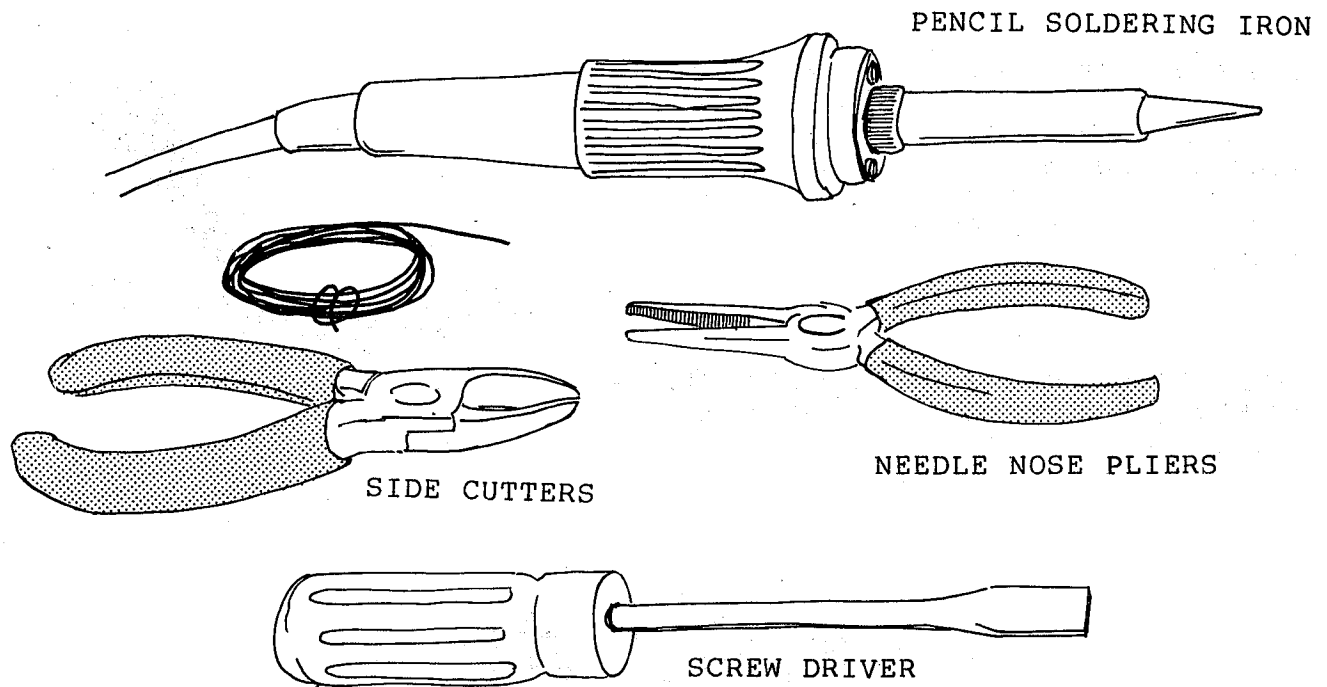
ASSEMBLY INSTRUCTIONS

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TU-300 KIT ASSEMBLY INSTRUCTIONS



TOOLS NEEDED FOR ASSEMBLY

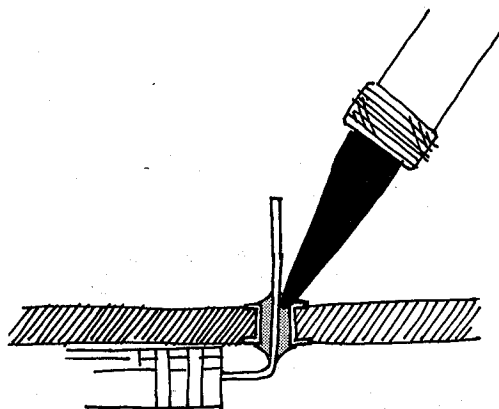
This TU-300 ASSEMBLY MANUAL consists of step-by-step assembly instructions which are designed to be easy to understand and follow. The end result of your kit building efforts will depend in part on the care you take at each step of the way. Take your time and take pride in your work. You'll enjoy using your TU-300 even more.

Soldering is one of the most critical areas of assembling kits. Poor soldering techniques make up a majority of the problems encountered by our service department on kits returned for repair. Use a 25 to 40 watt pencil soldering iron for soldering components to the PC boards. A good quality electronic solder is supplied with this kit and should be used during assembly. See soldering illustrations below and on the next page for hints on good soldering techniques.

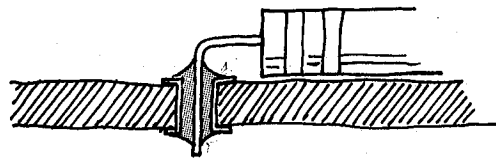
Specific soldering instructions are not included and it is left up to the builder to decide whether to solder each component as it is installed on the circuit board or to install several components and then solder them. If several components are installed before soldering, make sure that none fall off of the board before they are soldered. Don't install too many components at a time before soldering or the clutter of leads will make soldering more difficult.

TU-300 KIT ASSEMBLY INSTRUCTIONS

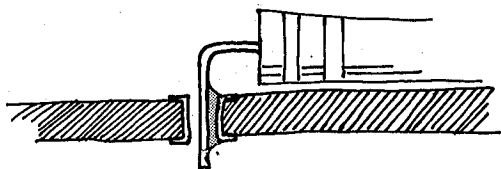
Position the tip of the soldering iron as shown in the illustration. Do not hold the iron on the contact area too long as prolong contact will blister and possibly lift or break the foil.



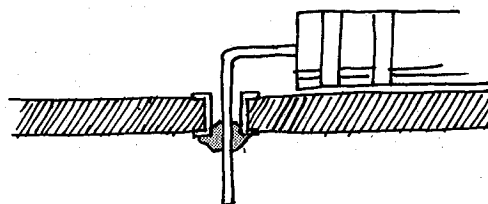
MAKE GOOD CONTACT WITH BOTH THE COMPONENT LEAD AND THE CIRCUIT BOARD FOIL.



GOOD CONNECTION - SOLDER SHOULD
LOOK SMOOTH AND SHINY



NOT ENOUGH SOLDER



TOO LITTLE HEAT - SOLDER DIDN'T
FLOW PROPERLY.

RESISTOR COLOR CODE



TOLERANCE
Gold, 5%
Silver, 10%
No Band 20%

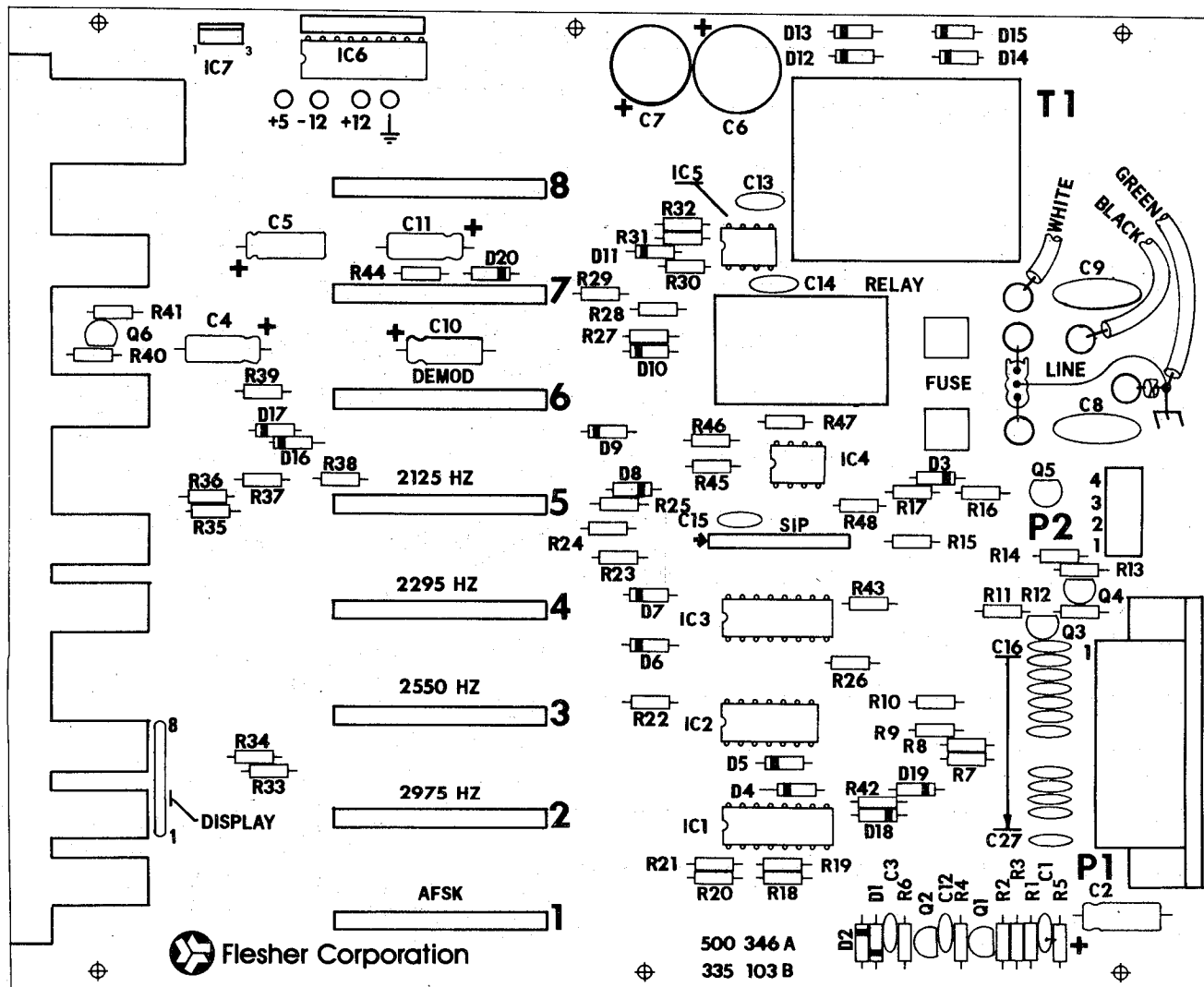
COLOR	1st DIGIT	2nd DIGIT	MULTIPLY BY
BLACK	0	0	1
BROWN	1	1	10
RED	2	2	100
ORANGE	3	3	1,000
YELLOW	4	4	10,000
GREEN	5	5	100,000
BLUE	6	6	1,000,000
VIOLET	7	7	10,000,000
GRAY	8	8	100,000,000
WHITE	9	9	1,000,000,000
GOLD			.1
SILVER			.01

***** Be sure to trim leads after soldering. *****

TU-300 KIT ASSEMBLY INSTRUCTIONS

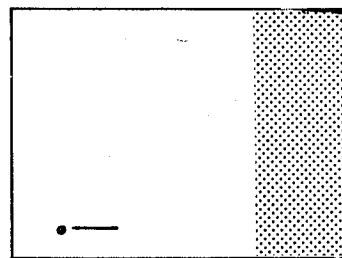
(MAIN CIRCUIT BOARD)

For the following assembly, position the board as shown below. Refer to the top right hand corner of the following pages of the main circuit board assembly to locate the portion of the board being assembled. Only part of the circuit board will be shown and that portion being assembled is represented by the shaded area.



