

1/25/85

**** NOTE ****

THIS DOCUMENT IS THE FINAL DRAFT OF THE TWIGGY MANUFACTURING INSTRUCTIONS.
COMMENTS AND FEEDBACK ARE WARMLY WELCOMED.

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942-3307

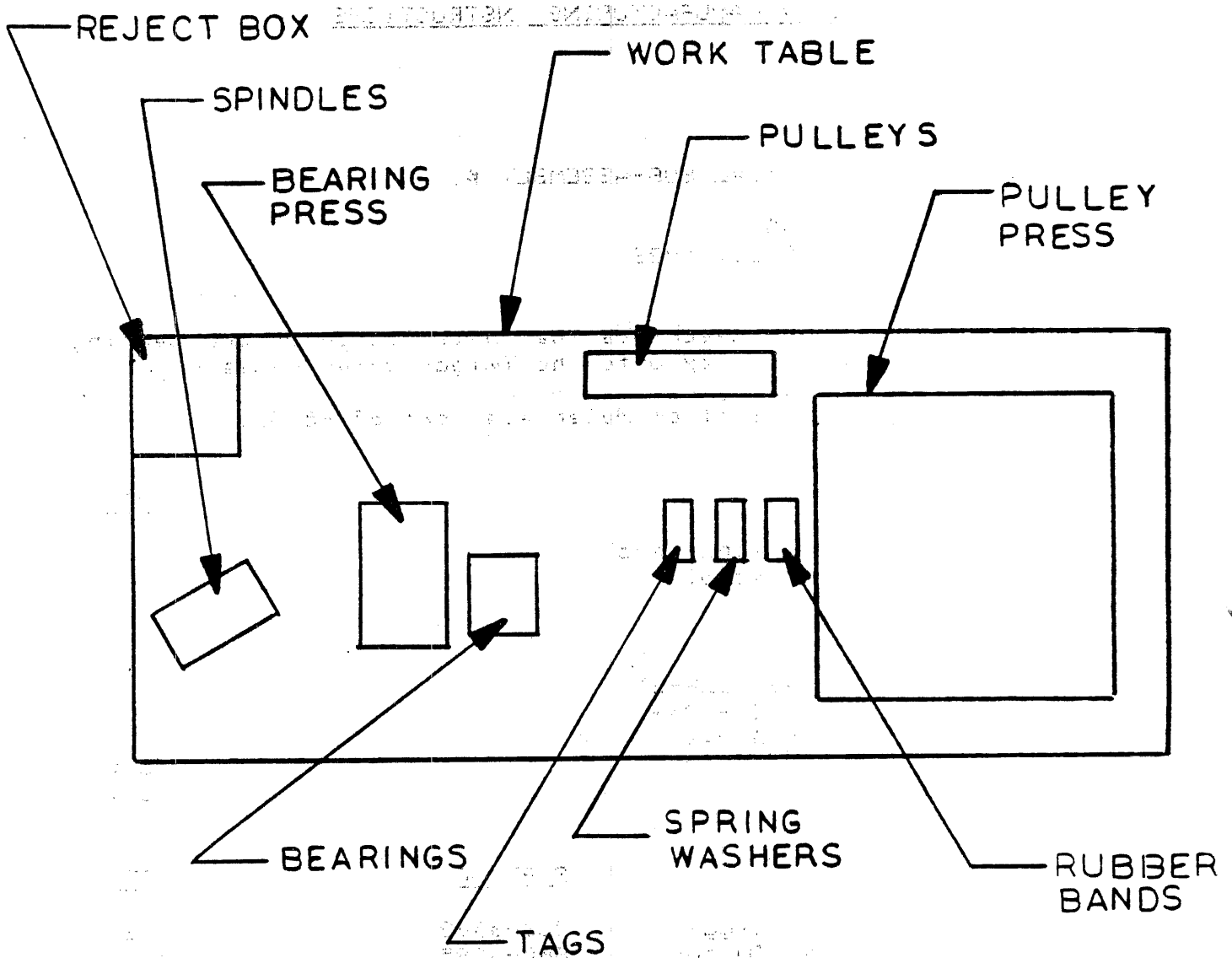


FIGURE 1. THE WORK STATION LAYOUT FOR SUB-ASSY # 1
(TOP VIEW)

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TWIGGY MANUFACTURING INSTRUCTIONS

NOE 71313

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2310000

1.0 TITLE: TWIGGY - MECHANICAL SUB-ASSEMBLY #1

BEARING PRESS

- 1.1 Part No.: 064-0240
- 1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the installation of the bearing, spindle, and pulley onto the Twiggy drive chassis.

