

GEMINI ROBOT KITS

Base Drive Assembly Instructions

PARTS LIST

Please review the following parts list to be sure that you have all the parts before you begin assembling your kit.

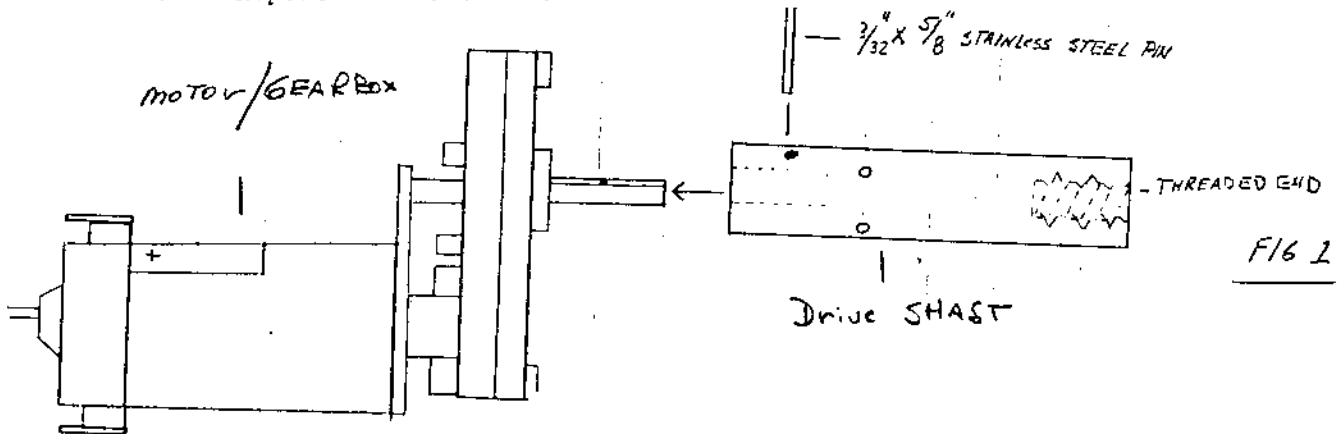
<u>Description</u>	<u>Quantity</u>	<u>Part #</u>
Molex connector	1	03-06-1363
Female molex pins	30	02-06-1103
Battery	3	PS1265
Tie down	15	MB-3A
Tie wrap (small)	24	T18S
Quick disconnects	6	C-29-1104X
LED Optocoupler	2	K-8172
Fork Lug	2	67F746
Tie wrap (large)	2	T4OR
Shrink tube 1/16"	3	37N1166
Shrink tube 1/8"	1	37N1170
Red wire	5 ft.	7195-R
Black wire	7 ft.	7195-B
White wire	5 ft.	7195-W
Green wire	6.5 ft.	7195-G
Yellow wire	2 ft.	7197/19-Y
Blue wire	2 ft.	7197/19-BL
Green wire	2 ft.	7197/19-G 18 gauge
Black wire	15 ft.	7197/19-B
Red wire	8 ft.	7197/19-R
Blue wire	3 ft.	7195-BL
Drive belts	2	6R3-110037
Bearings	8	BH1012
1/4-20 2 1/4 carriage bolt	2	93548A551
8-32 1/2 set screw	4	92311A194
Brevel motors	2	715-953019-701
8-32 1/2 RH bolts	8	91783A194
LED brack. a encoder mnt.	2	GIDV-24A
LED brack. b led encod. plt	2	GIDV-24B
Tension short spacer	2	GIDV-5C
Tension long spacer	2	GIDV-5E
Drive shaft	2	GIDV-11
Idler shaft	2	GIDV-12
Idler mount	2	GIDV-18
Drive mount	2	GIDV-19
8-32 3/4 RH bolts	16	91783A197
#8 lock washer	16	92146A009

8-32 hex nut	24	91841A009
Idler wheel lrg hole	2	P-66-WH
Drive wheel sml hole	2	P-66-WH
Idler pulleys	2	6A3-32H3712
Drive pulleys	2	6A3-32H3712
Socket head cap, screw	16	91251A201
1/4-20 1/2 bolt	6	91236A537
1/4 7/8 fender washer	4	91090A107
1/4 Lock Washer	8	91101A029
4-40 Nylon nut	1	94812A112
4-40 3/4 nylon screw	1	94611A110
Grommets	6	9600K22
Shocks	8	A10Z2-301A
Base ring	1	GIBS-1
F. & R. inner structure	2	GIBS-2
Drive base plate	1	GIBS-3
Right inner structure	1	GIBS-4
Left inner structure	1	GIBS-5
Battery case upright	2	GIBS-6R
Battery case upright	2	GIBS-6L
Battery case cross piece	1	GIBS-7N
Battery Case cross piece	1	GIBS-7
Shock mounts	4	GIBS-B
4-40 1/4 SS screw	12	917B3A106
4-40 3/8 SS screw	20	917B3A108
Set screw 4-40 1/4 set	2	91375A144
Fender washer 1"	4	91090A10B
#4 flat washer	24	92141A005
Dowel pin	2	90145A440
1/4 hex nut	2	91078A029
4-40 1/2 screw	4	91783A110
4-40 hex nut	34	91841A005

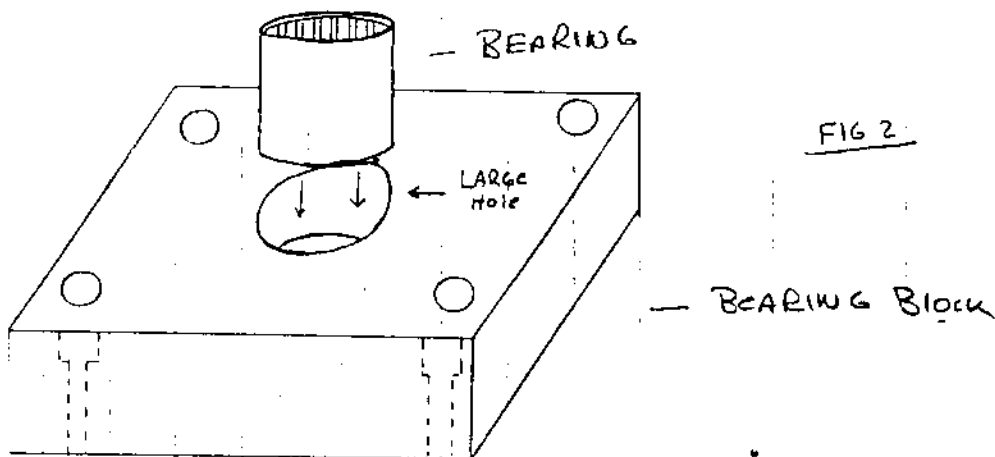
4-40 1/4 nylon spacer	1	30F1436
Rubber feet	8	SJ-5023
Teflon washer	4	GIDV-17
Encoder wheel	2	endocer-wheels
Teflon thrust washer	4	GIDV-30
Tapeswitch	4	102BP
Bumper sets	1	GIBS-12
Charger bumpers	1	GIBS-120
Wing nut	8	90866A009
Static chain coupling	1	3606T31
Charger bumper contact	2	GIBS-13
Upright battery cushion	8	GIBS-19
Battery spacer pad	5	GIBS-20
27K resistor	1	CCF 2527K
#4 lock washer	20	92146A005

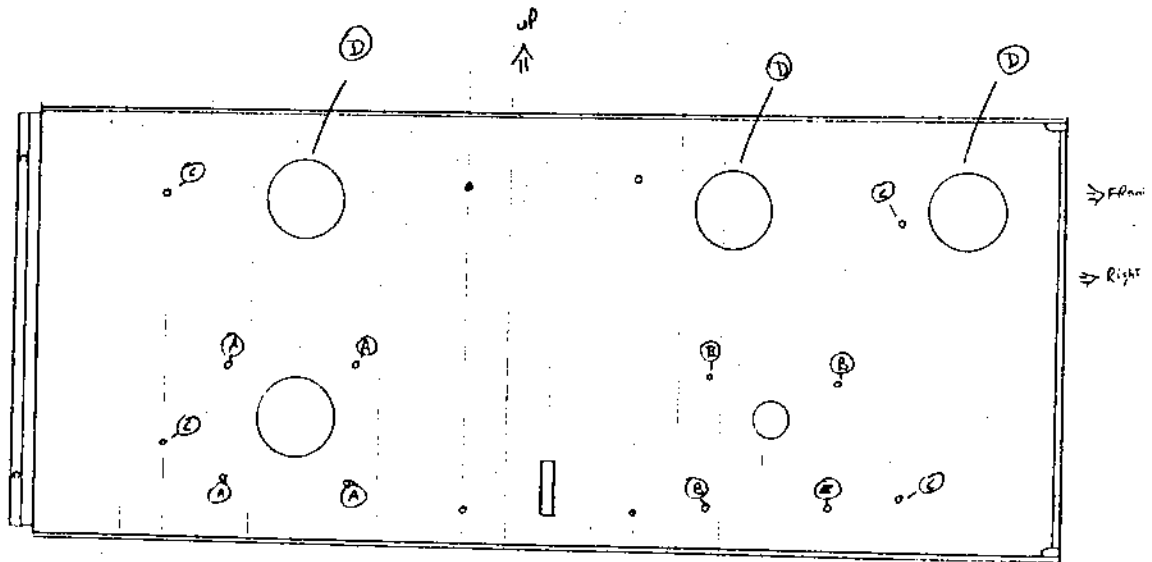
Assembly Instructions

1. Locate the two motors, two drive shafts and the two $3/32"$ x $5/8"$ shear pins. Slip drive shaft onto motor shaft with threaded end away from motor. Line up hole in drive shaft with hole in motor shaft and tap $3/32"$ x $5/8"$ pin into hole until flush with drive shaft with small hammer. Repeat for other motor.