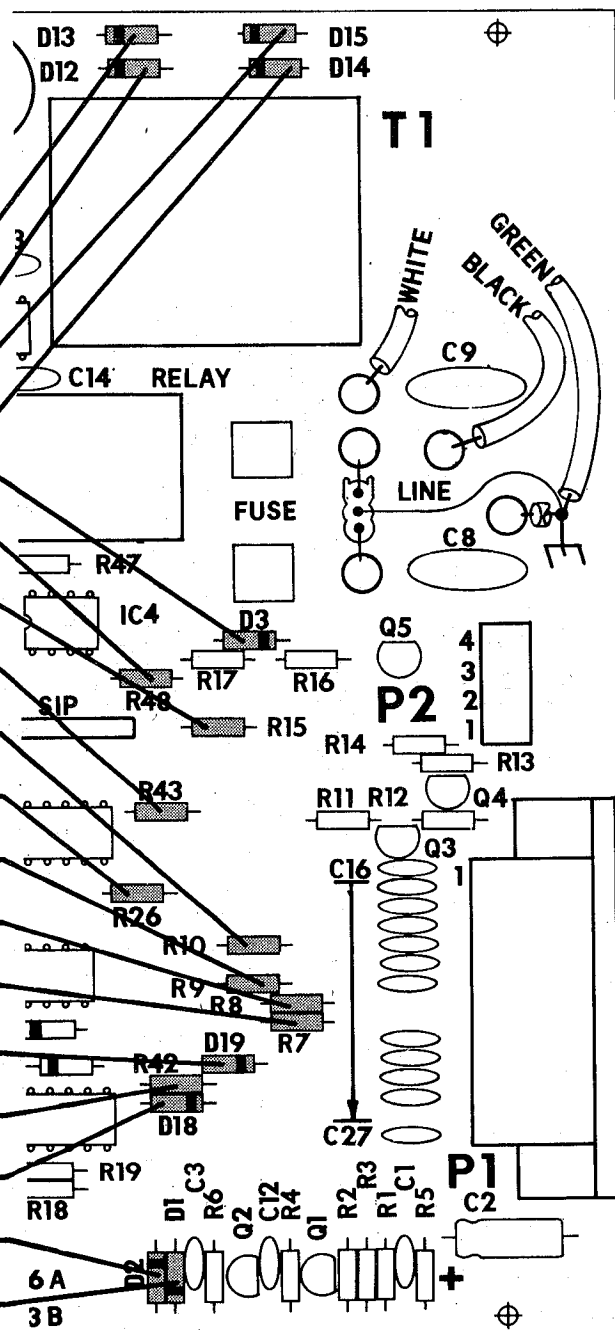
TU-300 KIT ASSEMBLY INSTRUCTIONS

(MAIN CIRCUIT BOARD)



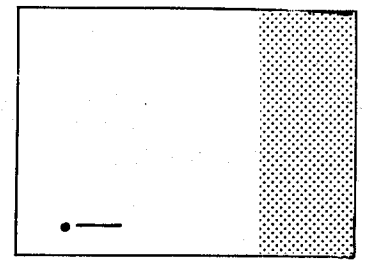
Install the following components on section #3.

- ✓ (✓) D13: 1N4003 diode
- ✓ (✓) D12: 1N4003 diode
- ✓ (✓) D15: 1N4003 diode
- ✓ (✓) D14: 1N4003 diode
- ✓ (✓) D3: 1N4148 diode
- ✓ (✓) R48: 1K ohm (BRN-BLK-RED)
- ✓ (✓) R15: 3.3K ohm (ORG-ORG-RED)
- ✓ (✓) R43: 3.3K ohm (ORG-ORG-RED)
- ✓ (✓) R10: 1K ohm (BRN-BLK-RED)
- ✓ (✓) R26: 10K ohm (BRN-BLK-ORG)
- ✓ (✓) R9: 4.7K ohm (YEL-VIO-RED)
- ✓ (✓) R8: 47K ohm (YEL-VIO-ORG)
- ✓ (✓) R7: 47K ohm (YEL-VIO-ORG)
- ✓ (✓) D19: 1N4148 diode
- ✓ (✓) R42: 10K ohm (BRN-BLK-ORG)
- ✓ (✓) D18: 1N4148 diode
- ✓ (✓) D2: 1N4148 diode
- ✓ (✓) D1: 1N4148 diode



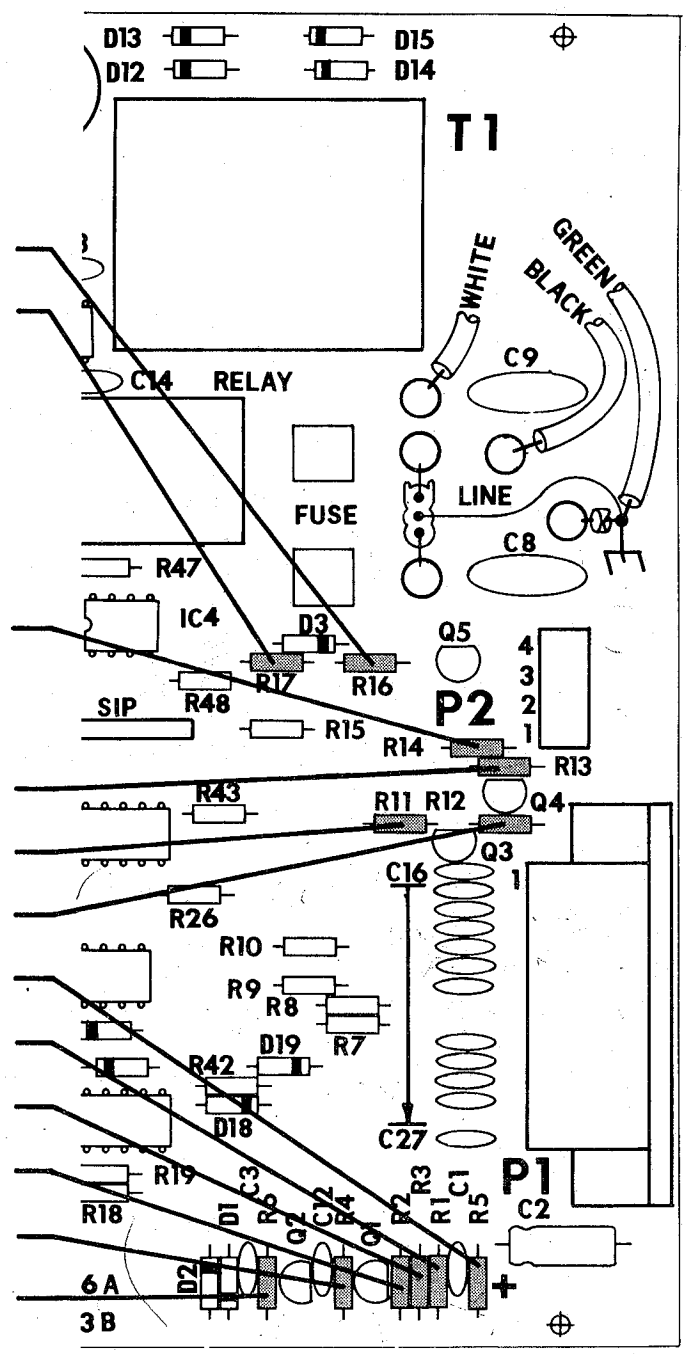
TU-300 KIT ASSEMBLY INSTRUCTIONS

(MAIN CIRCUIT BOARD)



Install the following components on section #3.

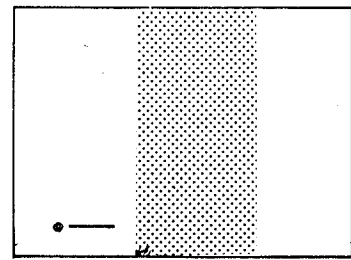
- ✓ (✓) R16: 10K ohm (BRN-BLK-ORG)
- ✓ (✓) R17: 2.7K ohm (RED-VIO-RED)
- ✓ (✓) R14: 2.7K ohm (RED-VIO-RED)
- ✓ (✓) R13: 2.7K ohm (RED-VIO-RED)
- ✓ (✓) R11: 2.7K ohm (RED-VIO-RED)
- ✓ (✓) R12: 2.7K ohm (RED-VIO-RED)
- ✓ (✓) R5: 330 ohm (ORG-ORG-BRN)
- ✓ (✓) R1: 330 ohm (ORG-ORG-BRN)
- ✓ (✓) R3: 2.2K ohm (RED-RED-RED)
- ✓ (✓) R2: 15K ohm (BRN-GRN-ORG)
- ✓ (✓) R4: 2.2K ohm (RED-RED-RED)
- ✓ (✓) R6: 1K ohm (BRN-BLK-RED)



18
12
30

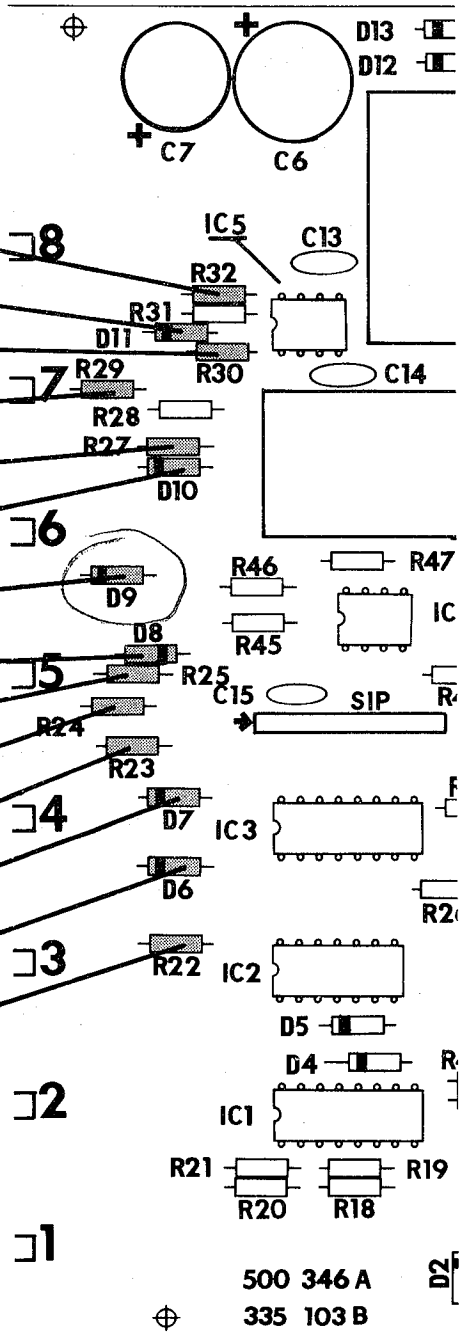
TU-300 KIT ASSEMBLY INSTRUCTIONS

(MAIN CIRCUIT BOARD)



Install the following components on section #2.

- ✓ (✓) R32: 220K ohm (RED-RED-YEL)
- ✓ (✓) D11: 1N4148 diode
- ✓ (✓) R30: 390K ohm (ORG-WHT-YEL)
- ✓ (✓) R29: 100K ohm (BRN-BLK-YEL)
- ✓ (✓) R27: 680 ohm (BLU-GRY-BRN)
- ✓ (✓) D10: 1N4148 diode
- () D9: 1N4148 diode (see note).
- ✓ (✓) D8: 1N4148 diode
- ✓ (✓) R25: 4.7K ohm (YEL-VIO-RED)
- ✓ (✓) R24: 4.7K ohm (YEL-VIO-RED)
- ✓ (✓) R23: 4.7K ohm (YEL-VIO-RED)
- ✓ (✓) D7: 1N4148 diode
- ✓ (✓) D6: 1N4148 diode
- ✓ (✓) R22: 4.7K ohm (YEL-VIO-RED)

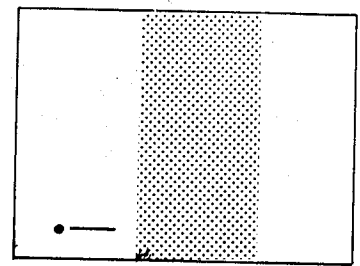


Note: Leave this diode out if a TU-300 AFSK circuit assembly is to be installed and used for tuning the filters. The diode will be installed later, during the filter tuning procedure. If any other method of tuning the filters is to be used, install the diode now.