3.0 REFERENCE DOCUMENTS: - Bill of Materials, p/n 653-5150.

4.0 EQUIPMENT REQUIRED:

QTY.

- 4.1 standard assembly work bench 1
- 4.2 standard assembly stool 1
- 4.3 pulley puller 1
- 4.4 table mat 1
- 4.5 pulley press 1
- 4.6 small bin (Akro #30-220-2) 1
- 4.7 medium bin (Akro #30-230-1) 1
- 4.8 large bin (Akro #30-240) 1
- 4.9 tags A/R
- 4.10 rubberbands A/R

5.0 MATERIALS REQUIRED:

PART NO.

QTY.

- 5.1 flanged bearing, Twiggy 880-0008 2
- 5.2 machined chassis, Twiggy 800-0095 1
- 5.3 pulley, Twiggy 815-5003 1
- 5.4 spindle assembly 800-5080 1
- 5.5 spring washer 870-0012 1

6.0 PREPARATION PROCEDURE:

- 6.1 Gather at least 5 bins and fill them with chassis.
- 6.2 Layout the work station according to Fig. 1

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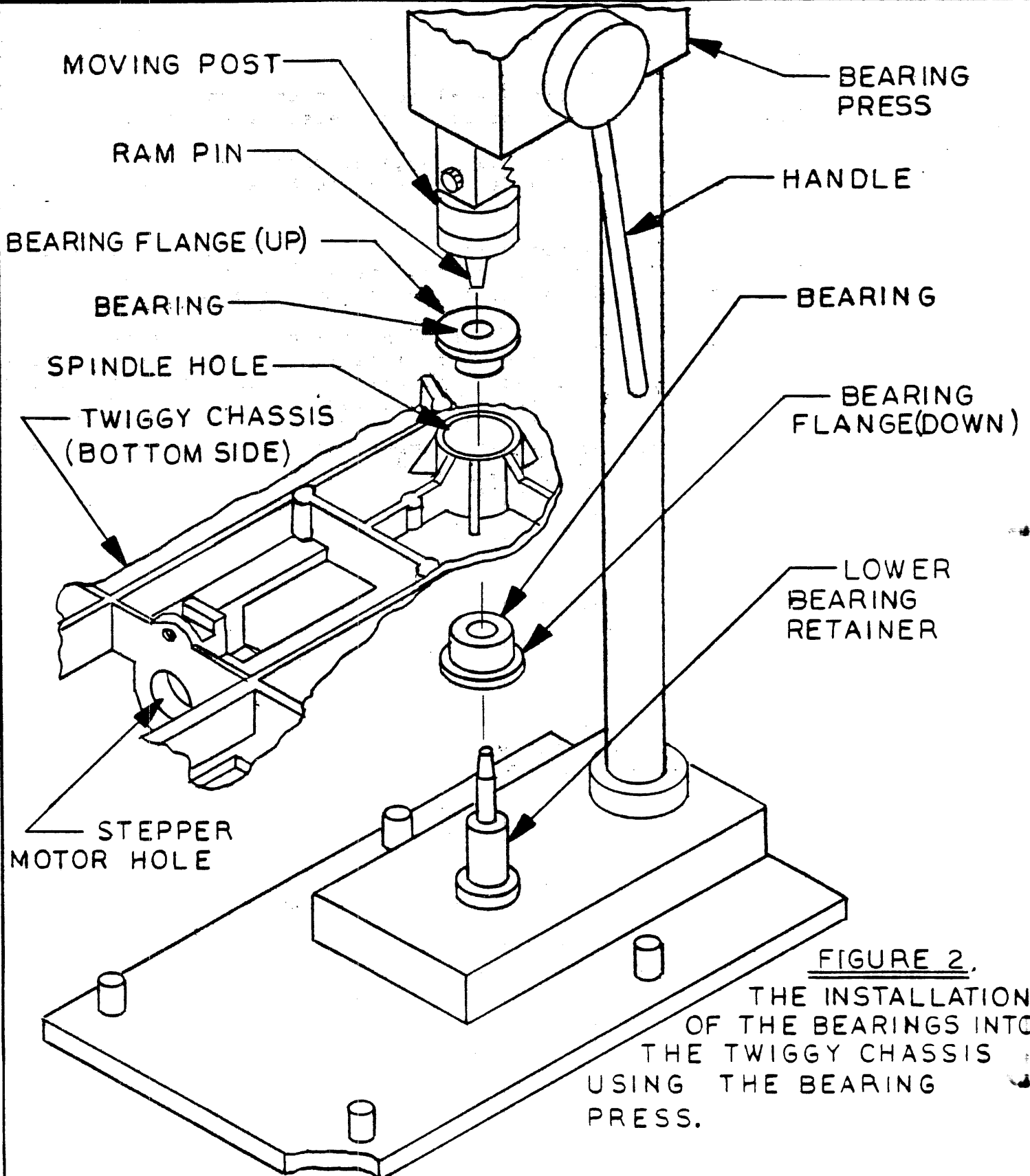
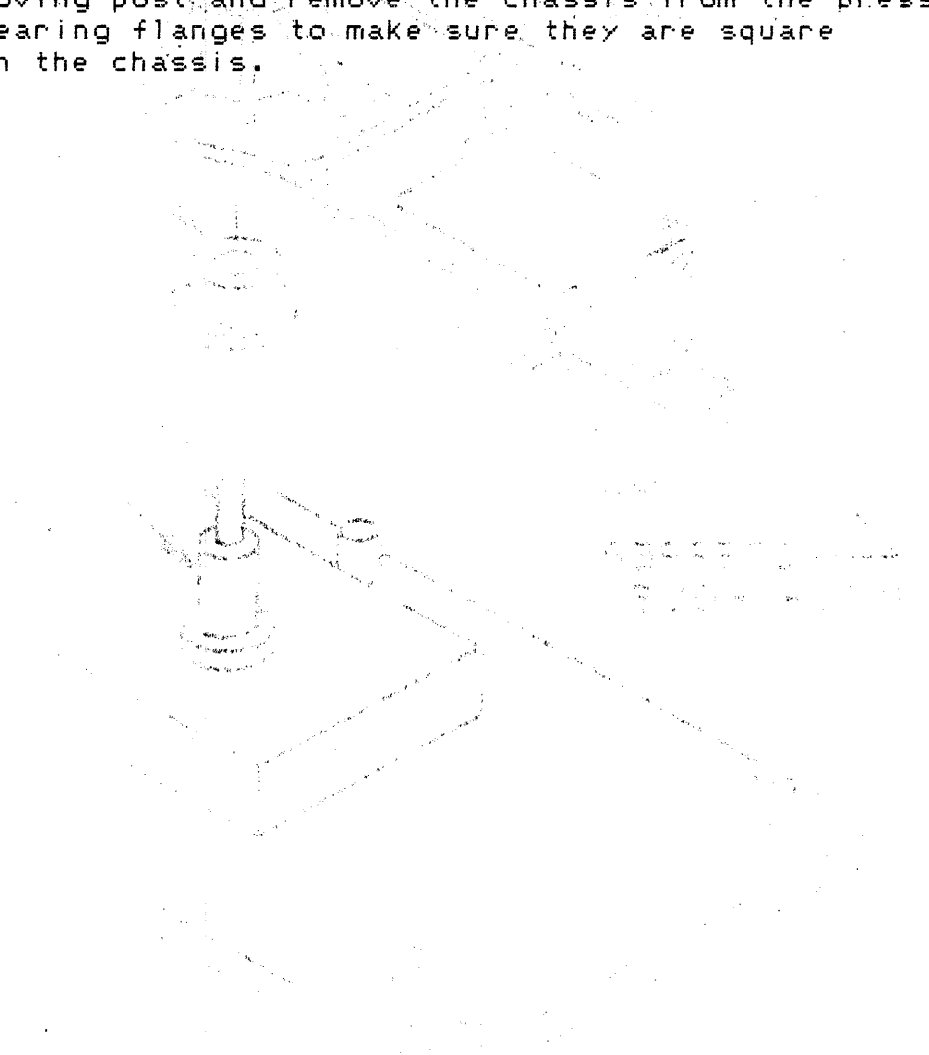


FIGURE 2.
THE INSTALLATION
OF THE BEARINGS INTO
THE TWIGGY CHASSIS
USING THE BEARING
PRESS.