2. Locate four $3" \times 3" \times 3/4"$ aluminum blocks and two of the eight bearings in the kit. Notice that two have larger holes in the center than the other two. Use the ones with the larger holes to install the bearings. To install a bearing in a block, use a small block of wood and a hammer. Tap on the wood block until the bearing is flush with the aluminum block.



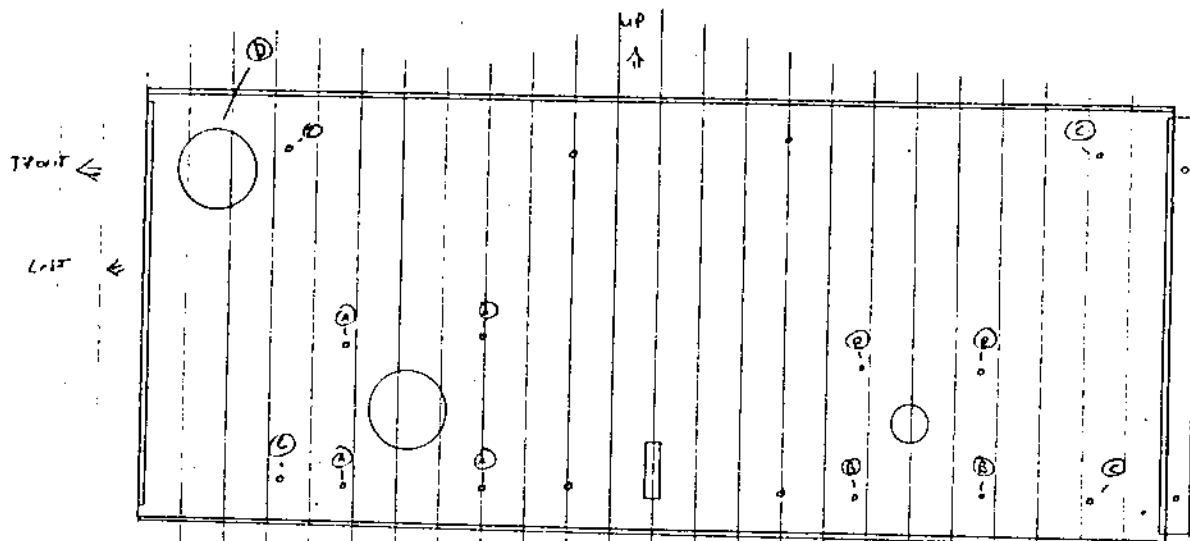


RIGHT INNER STRUCTURE

FIG 3

A = MOTOR MOUNTS
 B = IDLER MOUNTS
 C = FORWARD + REAR INNER STRUCTURE MOUNTS
 D = GROMMET

MOUNT BEARING BLOCKS ON THIS SIDE



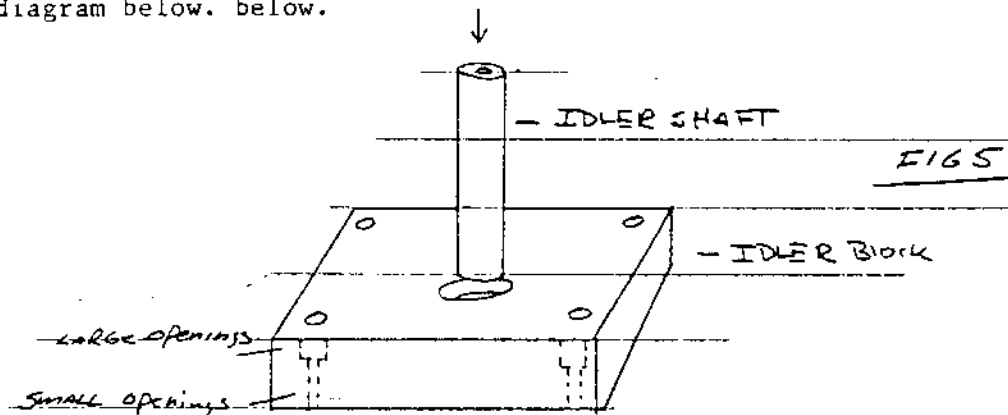
LEFT INNER STRUCTURE

FIG 4

A = MOTOR MOUNTS
 B = IDLER MOUNTS
 C = FORWARD + REAR INNER STRUCTURE MOUNTS
 D = GROMMET

MOUNT BEARING BLOCKS ON THIS SIDE

3. Fig. 3 shows a view of the right inner structure and Fig. 4 shows a view of the left inner structure. You will notice that the right structure has 4 large holes and the left structure only has 2. Place the right inner structure in front of you with the folded edges facing up as in Fig. 3. Place one of the bearing blocks you just assembled over the left bottom large hole and line up the small holes. Make sure the larger screw hole openings are facing upward so the screw heads will be inside the bearing block. Slip the motor shaft through the underside of the right inner structure into the bearing block and install 4, 3/4" x #8 round head screws. Repeat procedure for left inner structure. The motors will only mount one way so you can not make a mistake..
4. There will be two more blocks left in the kit which look like the bearing blocks except they have smaller middle holes in them. These are called the idler blocks. No bearings are installed in these blocks. You will also find another two shafts which look like the drive shafts, but they do not have a hole for a pin or the two set screw holes. They will be threaded on both ends. Insert one of these shafts into the idler block (both ends are the same so it makes no difference which end you use). Tap the shaft into the idler block until it is flush with the bottom, the larger screw hole openings on the idler block must be on top as in the diagram below. below.



5. With the right and left inner structures in the same position you used in step 3, the two sides will have the motors and bearing blocks installed on the left side motor mount holes (A). On the right side of both inner structures you will see holes labeled (B). Install the idler shaft assemblies through the holes in the same way. The bearing blocks were attached, but there will be no threaded motor gearbox holes to seat the screws (#8-32 x 3/4) into, so you will need 4, #8 nuts and lock washers. Again the idler blocks will only mount one way. On the underside of both inner structures, install 1, 1/4-20 bolt and lock washer into idler shaft to hold it in place against the inner structures.

Forward and rear inner structure

up
↑
① - on FRONT ONLY

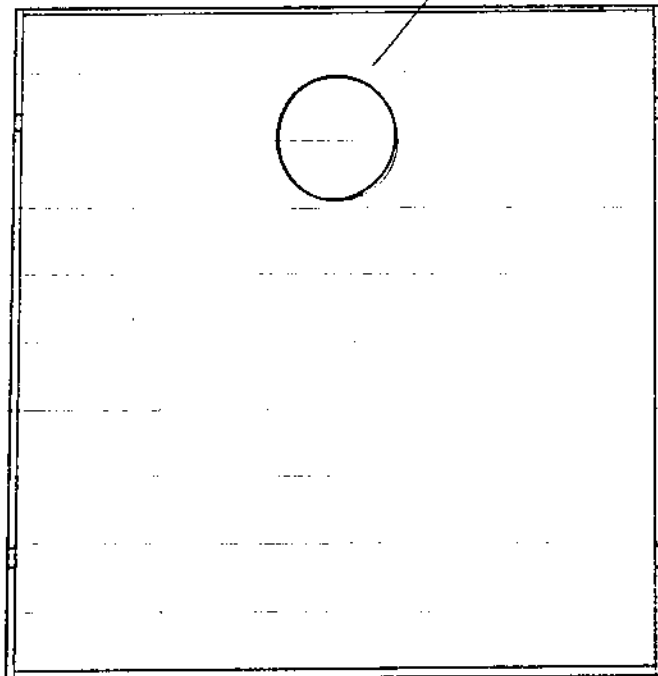
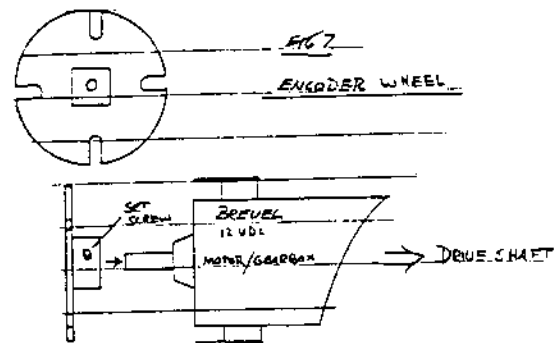