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12
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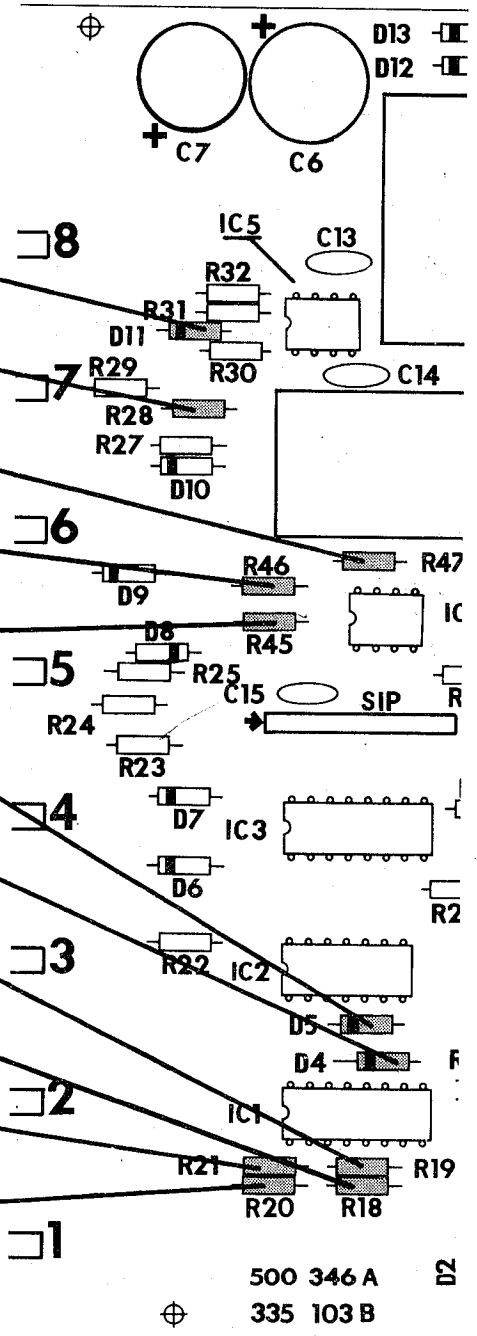
TU-300 KIT ASSEMBLY INSTRUCTIONS

(MAIN CIRCUIT BOARD)



Install the following components on section #2.

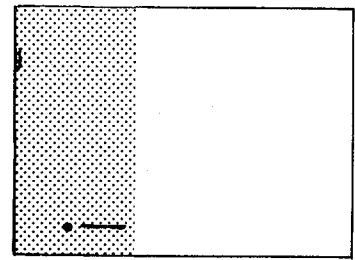
- ✓ (✓) R31: 100K ohm (BRN-BLK-YEL)
- ✓ (✓) R28: ^{300K} ~~220K~~ ohm (~~RED-RED-YEL~~)
- ✓ (✓) R47: 220K ohm (RED-RED-YEL)
- ✓ (✓) R46: 100K ohm (BRN-BLK-YEL)
- ✓ (✓) R45: 4.7K ohm (YEL-VIO-RED)
- ✓ (✓) D5: 1N4148 diode
- ✓ (✓) D4: 1N4148 diode
- ✓ (✓) R19: 270 ohm (RED-VIO-BRN)
- ✓ (✓) R18: 270 ohm (RED-VIO-BRN)
- ✓ (✓) R21: 100 ohm (BRN-BLK-BRN)
- ✓ (✓) R20: 100 ohm (BRN-BLK-BRN)



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11
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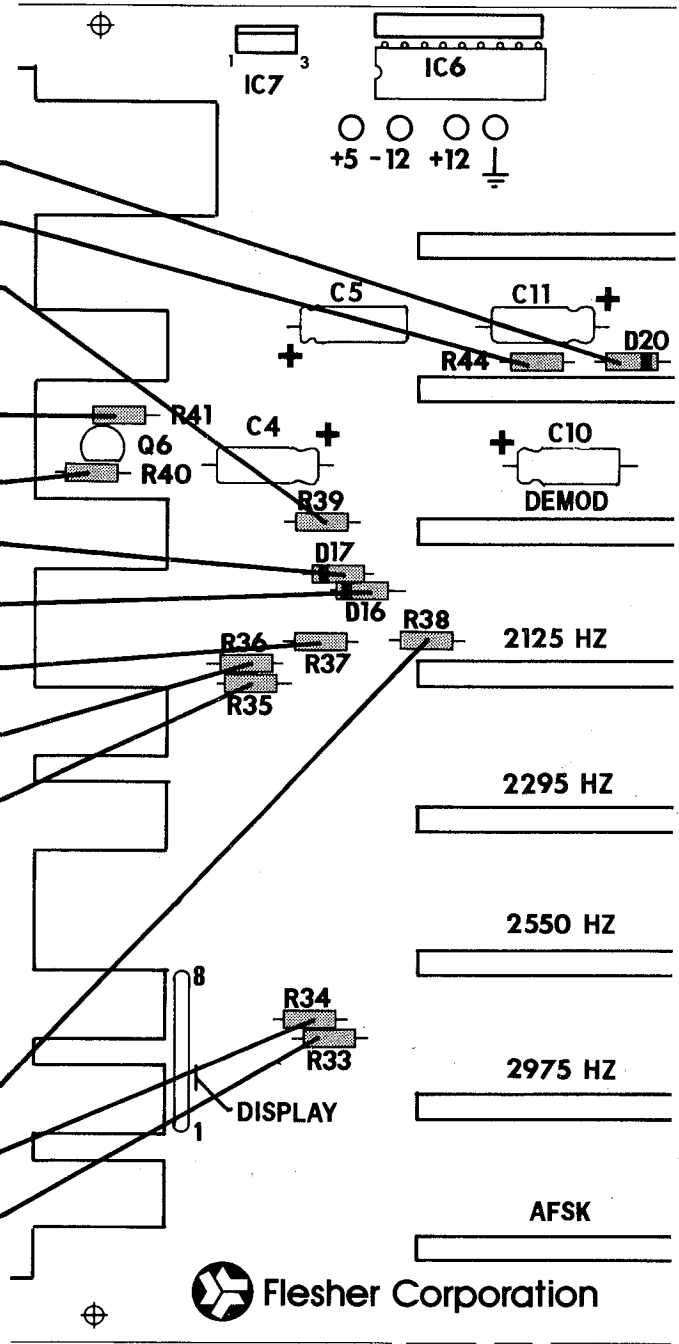
TU-300 KIT ASSEMBLY INSTRUCTIONS

(MAIN CIRCUIT BOARD)



Install the following components on section #1.

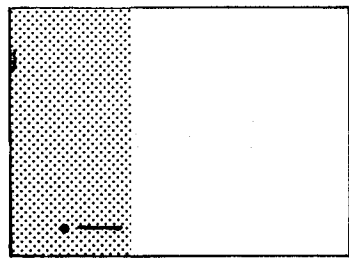
- ✓ (✓) D20: 1N4148 diode
- ✓ (✓) R44: 15K ohm (BRN-GRN-ORG)
- ✓ (✓) R39: 4.7K ohm (YEL-VIO-RED)
- ✓ (✓) R41: 2.7K ohm (RED-VIO-RED)
- ✓ (✓) R40: 2.7K ohm (RED-VIO-RED)
- ✓ (✓) D17: 1N4148 diode
- ✓ (✓) D16: 1N4148 diode
- ✓ (✓) R37: 100K ohm (BRN-BLK-YEL)
- ✓ (✓) R36: 100K ohm (BRN-BLK-YEL)
- ✓ (✓) R35: 220K ohm (RED-RED-YEL)
- ✓ (✓) R38: 390K ohm (ORG-WHT-YEL)
- ✓ (✓) R34: 1K ohm (BRN-BLK-RED)
- ✓ (✓) R33: 390 ohm (ORG-WHT-BRN)



Handwritten notes: 13/67

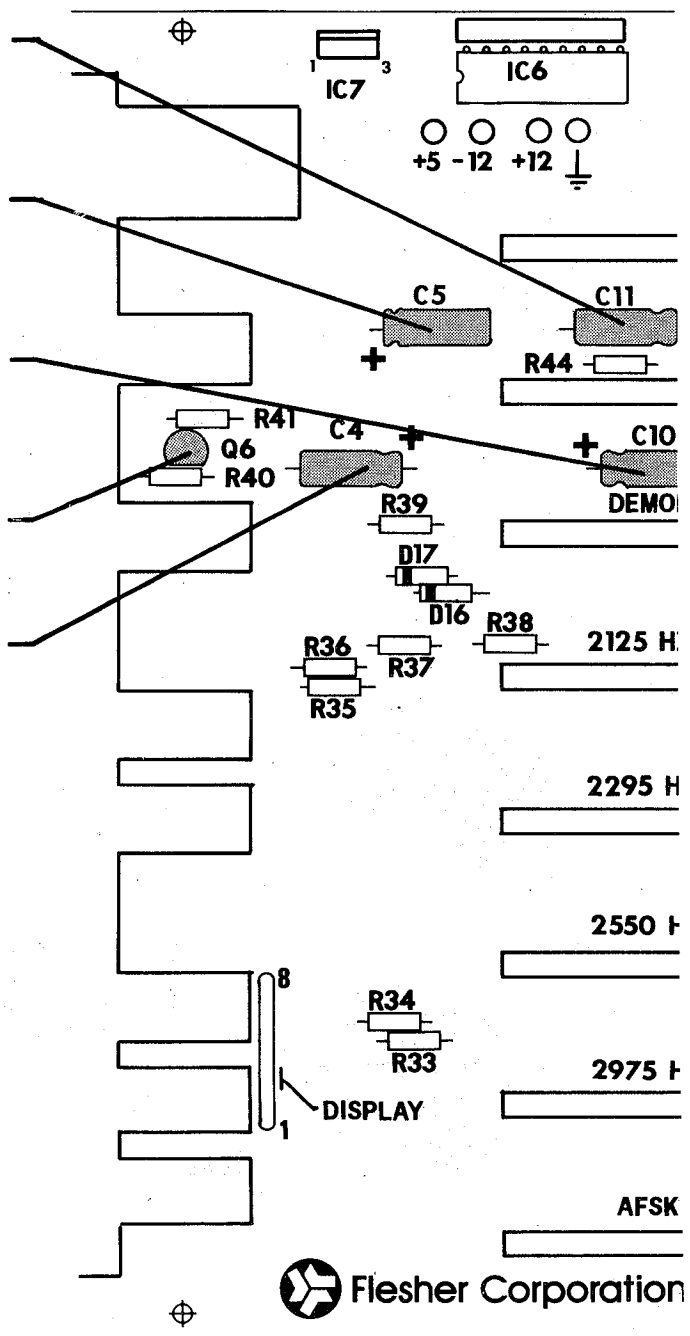
TU-300 KIT ASSEMBLY INSTRUCTIONS

(MAIN CIRCUIT BOARD)



Install the following components on section #1. Observe the polarity marks on the circuit board and be sure the capacitors are installed properly.

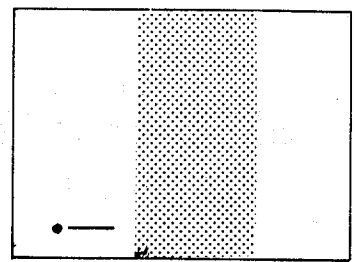
- (✓) C11: 4.7mfd electrolytic capacitor. Observe polarity.
- (✓) C5: 4.7mfd electrolytic capacitor. Observe polarity.
- (✓) C10: 4.7mfd electrolytic capacitor. Observe polarity.
- (✓) Q6: 2N4123, transistor.
- (✓) C4: 1.0mfd electrolytic capacitor. Observe polarity.