7.0 ASSEMBLY PROCEDURE:7.1 Bearing Installation:

- 7.1.1 Place a bearing with its flange down onto the lower bearing retainer on the bearing press. (see Fig. 2.)
- 7.1.2 Place a bearing with its flange up onto the ram pin on the moving post on the upper part of the press. (It is held there by a magnet.)
- 7.1.3 Turn the chassis bottom-side up (as shown in Fig. 2) and place it on the press so that the spindle hole is located over the bearing on the lower bearing retainer.
- 7.1.4 Bring the moving post down by rotating the press handle until the bearing on the moving post is inserted into the spindle hole. Maintain a constant downward pressure until the press stops. The bearing is now installed.
- 7.1.5 Raise the moving post and remove the chassis from the press. Check the bearing flanges to make sure they are square and flush in the chassis.



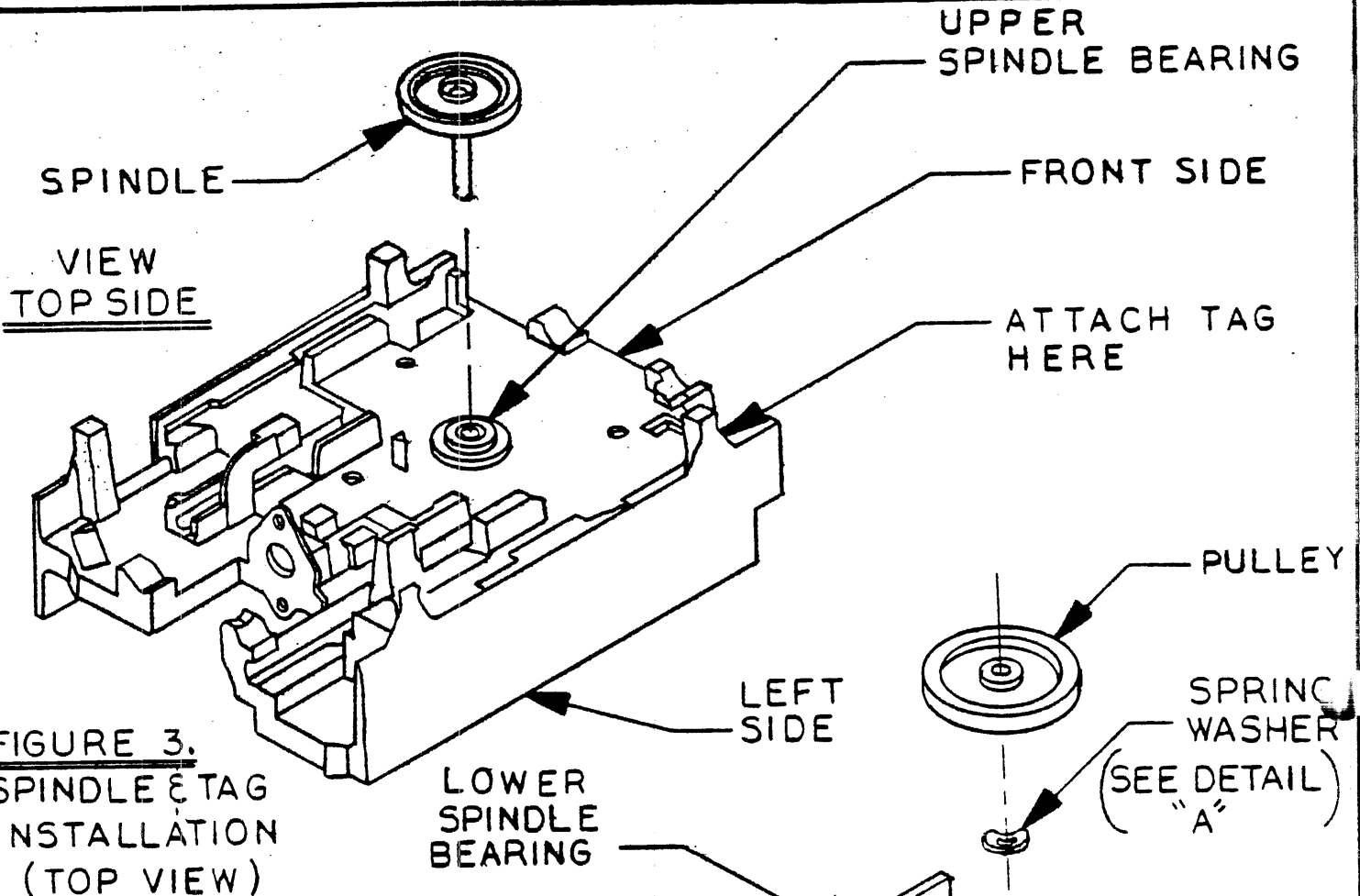


FIGURE 3.
SPINDLE & TAG
INSTALLATION
(TOP VIEW)