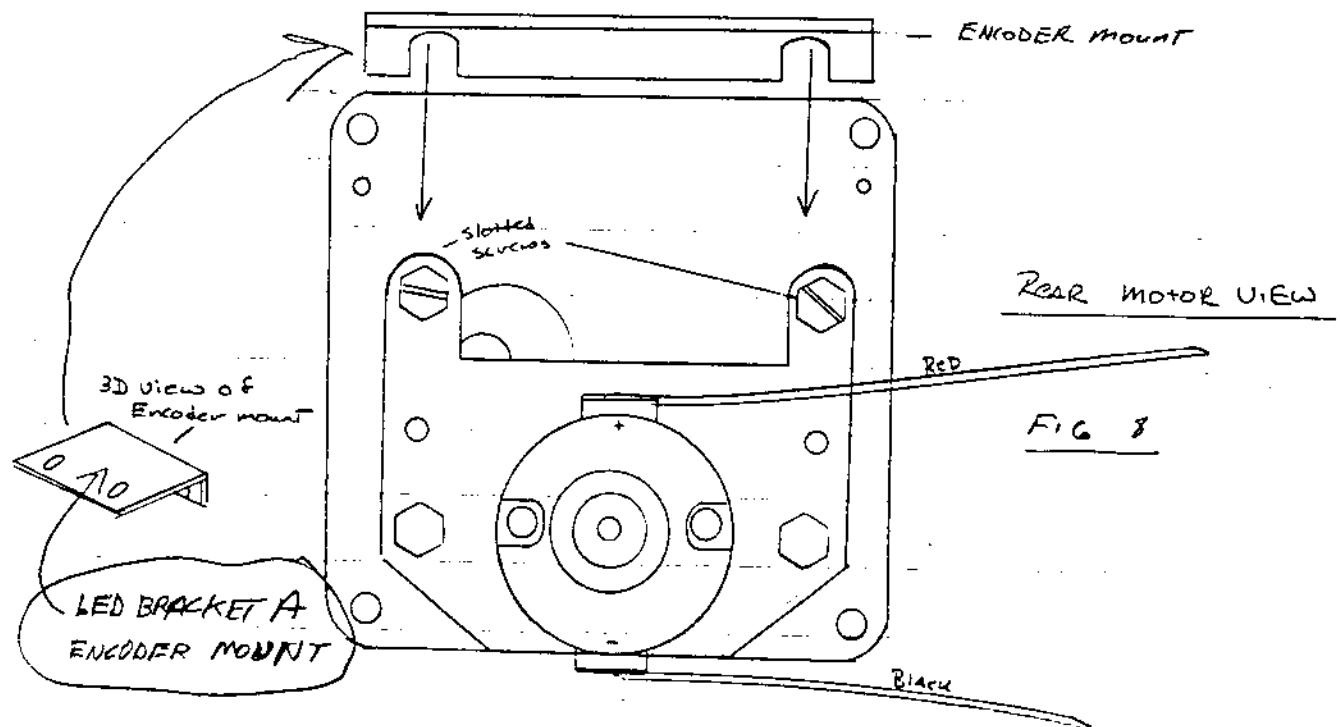
FIG 6

D = Glowet

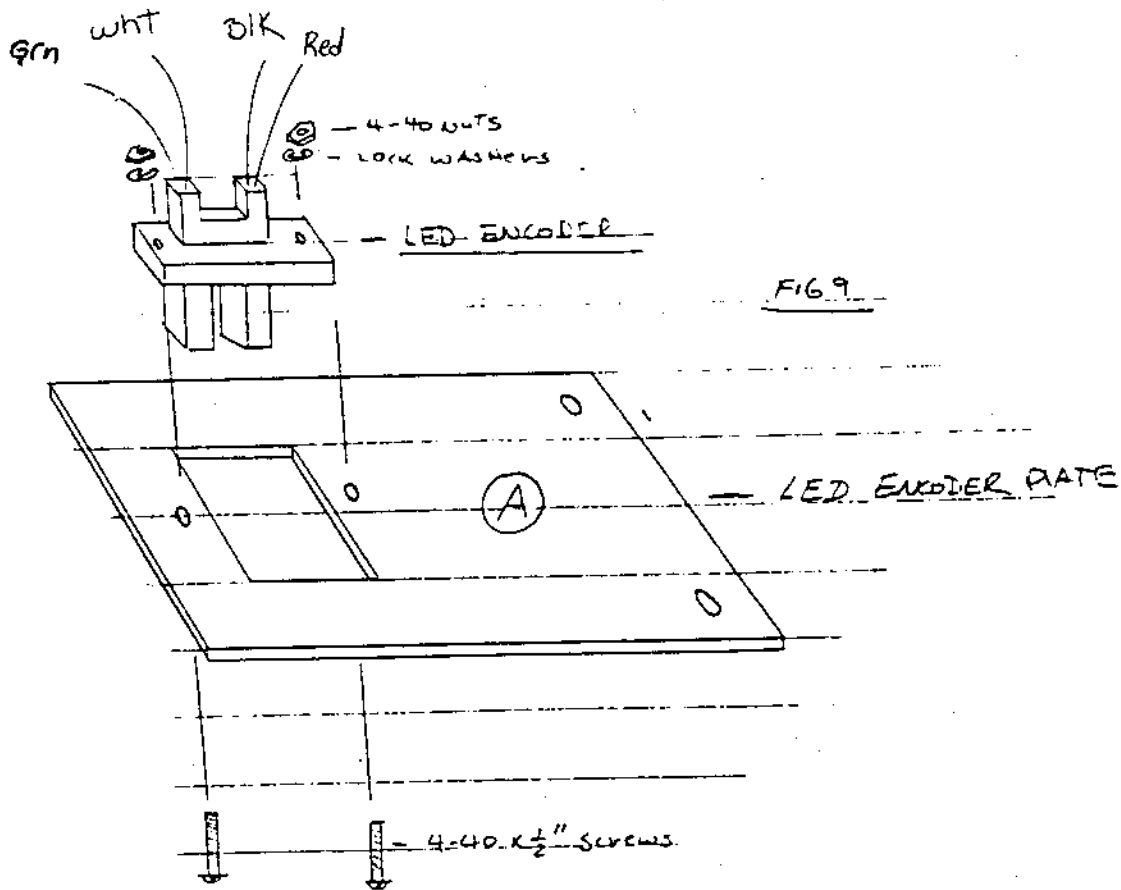
6. You will find two of the above pictured structures in the kit. There are no differences between the forward and rear inner structures. In the previous diagrams, the mounting holes (C) were pointed out for these structures. Mount one forward and rear structure to the right side of the right inner structure with folded ends facing right and the large hole in the forward and rear structure up. Secure with 2, 1/2" #8 screws, lock washers and nuts. Do the same with the left inner structure. Do not assemble the two sides together.
7. There are 2 encoder wheels in the kit. Install one to each motor end as shown below. Tighten with 4-40 1/4" screw and LockTite. Make sure the wheel does not touch the motor but keep it as close as possible.

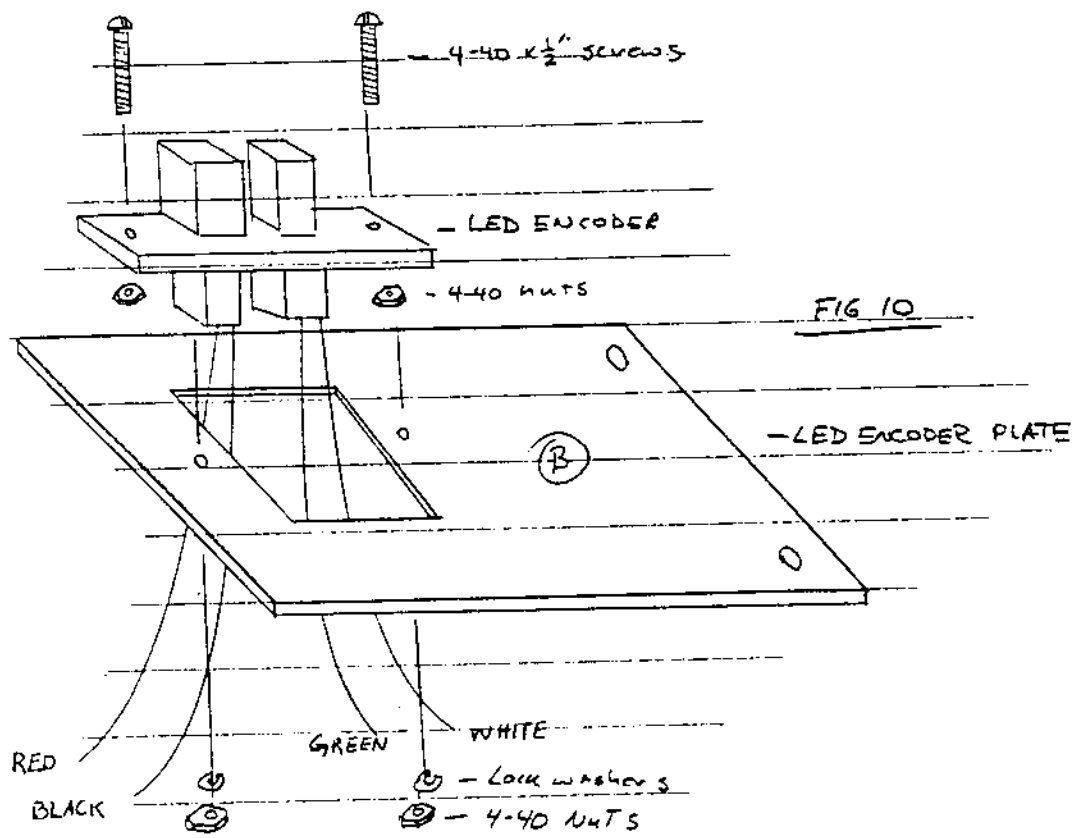


8. Insert grommets into the holes labeled (D) shown on the previous diagrams.
9. Locate one black and one red, 20" lengths of 18 gauge wire. Then locate one black and one red, 3' lengths of 18 gauge wire. Strip 1" of insulation from one end of each wire. Tin the ends of each wire as well as the positive (+) and negative (-) terminals on each motor. Wrap the tinned end of the 3' red wire around the positive (+) motor terminal, mounted on the right inner structure, and solder. Using the 20" red wire, do the same to the other motor, mounted on the left inner structure. Wrap the tinned end of the 3' black wire around the negative (-) motor terminal, mounted on the right inner structure, and solder. Using the 20" black wire, do the same to the other motor, mounted on the left inner structure.