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/m

TU-300 KIT ASSEMBLY INSTRUCTIONS

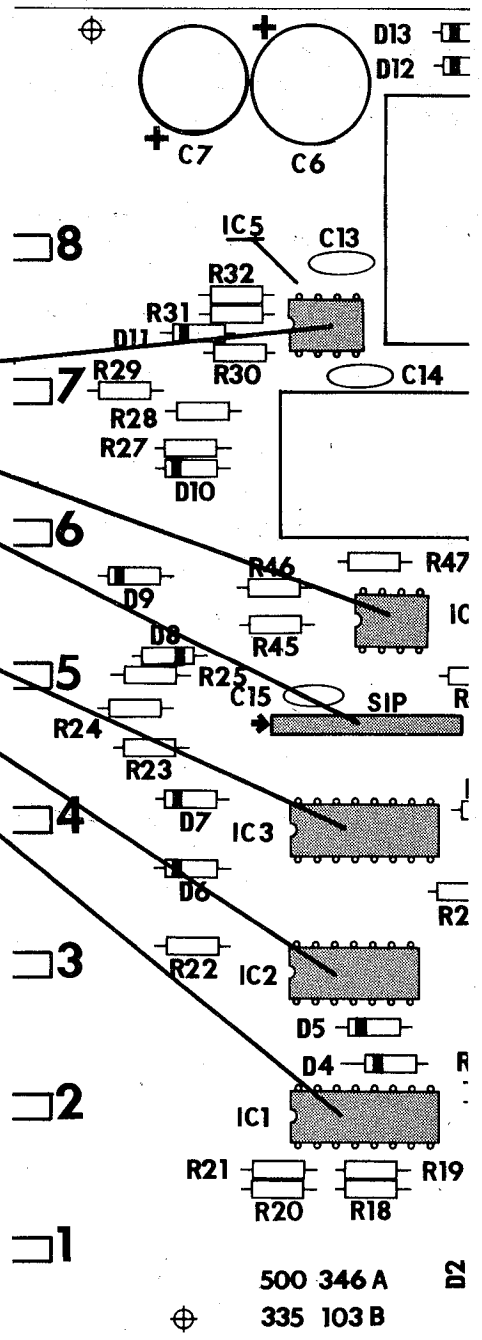
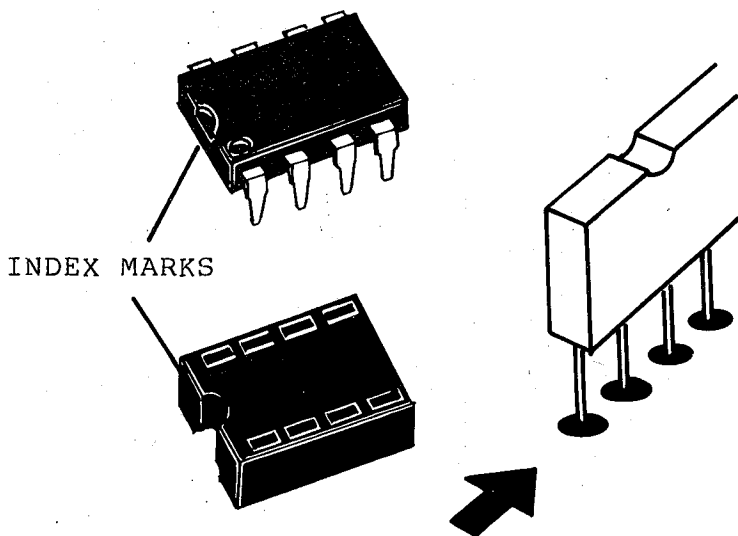
(MAIN CIRCUIT BOARD)



Install the following components on section #2.

Be sure the index marks of the IC sockets and SIP match the marks on the PC board. (See illustration below.)

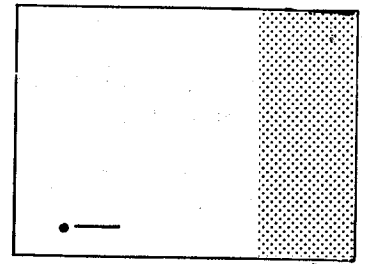
- ✓ (✓) Socket: IC5, 8 pin.
- ✓ (✓) Socket: IC4, 8 pin.
- ✓ (✓) SIP:(single in-line resistor package). Observe index mark on one end.
- ✓ (✓) Socket: IC3, 16 pin.
- ✓ (✓) Socket: IC2, 14 pin.
- ✓ (✓) Socket: IC1, 16 pin.



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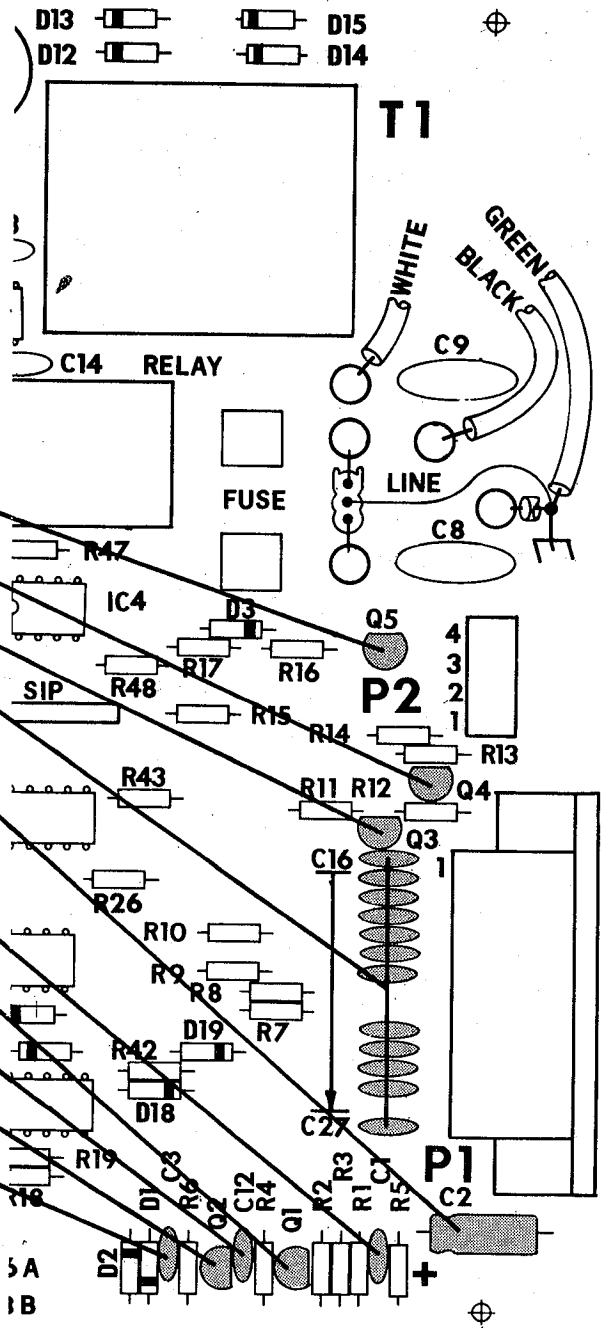
TU-300 KIT ASSEMBLY INSTRUCTIONS

(MAIN CIRCUIT BOARD)



Install the following components on section #3.

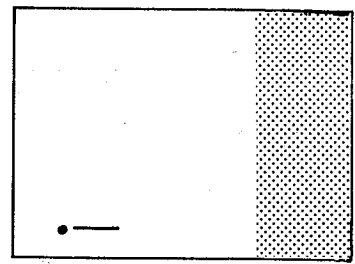
- ✓ (✓) Q5: 2N4123, transistor.
- ✓ (✓) Q4: 2N4123, transistor.
- ✓ (✓) Q3: 2N4123, transistor.
- ✓ (✓) C16: through C27: .01mfd disc capacitor.
- ✓ (✓) C2: 4.7mfd electrolytic capacitor. Observe polarity.
- ✓ (✓) C1: .1mfd disc capacitor.
- ✓ (✓) Q1: 2N4123, transistor.
- ✓ (✓) C12: .1mfd disc capacitor.
- ✓ (✓) Q2: 2N4123, transistor.
- ✓ (✓) C3: .1mfd disc capacitor.



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TU-300 KIT ASSEMBLY INSTRUCTIONS

(MAIN CIRCUIT BOARD)



Install the following components on section #3.

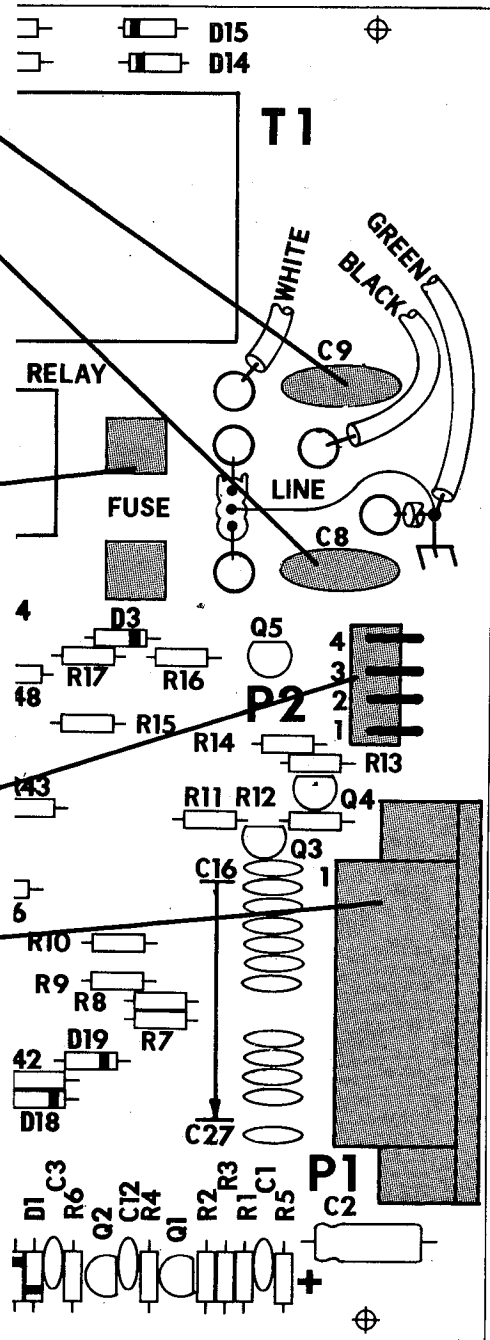
✓ (✓) C9: .01mfd, 1000v disc capacitor.

✓ (✓) C8: .01mfd, 1000v disc capacitor.

✓ (✓) Snap the fuse into the fuse clips to assure proper positioning and then install on PC board. Solder so not to damage the fuse internally.

✓ (✓) P2: connector, 4 pin male.

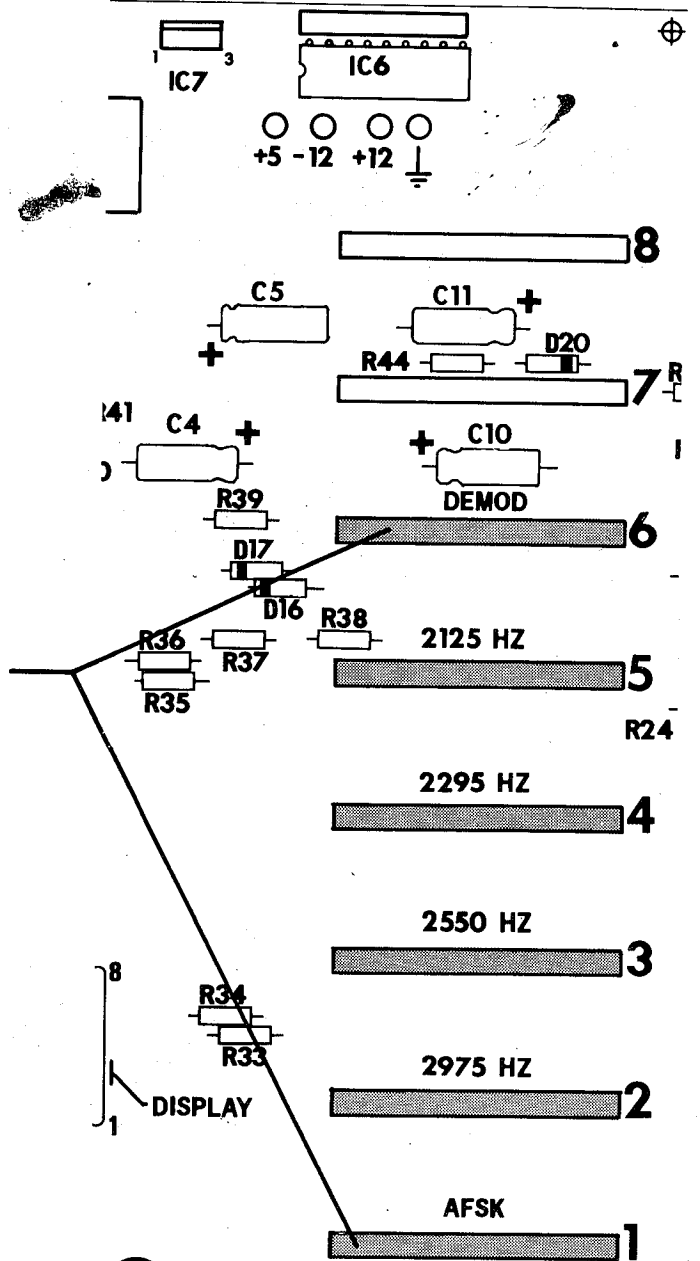
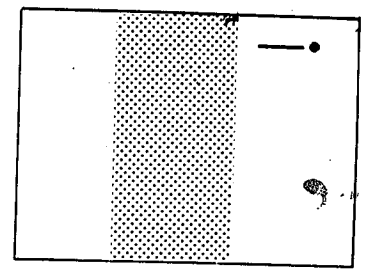
✓ (✓) P1: connector, 25 pin female.