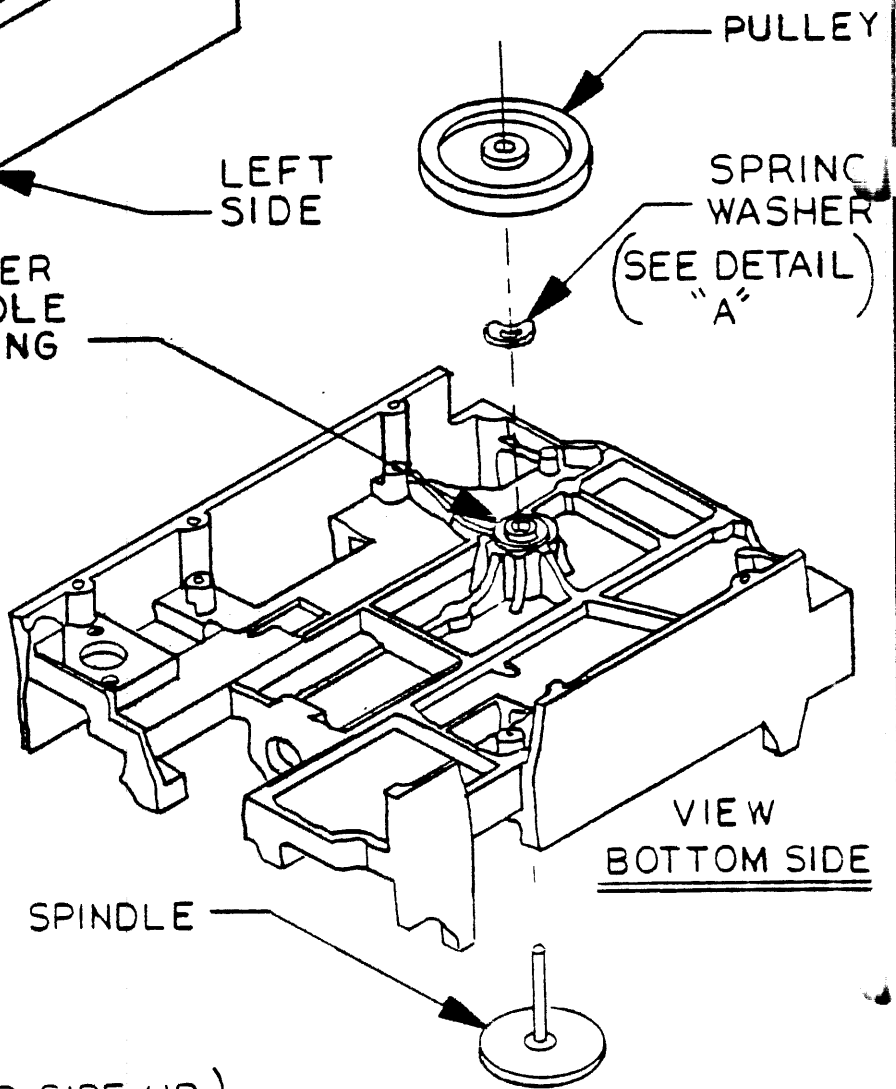
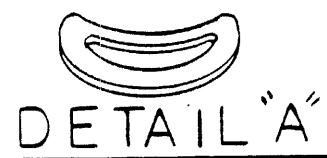


FIGURE 4.
PULLEY & SPRING
WASHER INSTALLATION
(BOTTOM VIEW)



DETAIL "A"

SPRING WASHER (CURVED-SIDE UP)

7.2 Spindle Installation:

- 7.2.1 Slide a spindle through the upper bearing (See Fig. 3.) until its shaft projects fully out the lower bearing.

7.3 Pulley Installation:

- 7.3.1 Flip the chassis so that the bottom-side faces up while holding the spindle in place. Slide a spring washer onto the spindle shaft so that the curve of the washer faces up. Make sure there is only one spring washer installed. (See Fig. 4.)