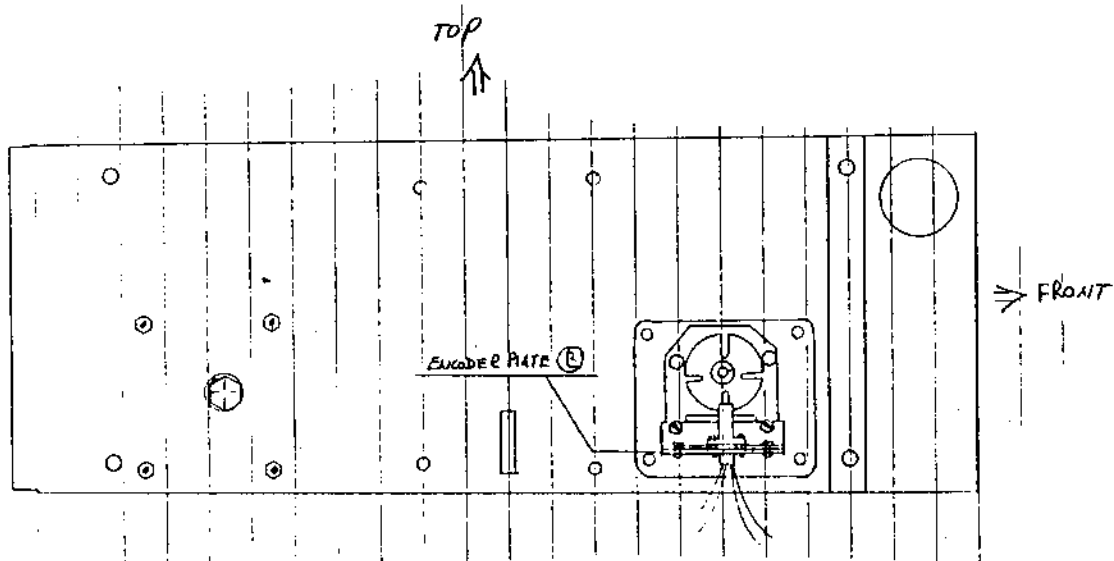
10. Loosen the two rear motor screws (slotted). Slide encoder mount under screw heads and retighten screws. Repeat for the other motor. You will notice on one motor that it will go on as shown in diagram above. The other will mount upside down.
11. Install one LED encoder to LED encoder plate as shown in the diagram below. Install the other according to the diagram on the following page.





Left inner structure

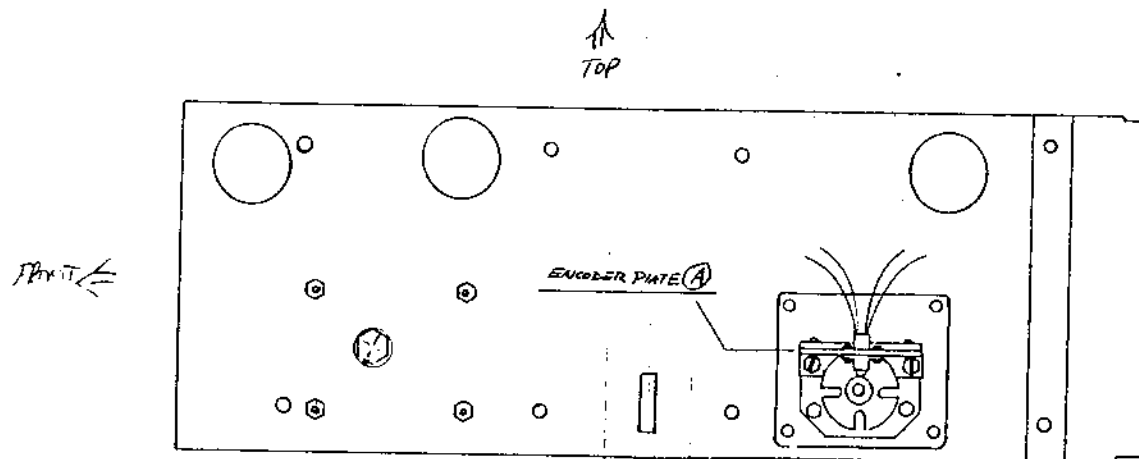
Fig. 11



12. Mount encoder plate (B) from previous page, fig. 10, to left inner structure under encoder mount with 4-40 1/4" screw, nut and LockTite as shown above.

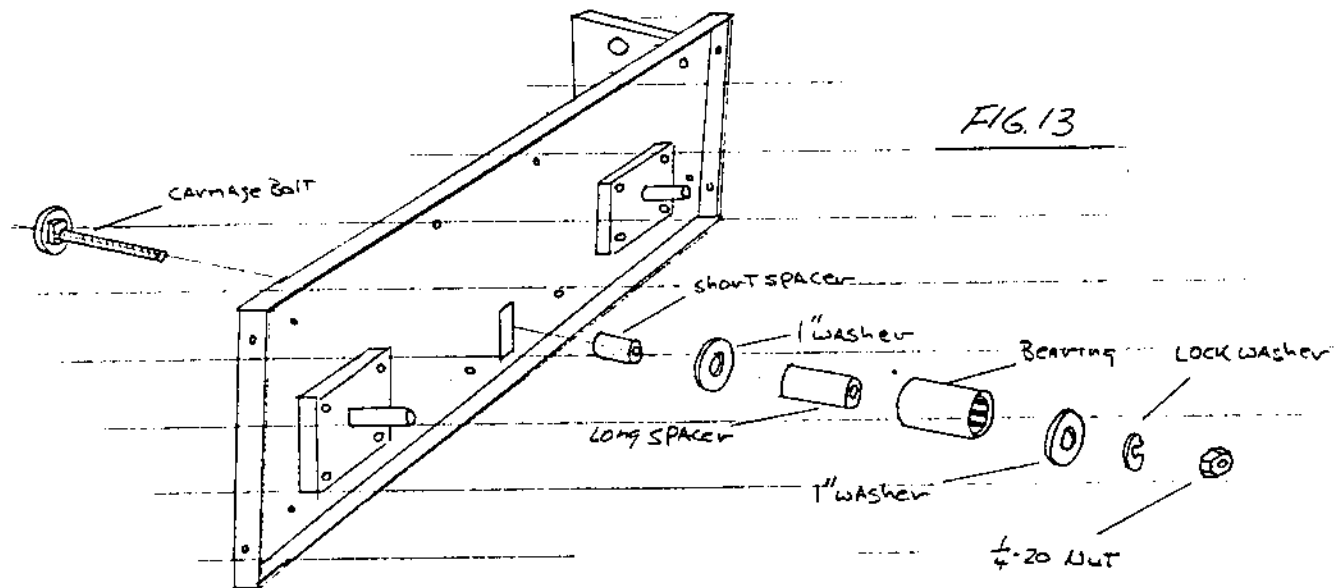
13. Mount encoder plate (A) from previous step, first diagram, to the right inner structure under encoder mount with 4-40 1/4" screw, nut and LockTite as shown in diagram below onto motor.

Fig.12



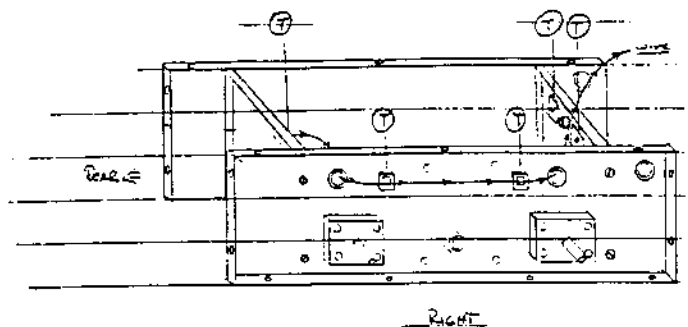
Mount encoder Plate (A) from previous page, fig.9, to right inner structure under encoder mount with 4-40 1/4" screw, nut and LockTite as shown above. Bend Encoder Plate upward to bend the plate away from the Encoder wheel, spin the wheel until you no longer hear the scraping noise.