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TU-300 KIT ASSEMBLY INSTRUCTIONS

(MAIN CIRCUIT BOARD)



Install the following components on section #1.

() Install six circuit board connectors in locations 1 through 6.

() Install the switch assembly. (SEE ILLUSTRATION ON NEXT PAGE.) Solder all terminals.

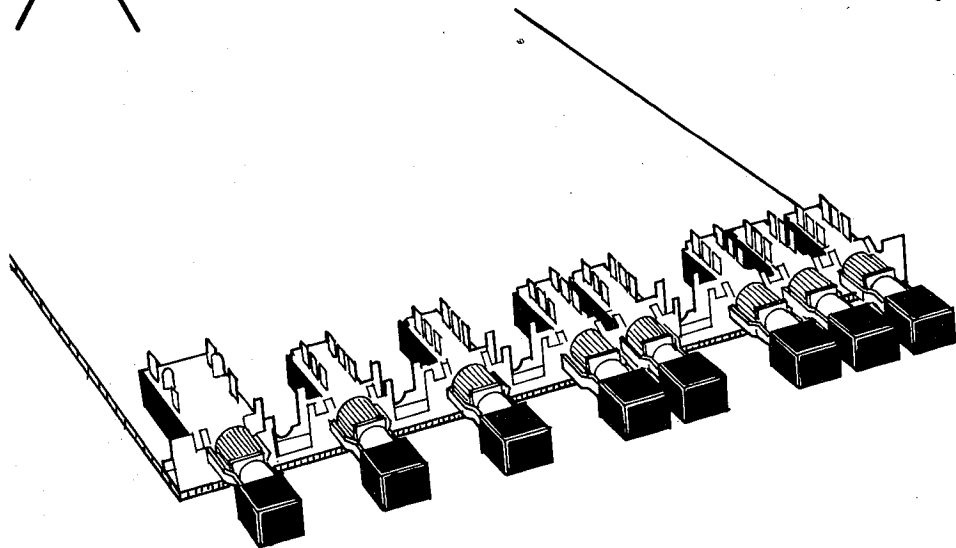
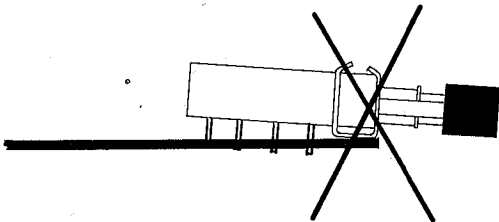
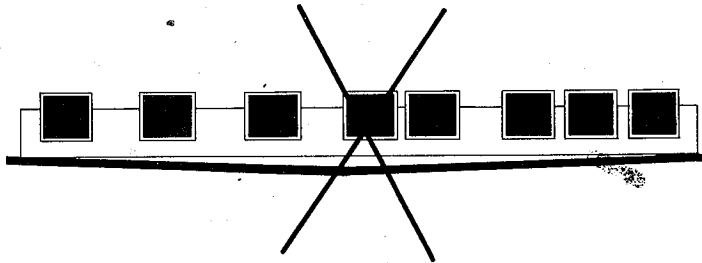


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TU-300 KIT ASSEMBLY INSTRUCTIONS

(MAIN CIRCUIT BOARD)

SWITCH ASSEMBLY ILLUSTRATION

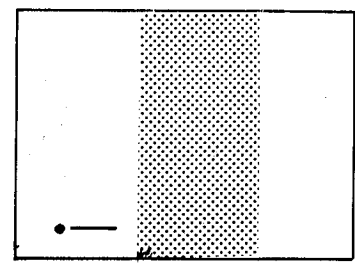


When installing the switch assembly, be sure the assembly is pressed flat and parallel to the circuit board. See illustrations.

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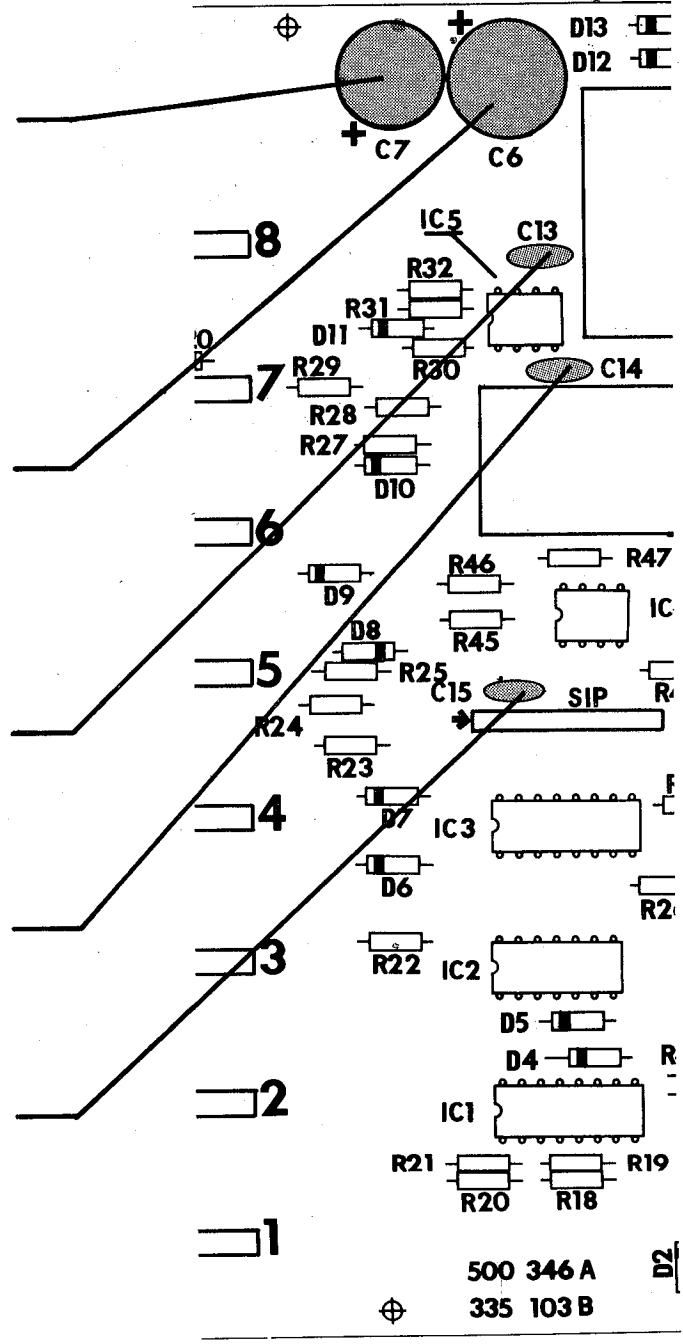
TU-300 KIT ASSEMBLY INSTRUCTIONS

(MAIN CIRCUIT BOARD)



Install the following components on section #2.

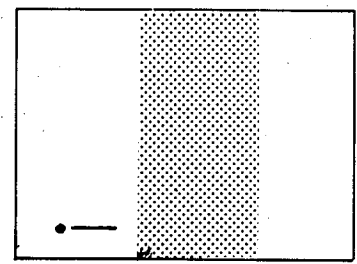
- (✓) C7: 220mfd electrolytic capacitor. Observe polarity markings on the side of the capacitor and on circuit board.
- (✓) C6: 470mfd electrolytic capacitor. Observe polarity markings on the side of the capacitor and on the circuit board.
- (✓) C13: .01mfd disc capacitor
100V
- (✓) C14: .01mfd disc capacitor
100V
- (✓) C15: .01mfd disc capacitor
~~100V~~ 50



Handwritten notes:
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TU-300 KIT ASSEMBLY INSTRUCTIONS

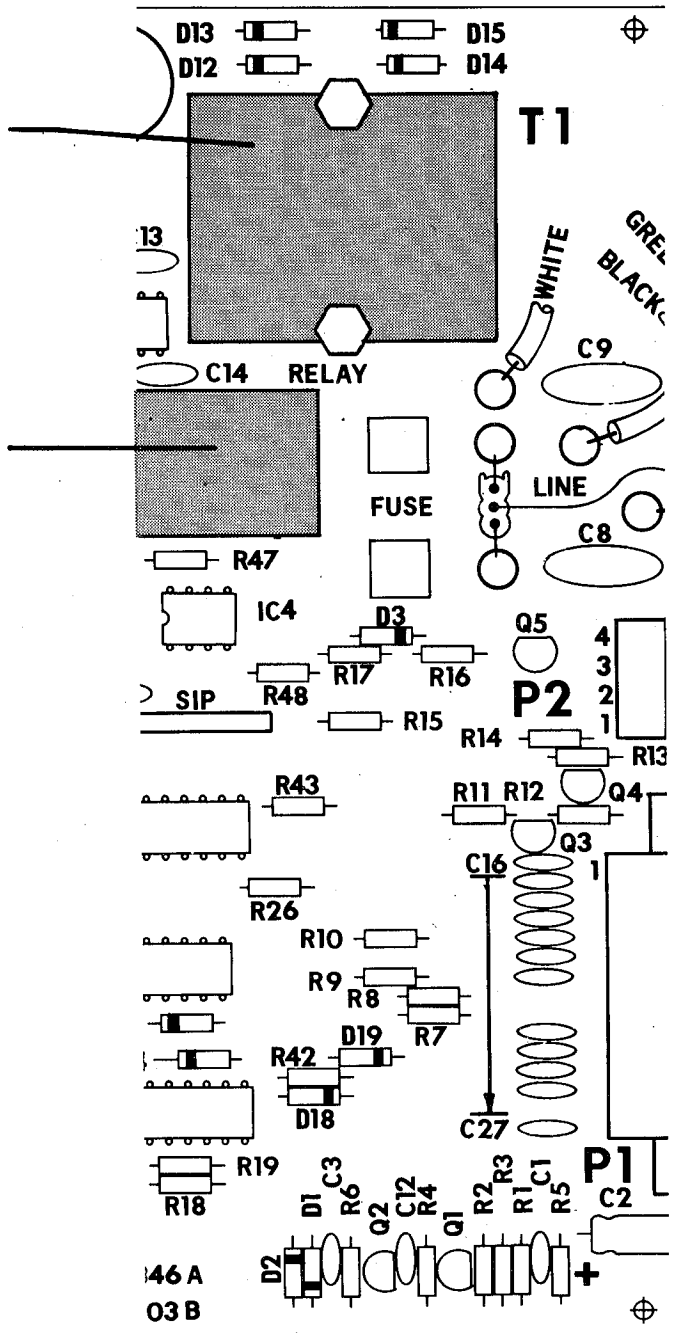
(MAIN CIRCUIT BOARD)



Install the following components on section #3.

✓ (✓) Install T1 power transformer in the location marked T1. Use 4-40 nylon screws and nuts to secure transformer to PC board before soldering the pins. Trim leads close to the circuit board.

✓ (✓) Install relay in location marked 'RELAY'. Trim leads close to the circuit board.



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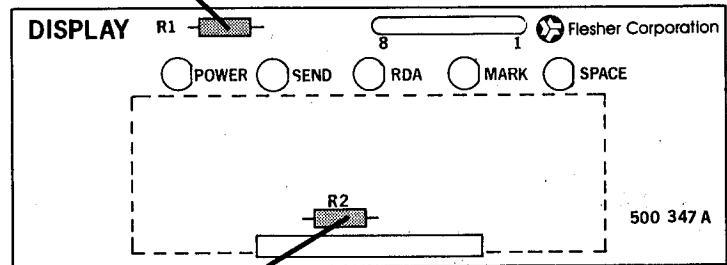
This completes the preliminary assembly of the mother board. Set it aside and proceed to the next section (DISPLAY BOARD).