14. Tie wrap motor leads to motor body with large tie wraps to keep them away from any moving parts.
15. On the right and left inner structures you will find a rectangular hole. Insert a carriage bolt $1/4"$ 20 x $2 1/4"$ through this hole from the inside and insert the short spacer, 1" washer, long spacer, bearing, 1" washer, lock washer, $1/4$ 20 nut as shown below. Repeat for the other side.

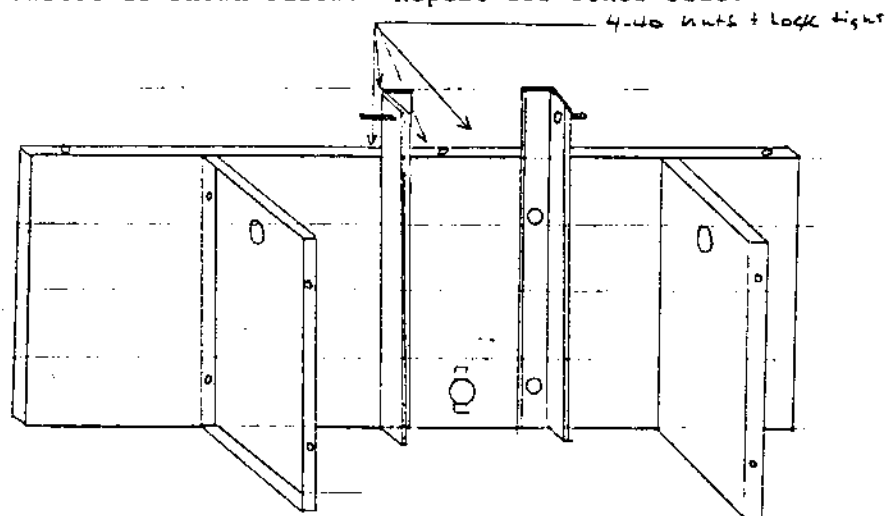


16. Bolt the two base halves together with 4, $1/2"$ #8 screws, lock washers and nuts.
17. The red-green-white-blue wires coming from the LED encoders are too short. There are 8 wires to lengthen. Lengthen the wires on the right inner structure with 2' of 22 gauge wire of the same color. Overall length should be about 36" for these encoder wires. Lengthen the wires on the left inner structure with 8" of 22 gauge wire of the same color. Overall length should be about 20" for these encoder wires. After soldering, slide a piece of $1/16"$ x $1/2"$ heat shrink tubing over the connections.
18. Route motor and encoder wires through grommets as shown below. Peel off backing from five square white sticky back tapes. Tie down and stick on the inner structure at locations marked (T).

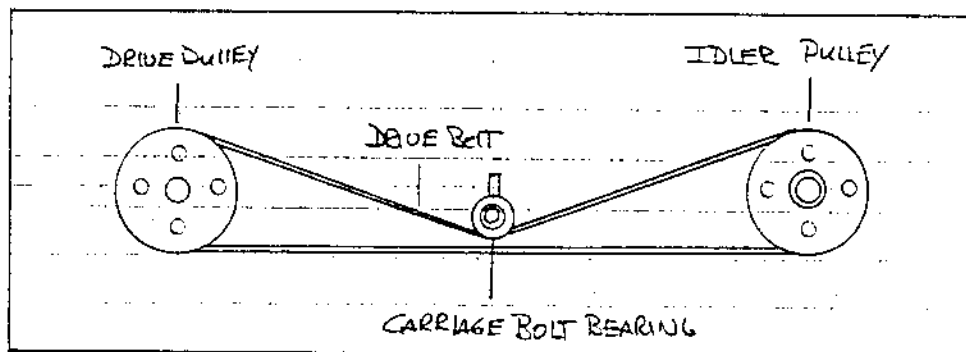
12



19. Mount battery uprights on right and left inner structures with 8, 4-40 nuts and LockTite as shown below. Repeat for other side.

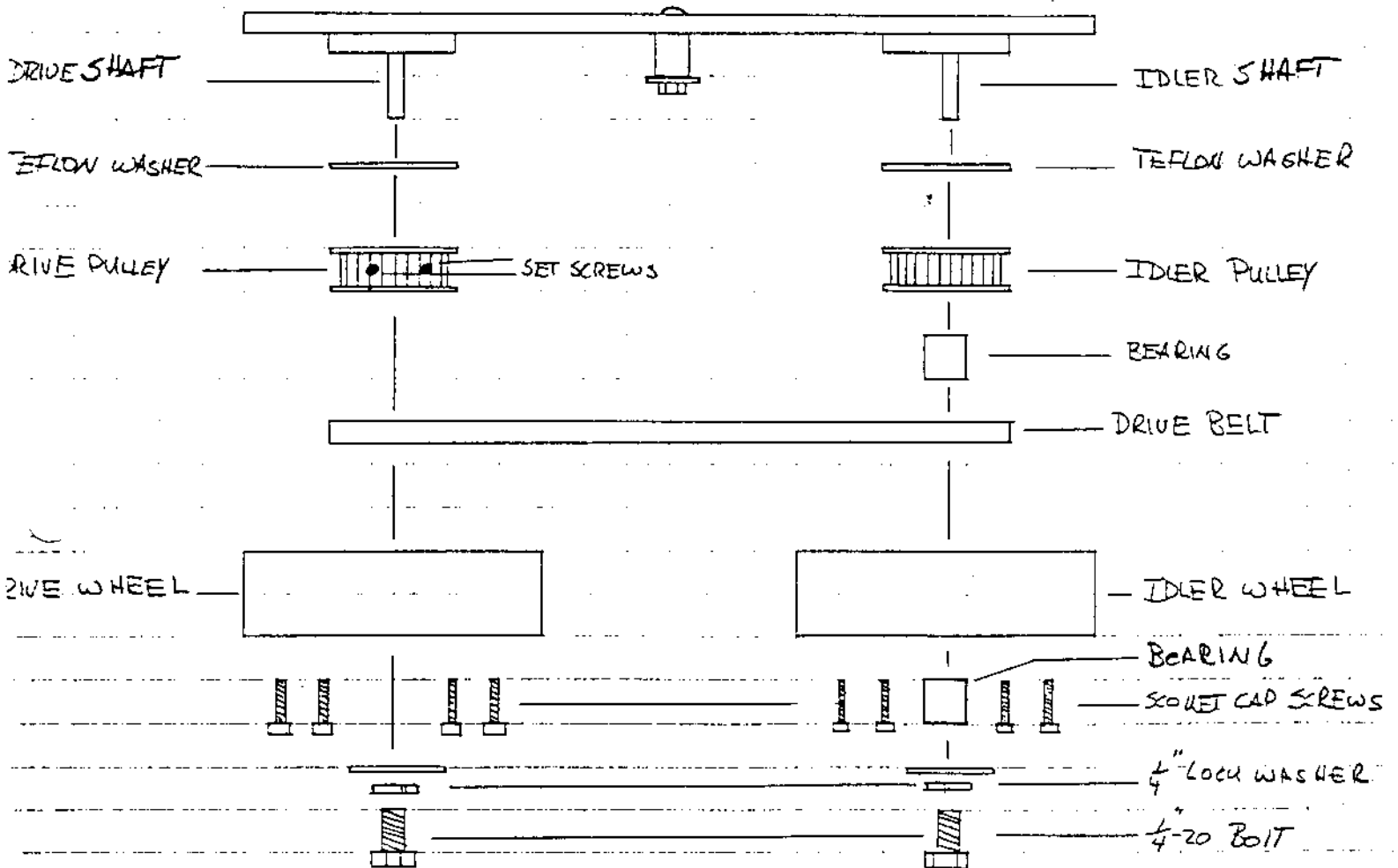


20. Slip two of the four large (3" dia.) teflon washers onto both idler and drive shafts. Next locate the four ribbed pulleys. Two have larger holes than the other two; install a bearing into each of the larger-holed pulleys. Find four 8-32 x 1/2" set screws and start them into the drive pulleys (two on each). Then slide the drive pulleys onto the drive shafts and idler pulleys onto the idler shafts. The drive shafts have two set screw seating indentations in each; line these up with the set screws and drive the screws into the indentations tightly with Lock-Tite. Install the two rubber belts on the pulleys and around the carriage bolt as shown below.



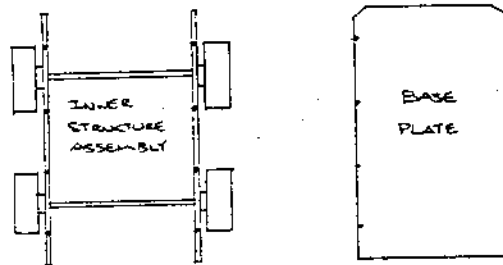
Adjust the belt tightness by loosening the nut on the carriage bolt and moving it down to tighten or up to loosen. Now locate four black wheels (two with larger holes). Install one bearing in each wheel and mount wheel onto idler pulley with four 8 x 1 1/4" socket cap screws, one 1/4" bolt, lock washer and washer. Mount other two wheels on drive pulleys with eight 8 x 1 1/4" socket cap screws, one 1/4" bolt, flat washer and lock washer.

TOP VIEW OF DRIVE ASSEMBLY

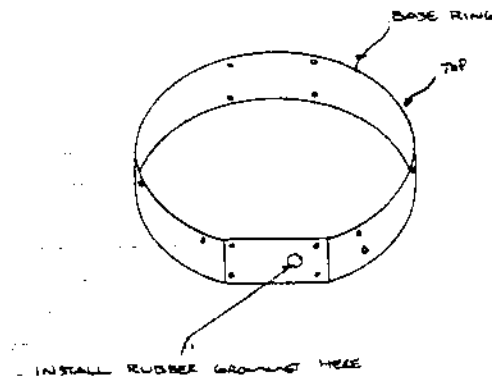


21. Mount base plate to bottom of inner structure assembly with 8, 4-40 1/4" round head screws.

Inner structure assembly



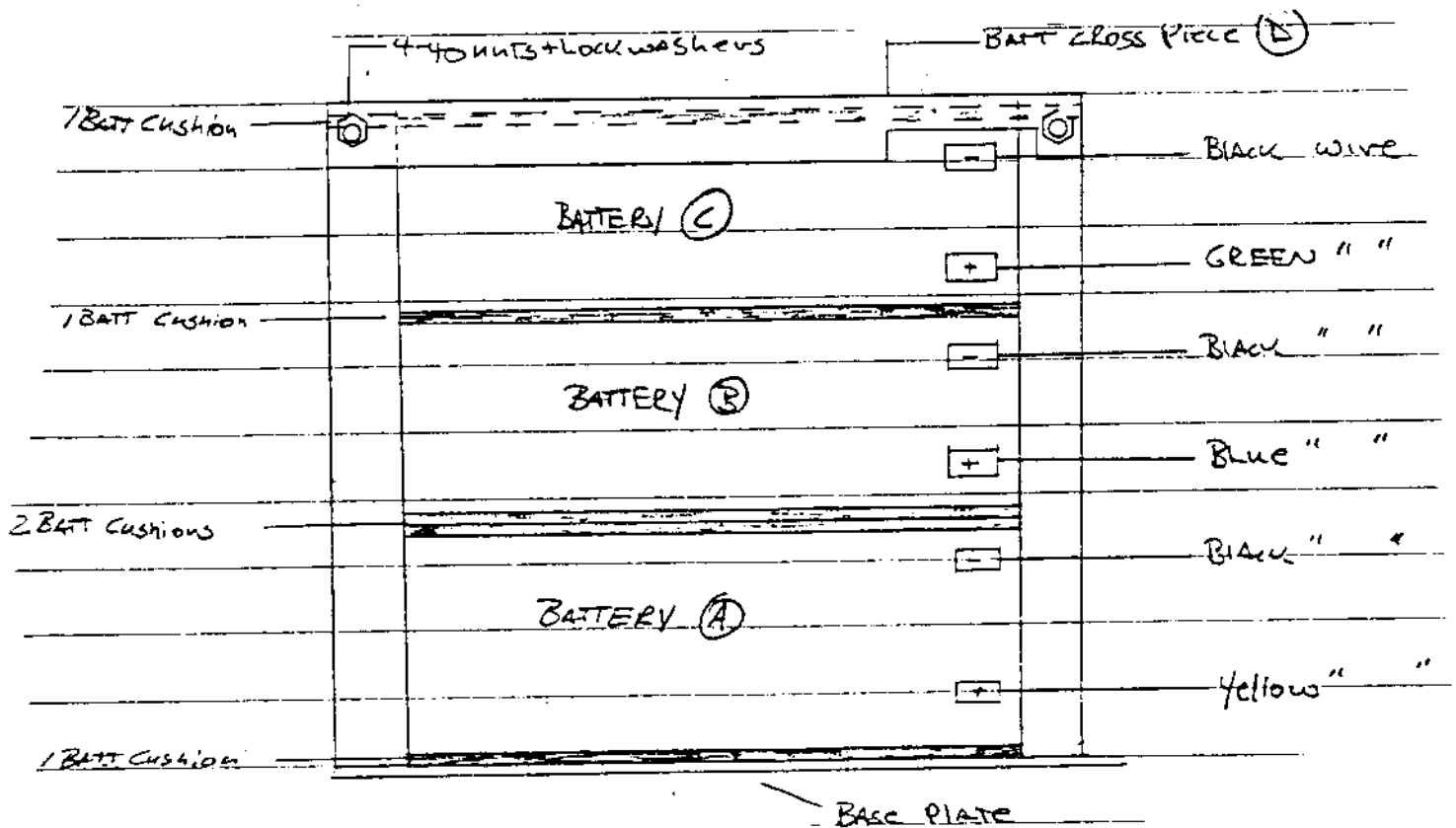
22. Slide base ring over the base inner structure and mount with 8, 4-40 3/8 screws and LockTite. Make sure base ring is flush with the bottom of the inner structure and that the angled flanges on the inner structure mount to round part of the ring.



23. Crimp and solder female diconnects onto the ends of the following lengths of 18 gauge wire: 22" yellow, 22" black, 18" blue, 18" black, 17" green, and 18" black. Push the 22" yellow on the positive terminal of one battery and the 22" black on the negative terminal of the same battery. Do the same for the 18" blue and black wires on another battery. Repeat for the 17" green and 18" black wires. NOTE: Tape the loose ends of all the wires so that they will not short out against the base assembly.
24. A. Place battery cushion on the base plate between the battery up-rights.
B. Place battery with yellow wire into uprights and drop to bottom.
C. Place 2 battery cushions on top of battery A.

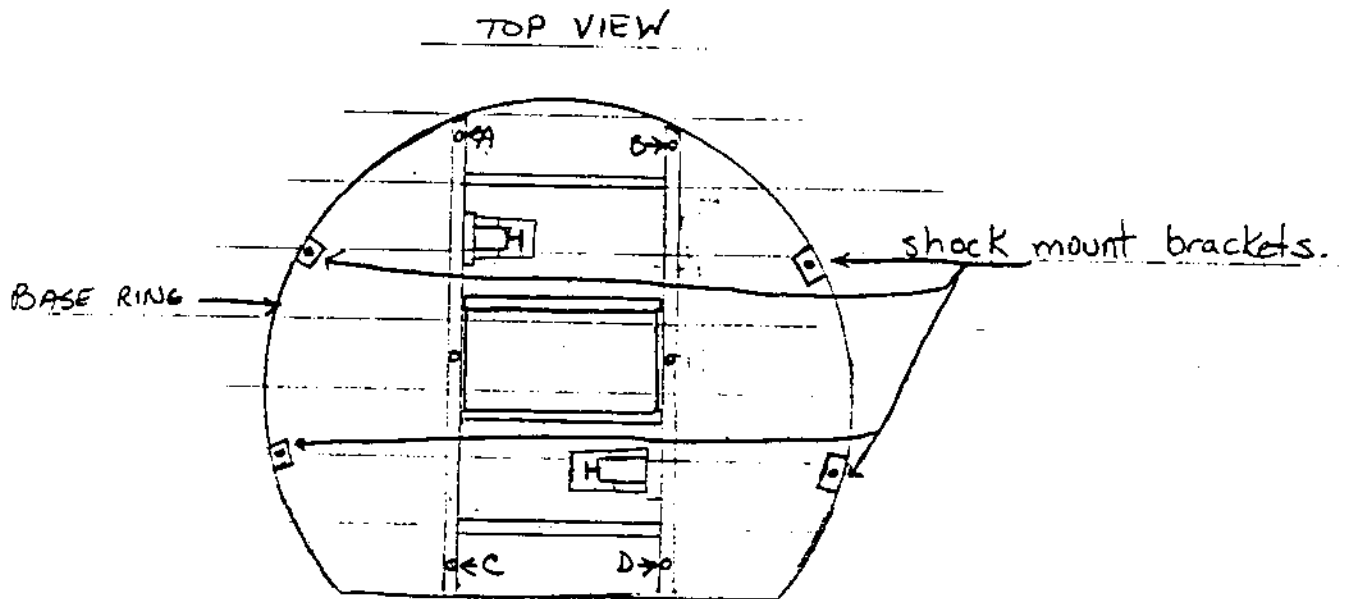
- D. Place battery B with blue wire on top of A.
- E. Place 1 battery cushion on top of battery B.
- F. Place battery C with green wire on top of B.
- G. Place 1 battery cushion on top of C.
- H. Place battery cage crosspiece D with slot across the top of front uprights.
- I. Place last battery without slot across rear of battery cage as in step H and secure both with 4-40 nuts and lock washers.