TU-300 KIT ASSEMBLY INSTRUCTIONS

(DISPLAY BOARD)

Position the DISPLAY PC board as shown and install the following:

(✓) R1: 330 ohm (ORG-ORG-BRN)

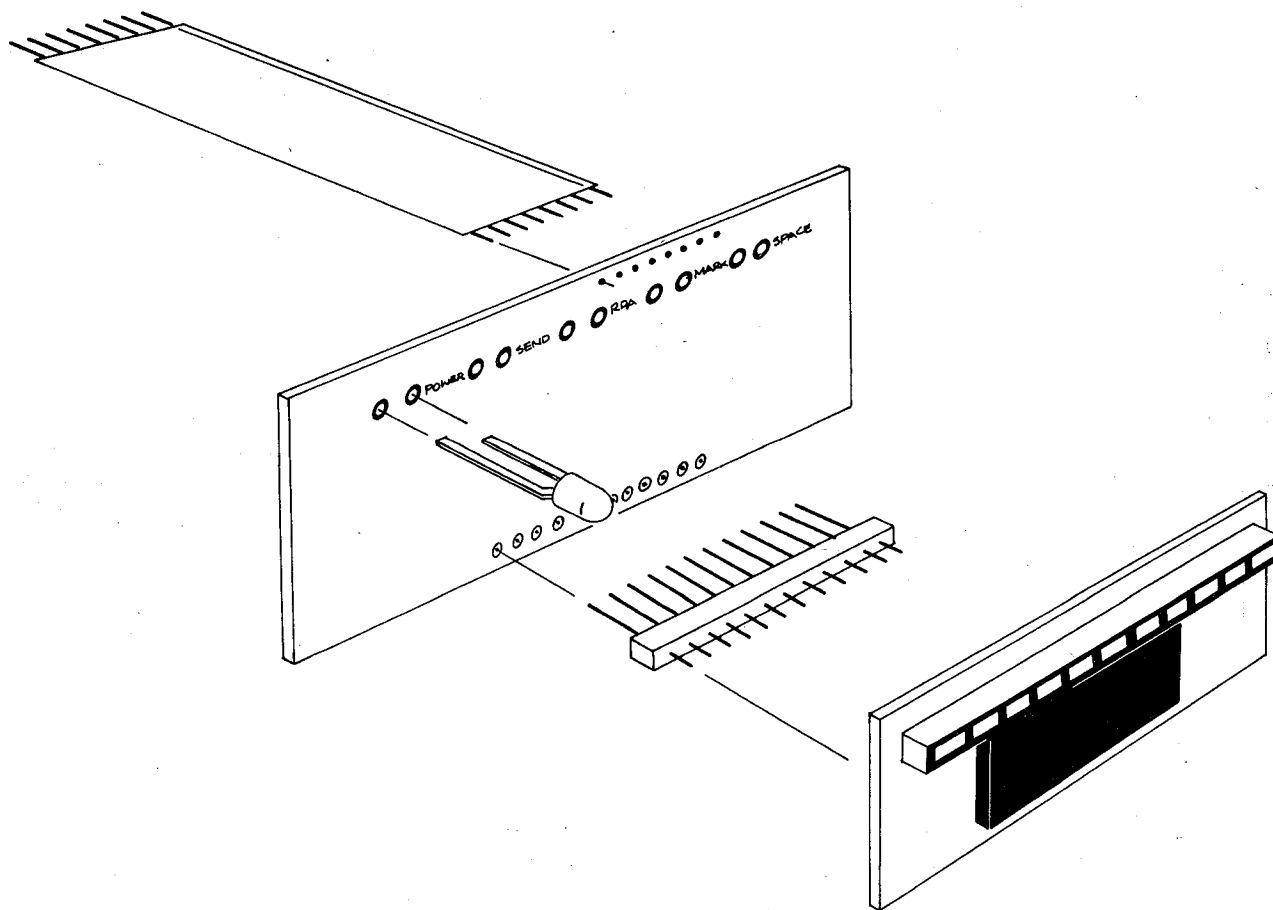


(✓) R2: 1K ohm (BRN-BLK-RED)

- (✓) Install the five LED's in the spaces marked with the shorter of the leads nearest to the marked label for the respective LED. Be sure the LED's are seated as close to the board as the leads will permit and are straight and vertical on the board. (See illustration on opposite page.) CAUTION: Solder quickly. Excessive heat can damage LED's.
- FOLLOWING*
- (✓) Install the connector strip on the board with the longest pins through the board. Part No.137 188 (see illustration on opposite page).
- (✓) Install the display module over the short pins on the connector strip and solder all pins. Be sure the display module is parallel to the circuit board and completely seated on the connector strip before soldering.(See illustration on opposite page.)
- (✓) Install the flat 8 conductor cable from the back side of the circuit board and solder the wires on the component side of the board. (See illustration on opposite page.)

This completes the assembly of the display circuit board. Set it aside for use in later assembly steps.

TU-300 DISPLAY BOARD ILLUSTRATION



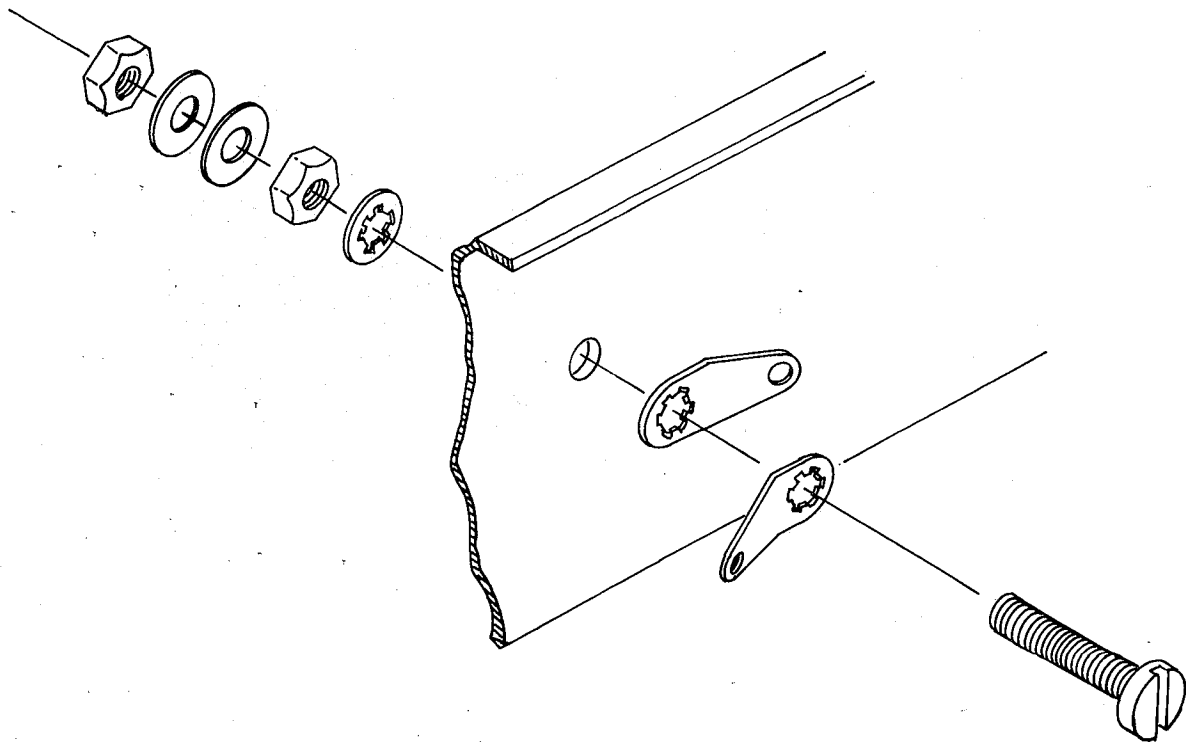
✓

TU-300 KIT ASSEMBLY INSTRUCTIONS

(CHASSIS ASSEMBLY)

For the following instructions, refer to illustrations on the page on which the instruction appears or on the larger detached illustration sheet. Each instruction directs you to the correct illustration.

- (.) Install the ground terminals using a 6-32 X 1/2 inch screw, two 6-32 nuts, two #6 flat washers and a #6 star lock washer as shown in illustration below. Leave the second nut loose and the extra length of this screw will be used as an external ground connection.

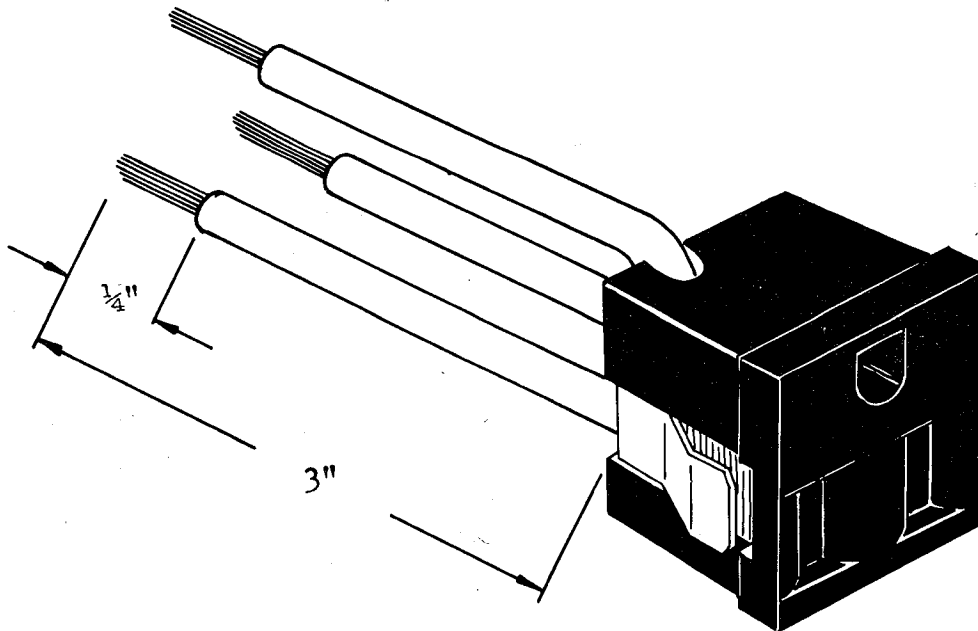


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TU-300 KIT ASSEMBLY INSTRUCTIONS

(CHASSIS ASSEMBLY)

- (✓) Cut all three leads of the auxiliary power receptacle to three inches length. Strip 1/4 inch of insulation from each lead. Save excess green wire. It will be used later.
(See illustration below.)