Front view



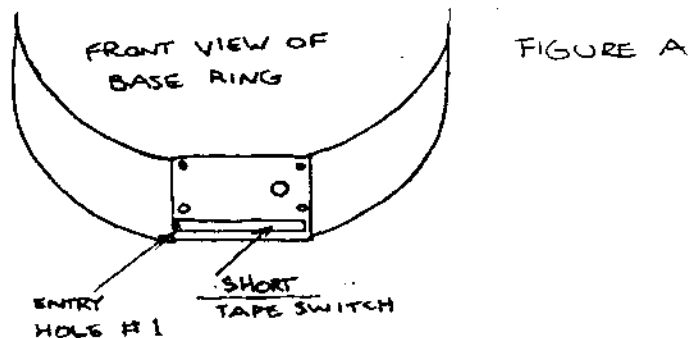
25. Shock Mounting Instructions

- A. Mount 4 shock mount brackets in holes provided with 4-40 3/8" screws.
- B. Mount 4 rubber shocks to shock mount brackets using 4 #8 hexnuts.
- C. Mount 4 rubber shocks to holes A, B, C, and D on the top of the right and left inner structures using 4 #8 hex nuts.
- D. Install a wing nut on each of the rubber shock mounts. These will be used later for securing the torso to the base.

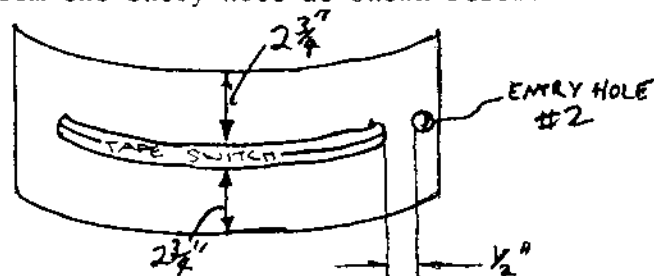


26. Mounting Tape Switches

- A. Tape switch #1. Remove backing from tape switch #1 and mount across the front and bottom of the base ring as shown in diagram below. Route the tape switch wires through the wire entry hole #1. The short tape switch goes in front as marked.

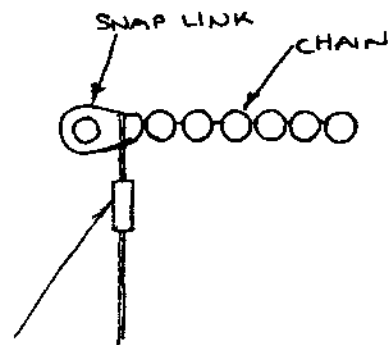


- B. Tape switch #2. Mount tape switch in the center of the base ring and a 1/2" away from the entry hole as shown below.



- C. Tape switch #3 and #4. Use the same procedure as for tape switch #2.

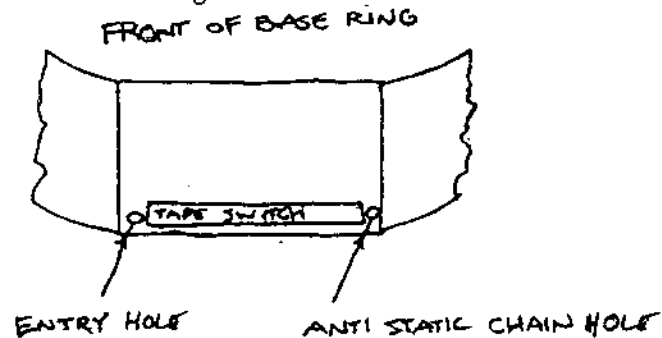
27. Assemble the static chain as indicated below.



SOLDER 27 K Ω RESISTOR
TO SNAP LINK

28. Antistatic Chain Mounting

- A. Use a 4-40 $\frac{3}{4}$ " nylon screw and push it through antistatic chain hole from outside of the base ring. See below.



- B. Slide $\frac{1}{4}$ " nylon stand off onto screw from the inside of base ring. See below.

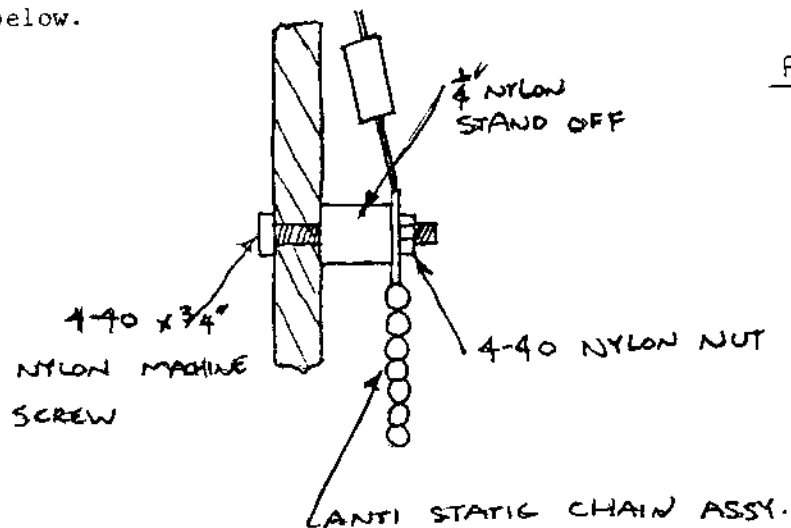
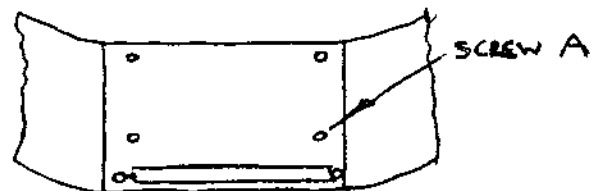


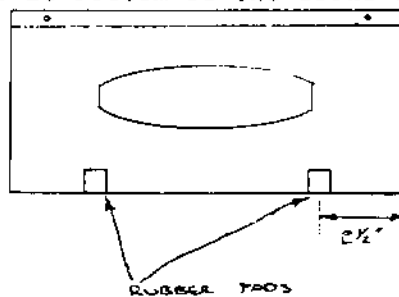
FIG. B

- C. Slide eyelet of antistatic chain assembly onto screw and tighten down with 4-40 nylon nut.
- D. Loosen screw A (see below) and insert wire from anti-static chain assembly above screw A and between base ring and left inner structure and retighten screw.

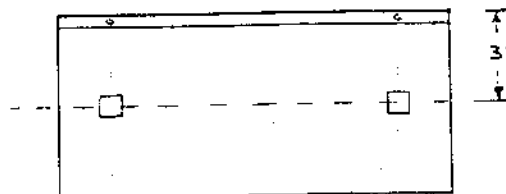


29. Bumper Pads

- A. Stick large rubber pads at bottom of the front bumper.

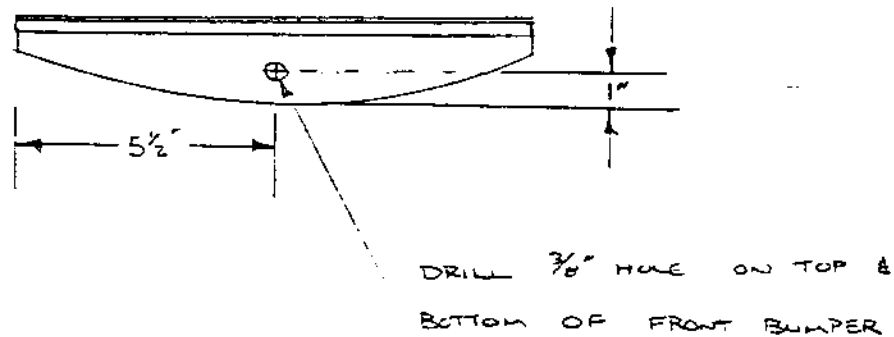


- B. Stick rubber pads on the curved bumpers 3" down from the top and line with the top bumper mounting holes.



29. A - Installation of Charger Bumper Contacts:

A.



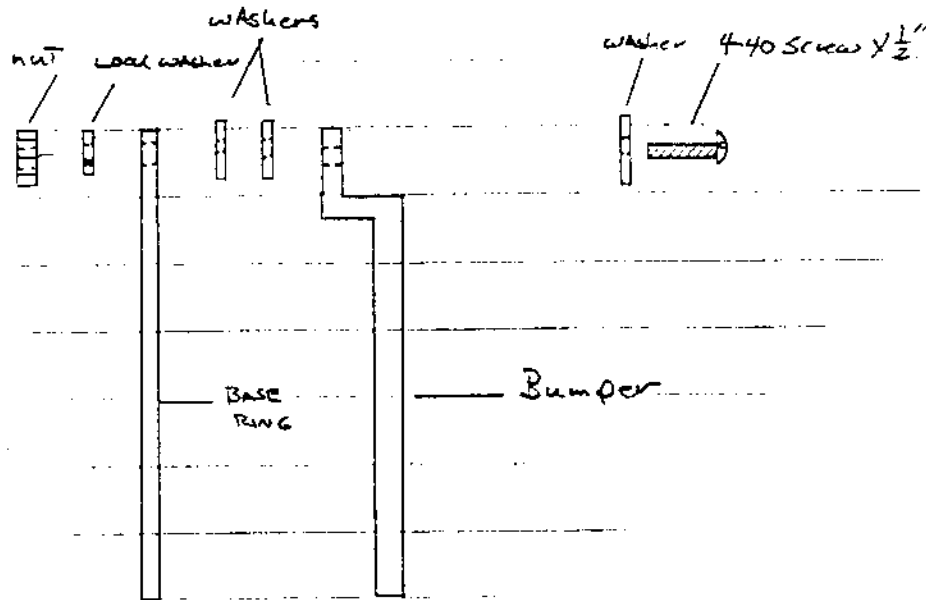
B. Place contact strips on bumper one at a time (do not remove backing on strips yet) and center them, leaving approximately 1/8" between front of bumper and front of strips. Use a felt tip pen to transfer hole location onto back sides of contact strips.