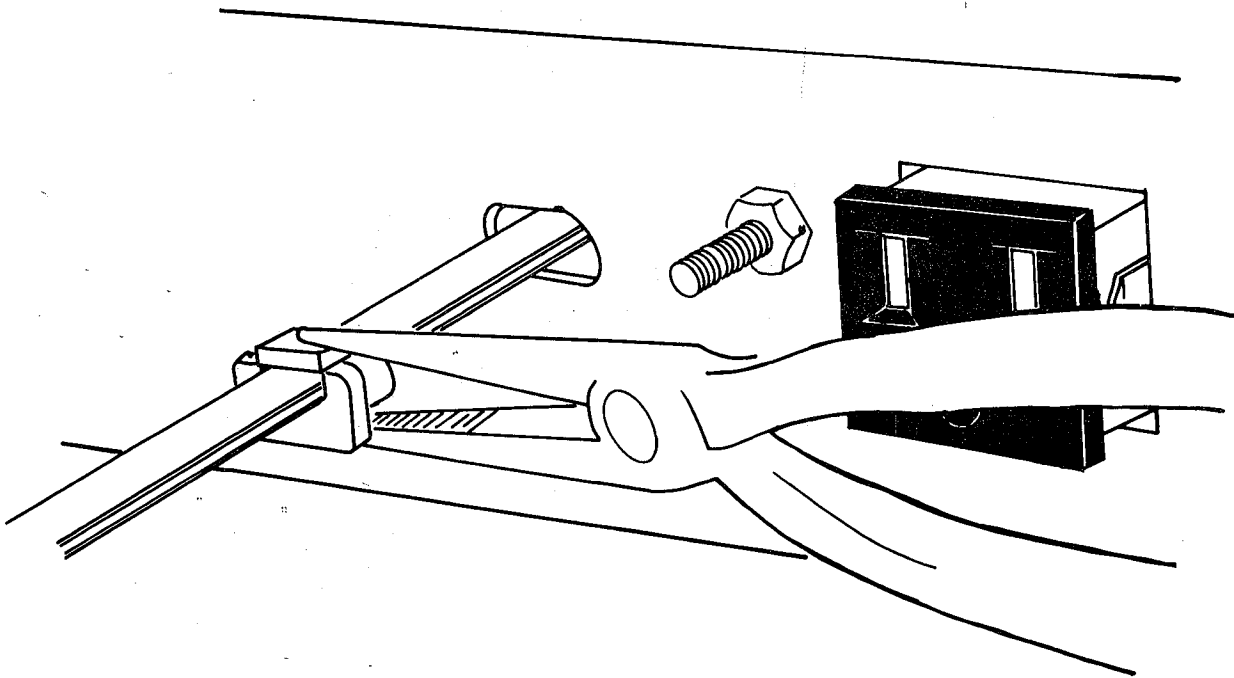


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TU-300 KIT ASSEMBLY INSTRUCTIONS

(CHASSIS ASSEMBLY)

- (✓) Install the auxiliary power receptacle in the rear of the chassis as shown in illustration below. Trim leads close to circuit board.
- (✓) Install the power line cord and strain relief. Install the cord with approximately three inches inside the chassis and the ribbed edges nearest the auxiliary power receptacle. (See illustration below.)

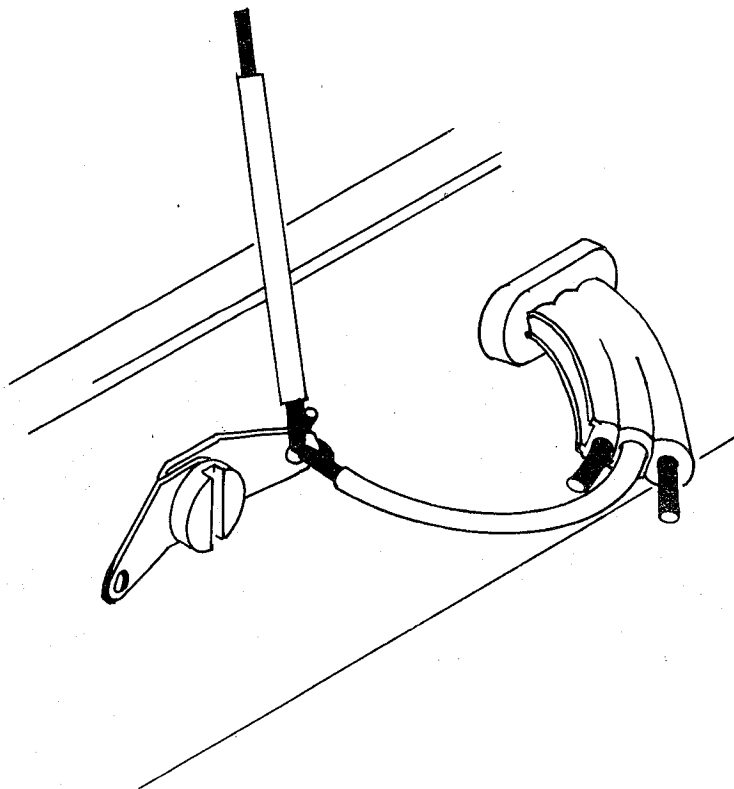


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TU-300 KIT ASSEMBLY INSTRUCTIONS

(CHASSIS ASSEMBLY)

- (✓) Use the excess length of green wire cut from the auxiliary power receptacle and cut it to two inches length. Strip 1/4 inch of insulation from each end.
- (✓) Connect the prepared two inch length of green wire to the one of the ground lugs on the rear of the inside chassis. Do not solder yet. Leave the other end unconnected.



- (✓) Connect the green wire from the power cord to the same ground lug on the chassis, that the 2 inch length of green wire connects to. Solder both wires.
- (✓) Connect the green wire from the auxiliary receptacle to the other lug on the chassis.

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TU-300 KIT ASSEMBLY INSTRUCTIONS

(CHASSIS ASSEMBLY)

- (✓) Place the chassis on the work table with the circuit board mounting tabs on top.
- (✓) Place the previously assembled main circuit board with the component side down on the chassis and use six 6-32 x 1/4 inch screws to fasten it to the chassis. (Refer to large detached illustration sheet.) Leave the screws one turn loose. They will be tightened later.
- (✓) Connect the white wire from the auxiliary power connector to the hole in the circuit board marked for the white wire. Trim wire close to circuit board after soldering.
- (✓) Connect the black wire from the auxiliary power connector to the hole in the circuit board marked for the black wire. Trim wire close to circuit board after soldering.
- (✓) Connect the green wire from the chassis ground lug to the hole in the circuit board marked for the green wire. (The hole between capacitors C8 and C9.)

NOTE: One of the two grey wires of the power cord has ribbed edges and the other one is smooth. Be sure to connect the correct wire to the circuit board in the next two instructions.
(See illustration below.)

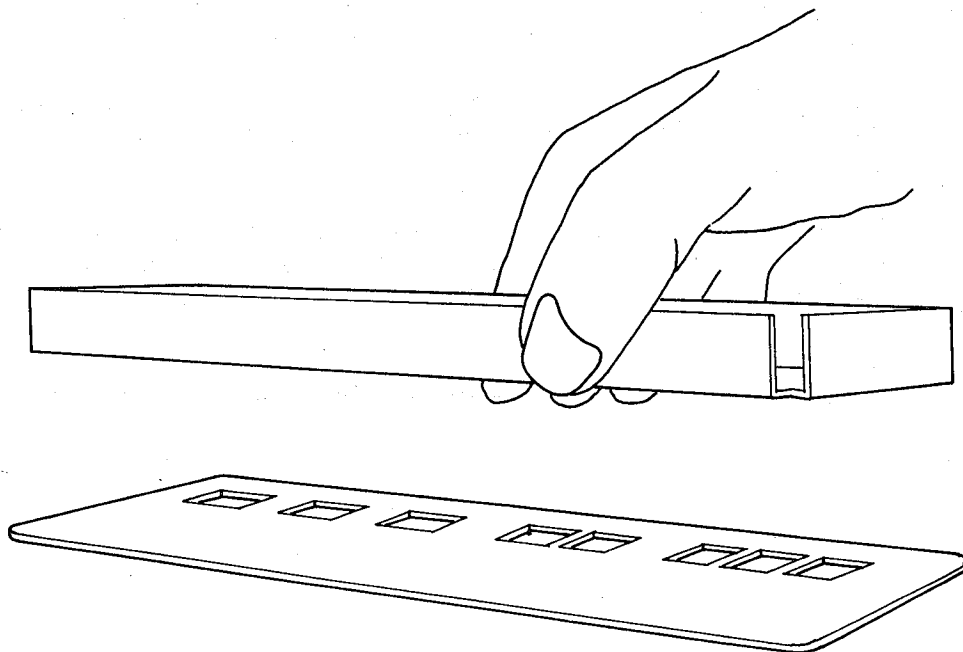
- (✓) Connect the ribbed power cord wire to the circuit board hole nearest the white wire from auxiliary plug. Trim wire close to circuit board after soldering.
- (✓) Connect the smooth power cord wire to the circuit board hole nearest C8 as indicated by the markings on the circuit board. Trim wire close to circuit board after soldering.
- (✓) Set this chassis and circuit board assembly aside temporarily.

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TU-300 KIT ASSEMBLY INSTRUCTIONS

(CHASSIS ASSEMBLY)

- (✓) Locate the chassis front panel and legend panel. Before removing the adhesive backing from the legend panel, place the panel legend on the chassis front panel and note that the legend panel is the same height as the chassis front panel, but is slightly longer. Be sure to center the legend panel in the following steps.
- (✓) Remove the adhesive backing from the legend panel. Use care and avoid bending or scratching the panel. Lay the panel on a clean flat surface with the adhesive side up.
- (✓) Carefully align the chassis front panel over the legend panel before the two make contact and apply steady pressure to affix the adhesive. (See illustration below.)

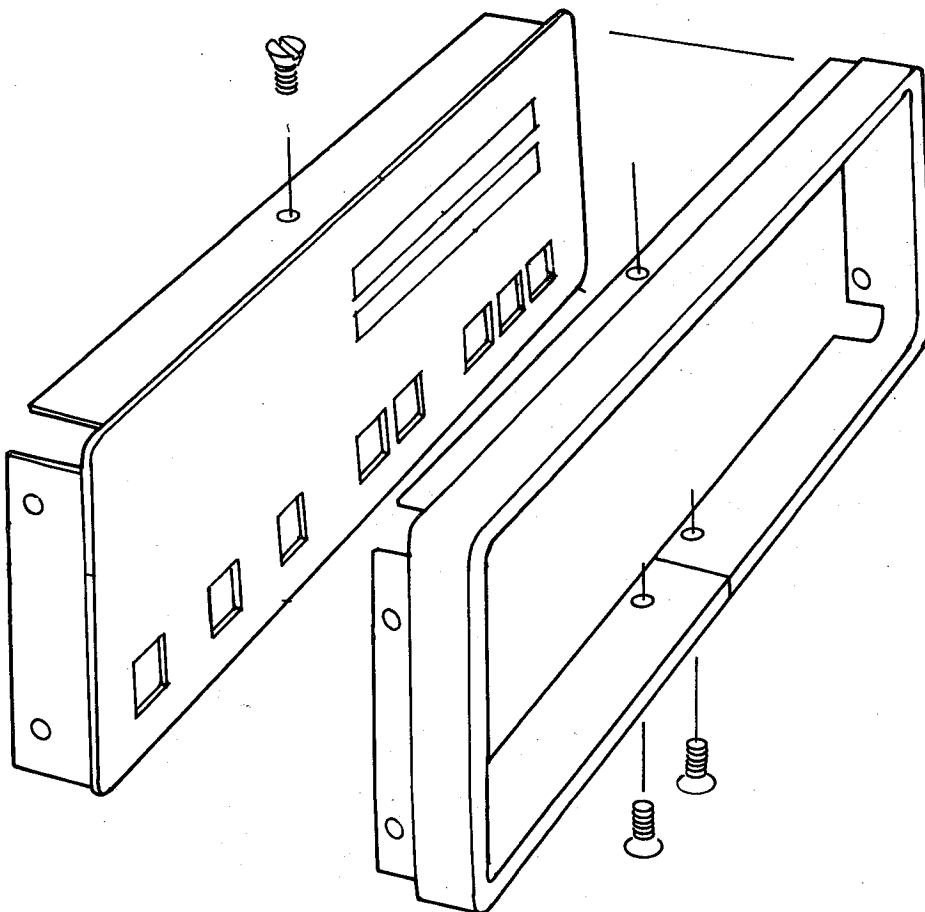


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TU-300 KIT ASSEMBLY INSTRUCTIONS

(CHASSIS ASSEMBLY)

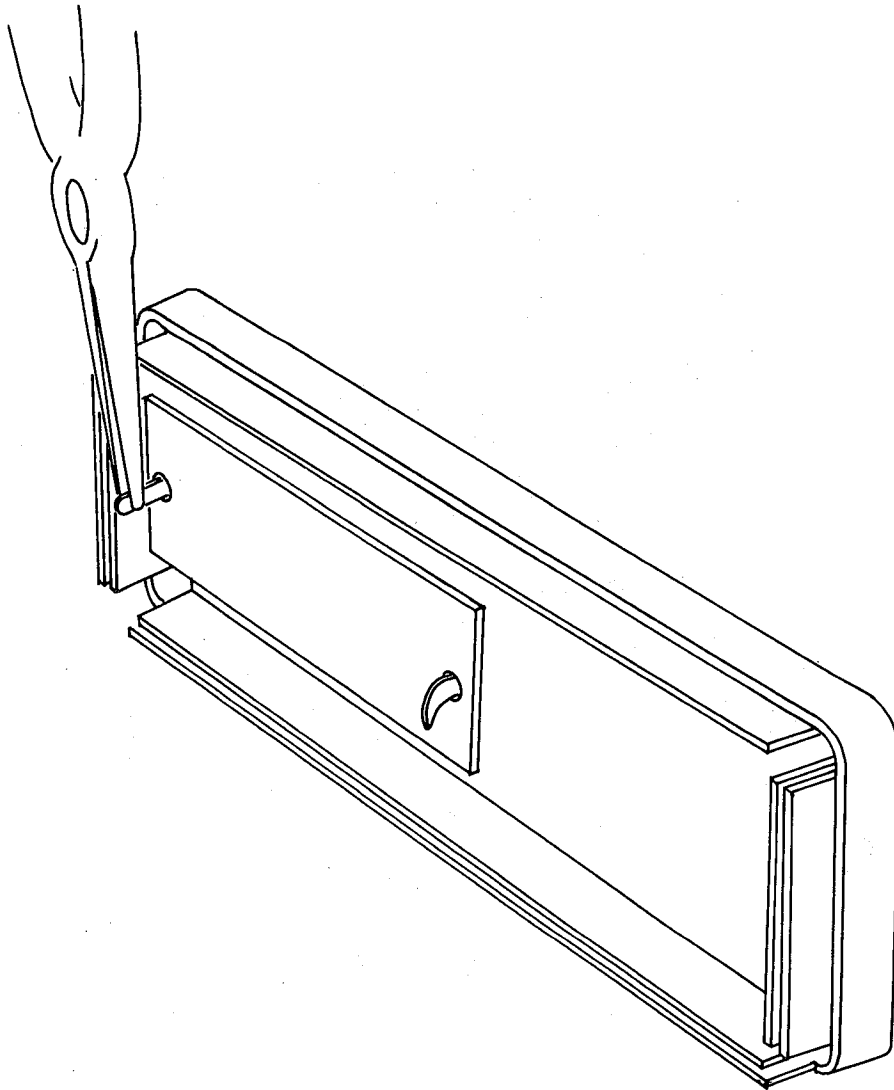
- (✓) Locate the trim bezel and install it on the chassis front panel with the split at the bottom. Temporarily fasten the trim bezel with one screw on the top and two screws on the bottom. (See illustration below.) Leave the screws about one turn loose and don't install the screws on the side yet.



TU-300 KIT ASSEMBLY INSTRUCTIONS

(CHASSIS ASSEMBLY)

- (✓) Install the display circuit board over the two tabs on the rear of the chassis front panel. The individual LED's should be nearest the top of the panel.
- (✓) Bend the mounting tabs outward just enough to hold the board securely. A 45 degree bend should be sufficient. (See illustration below.)

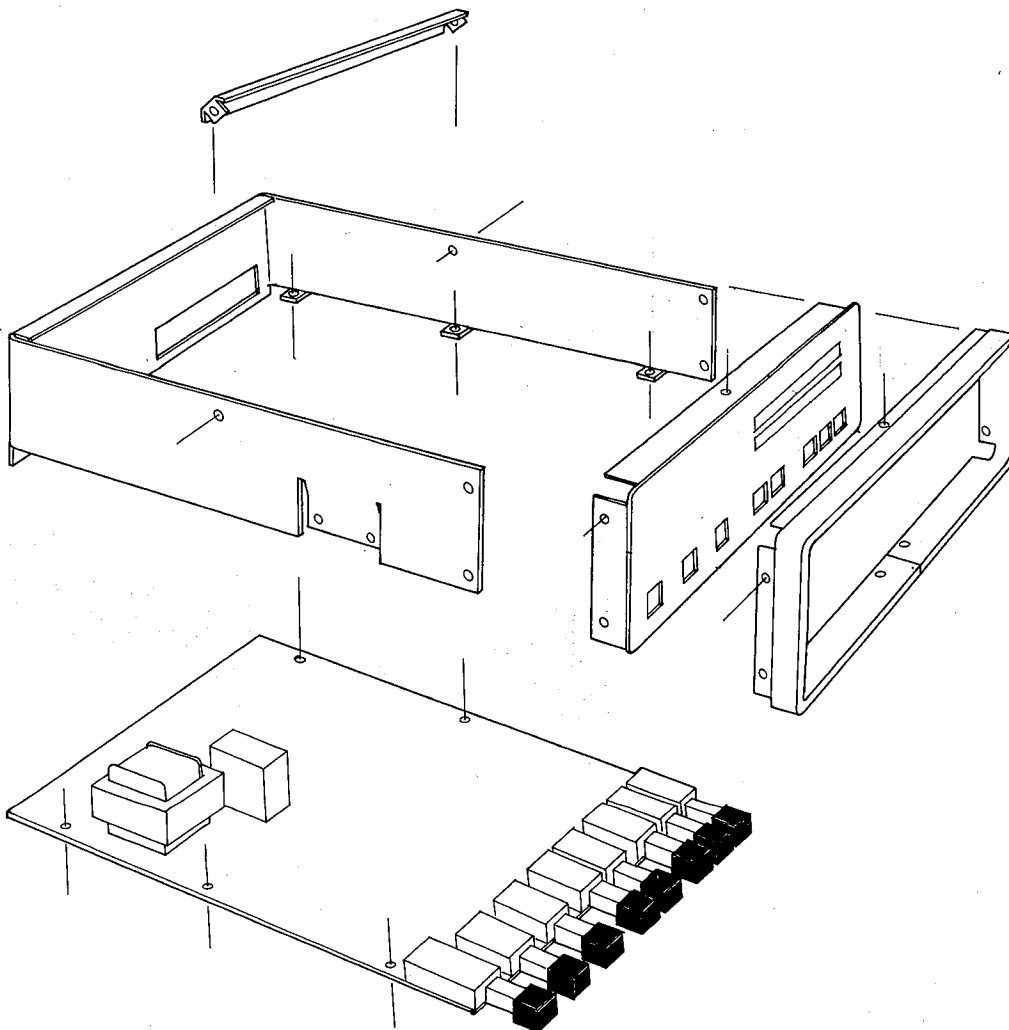


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TU-300 KIT ASSEMBLY INSTRUCTIONS

(CHASSIS ASSEMBLY)

- (✓) Install the front panel assembly on the chassis and circuit board assembly by sliding the front panel over the switch buttons and inserting the front edges of the chassis in the gap between the chassis front panel and the trim bezel. Use two 4-40 x 1/4 inch flat-head screws on each side of the panel to fasten the two assemblies together. Before tightening the 7 trim bezel screws, adjust the position of the front panel assembly so that the switches are vertically centered in the switch button cut-outs in the legend panel. (See chassis assembly illustration.)
- (✓) Tighten the six circuit board mounting screws which were previously left loose.
- (✓) Carefully insert the flat cable wires from the display board in the mother board and solder all wires.

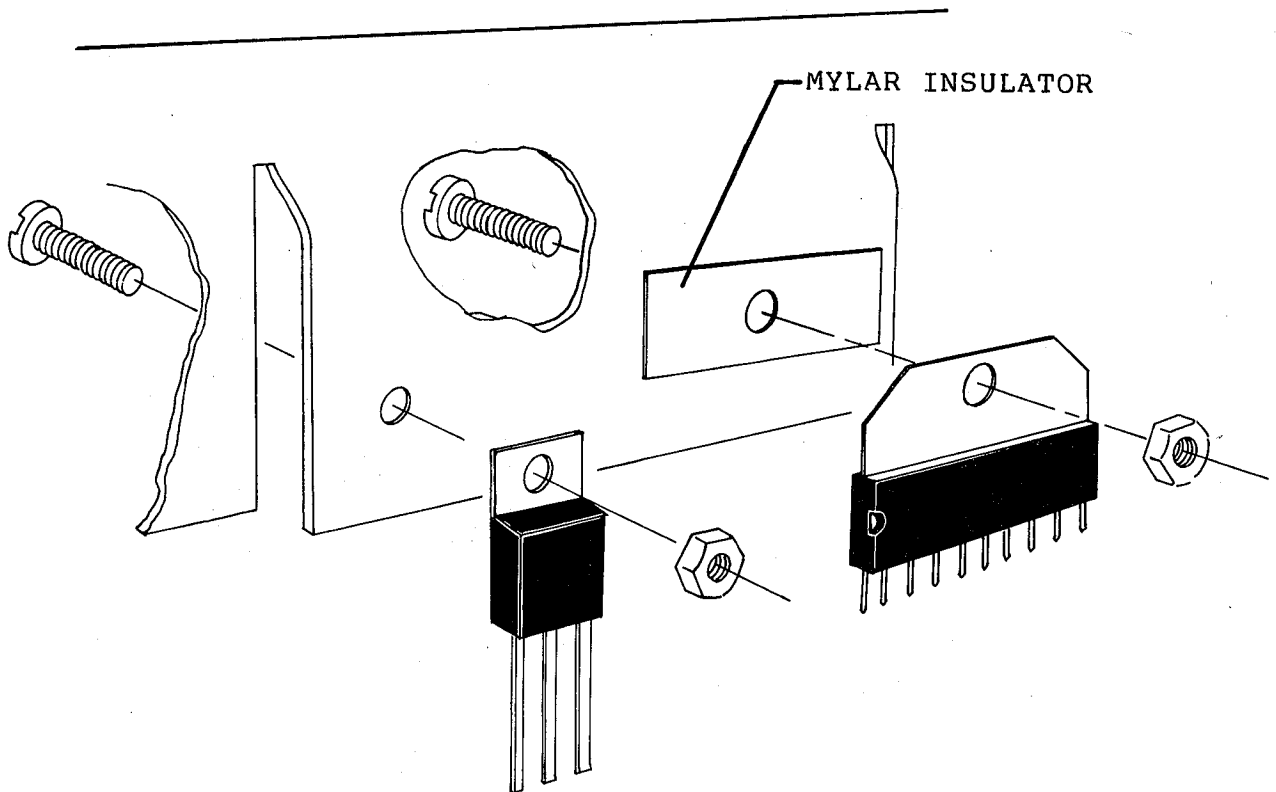


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TU-300 KIT ASSEMBLY INSTRUCTIONS

(CHASSIS ASSEMBLY)

- (✓) Install IC6. Place the mylar insulator under the IC heatsink tab and use a nylon screw and nut to secure the IC to the chassis. Solder the IC leads only after it has been fastened to the chassis. (See illustration below.)
- (✓) Install IC7 similar to IC6 except that no insulator is required. Use nylon mounting hardware. (See illustration below.)



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TU-300 KIT ASSEMBLY INSTRUCTIONS

(CHASSIS ASSEMBLY)

The following resistance check is to assure the power supply is ready and free of short circuits. All IC's, except for the regulators, should be removed. Power must not be applied, not even plugged in until unit is ready for alignment.

Make a visual check of components, such as electrolytic capacitors and diodes, assuring the polarity of each to be correct.

The following measurements require an ohm meter and should be within plus/minus 10 percent.

- (✓) Connect the common lead of the ohm meter to the ground lug located on the rear chassis.
- (✓) Touch the positive probe of the ohm meter to the pad in front of IC6 marked '+5'. The reading should be approximately 4.3K.
- (✓) Touch the positive probe of the ohm meter to the pad in front of IC6 marked '-12'. The reading should be approximately 6.8K.
- (✓) Touch the positive probe of the ohm meter to the pad in front of IC6 marked '+12'. The reading should be approximately 1.2K.
- (✓) Touch the positive probe of the ohm meter to the cathode (banded end) of D12. The reading should be approximately 4.4K. ?
- (✓) Touch the positive probe of the ohm meter to the anode of D14. The reading should be approximately 11.7K. ?
- (✓) Touch the positive probe of the ohm meter to the fuse clips. You should not get a reading at this point.

If your meter varies drastically from these measurements, check the foil side of the board for solder bridges, or component side for reversed polarities.

If everything checks okay, then proceed with the assembly.

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