C. Using an x-acto knife or equivalent, carefully cut a 1/2" square out of foam backing approximately where you marked the hole location. Be cautious, as the brass strips can be cut through very easily. Clean away all of the adhesive until a clean surface is exposed.

D. Two 28" lengths of 18 gauge wire will be soldered to the prepared strips. Strip back 1/2" on each wire (red & black), and bend 1/8" of exposed wire at a right angle. Solder the red wire onto the top contact and the black wire onto the bottom contact, taking care to keep the wires in the correct location so that they will pass through the 3/8" drilled holes and still allow proper location of the contact strips.

E. Remove backing, thread wires through holes in bumper and apply contact strips to bumper.

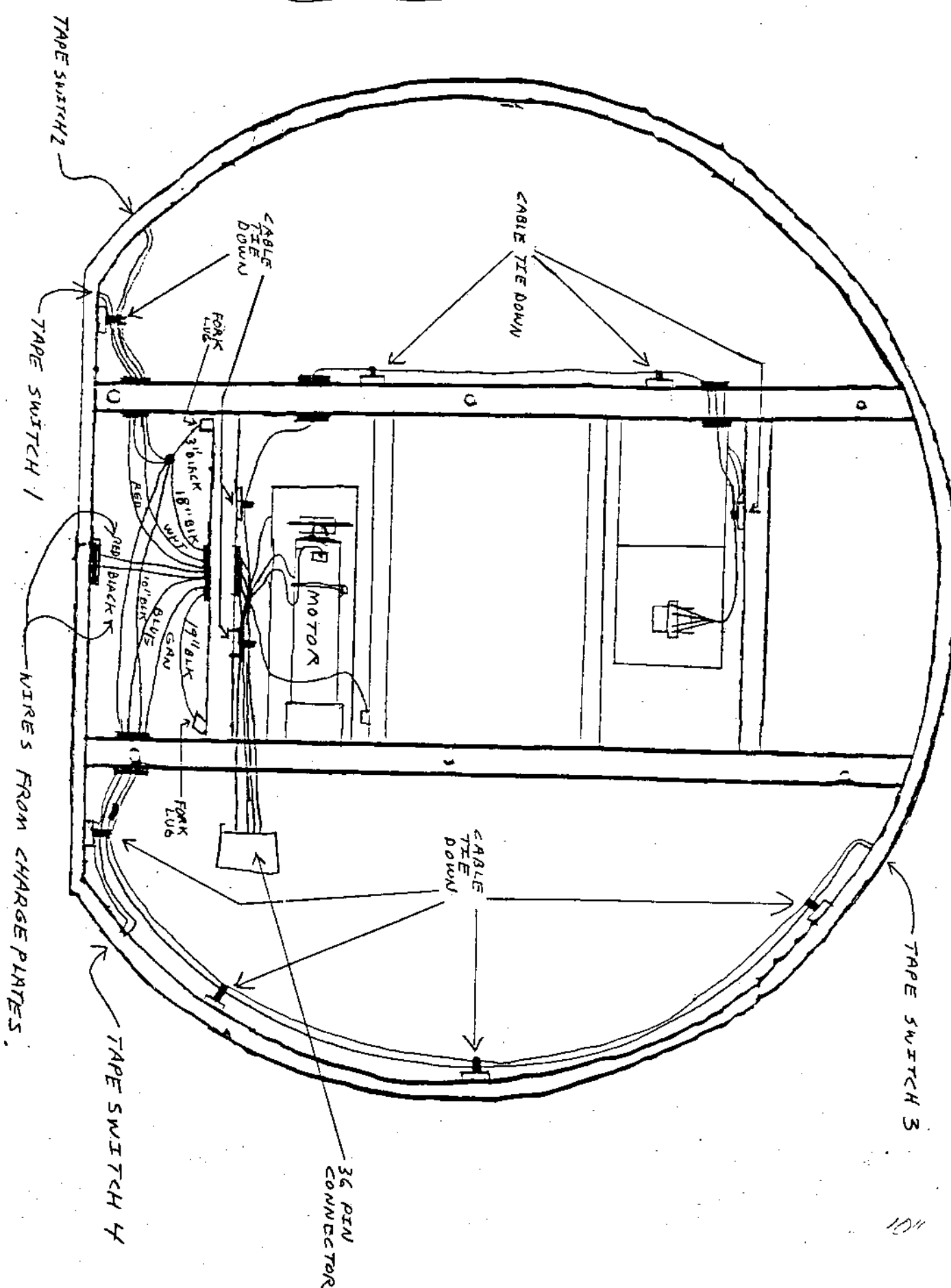
30. Install all bumpers to base ring with hardware shown below with 2 screws on each bumper. The flat section of the base ring takes the brass covered charging bumper. NOTE: 28" lengths of red and black 18 gauge wire on brass covered charging bumper must be inserted through grommet on base ring.

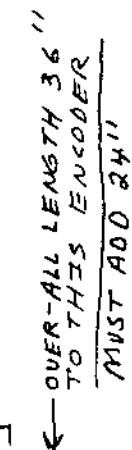
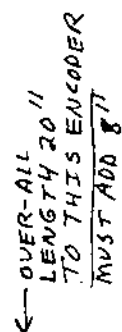
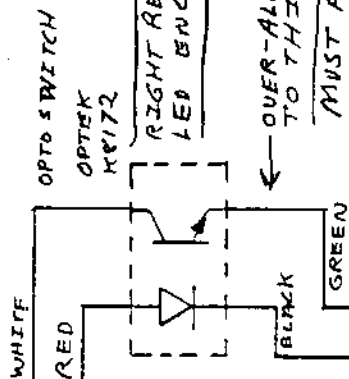
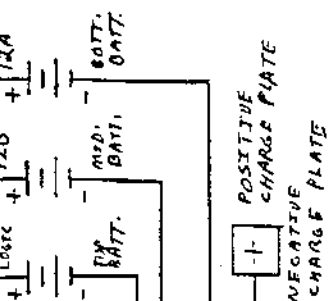
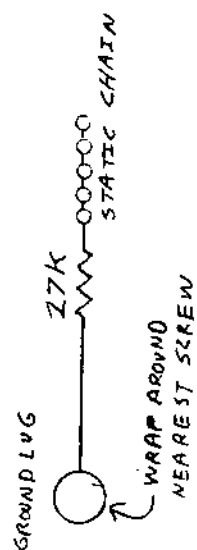


Refer to base wiring diagram (page 24) for the following steps.

31. Referring to detail A, run the tape switch wires as shown and use cable tie downs as shown.
32. Each tape switch has a pair of wires on it. Take one wire from the pair going to tape switch 1 and solder two 8" red 22 gauge wires to this wire. Then take one wire from the pair going to tape switch 2 and solder two 10" white 22 gauge wires to this wire. Take one wire from the pair going to tape switch 3 and solder two 21" green 22 gauge wires to this wire. Take one wire from the pair going to tape switch 4 and solder two 10" blue 22 gauge wires to this wire. After soldering, slide a piece of 1/8" x 1/2" heat shrink tubing over the connections.
33. Strip 1/2" of insulation from both ends of one 10" black 22 gauge wire. Solder one end to the remaining wire from tape switch 3. After soldering, slide a piece of 1/8" x 1/2" heat shrink tubing over the connection.
34. Strip 1/2" of insulation from one end of one 3" and one 18" black 22 gauge wires. Take the remaining wires from the other tape switch pairs and the 10" black wire from tape switch 3 and the 3" and 18" black wires and solder them together. Cover this connection with electrical tape.
35. Strip 1/4" of insulation from the other end of the 3" black wire and crimp and solder a fork lug on this end. Ground this fork lug to any convenient screw on the base.
36. Strip 1/2" of insulation from one end of a 19" black 22 gauge wire. Crimp and solder a fork lug to this end. Ground this fork lug to the same screw in step 35.
37. Run all the above wires as shown in detail A.
38. Refer to the how-tos for this step. Strip 1/8" of all wires going to the 36 pin connector shown in detail A. There should be 30 wires going to this connector. Crimp and solder one female molex pin to each of these wires.
39. Referring to the base wiring diagram, insert the female molex pins into the back of the 36 pin connector as shown in the base wiring diagram.
40. Use tie wraps to lace wires together.

DETAIL A





BASE WIRING
DIAGRAM



Test connections with volt meter for 12 volts at pins 3+4, 2+5, 1+6 and double check all other connections for proper hook up.

Route all cables away from the moving parts with tie wraps and sticky back tie downs as shown below.