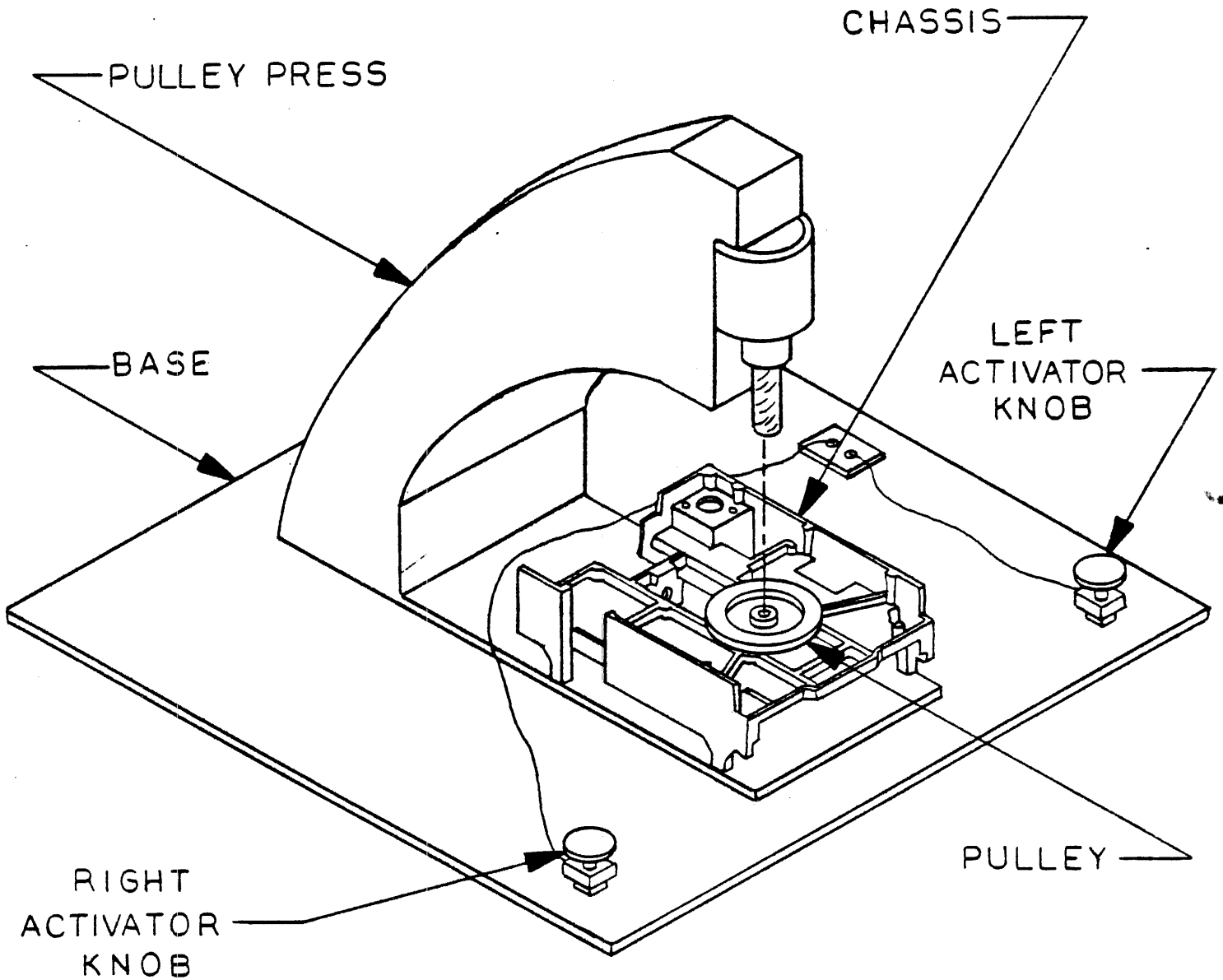


FIGURE 5. THE INSTALLATION OF THE PULLEY USING THE PRESS

- 7.3.2 Place the chassis bottom-side up on the pulley press. (See Fig. 5.)
- 7.3.3 Place a pulley onto the spindle shaft on top of the spring washer, and be sure the pulley is centered on the tip of the shaft.
- 7.3.4 Activate the press by exerting pressure simultaneously on both activator knobs on the press base. (See Fig. 5.) Maintain the pressure until the press goes down fully, and wait 2 more seconds before releasing the activator knobs. When the press has returned to its original position, remove the chassis.

7.4 Spindle Inspection:

- 7.4.1 While holding the chassis in one hand, check the installation of the spindle by spinning it with the other hand. The pulley must spin smoothly and freely. Hold the unit next to your ear, spin the spindle again, and listen for grinding sounds. If the spindle does not spin freely, reject the chassis assembly.
- 7.4.2 Hold the chassis so that the top of the upper bearing is level with your eye. Push up on the pulley. The spring washer should be squeezed and force the spindle to move up. The bearing may also be lifted, but it must return to its original position when you stop pushing. If the bearing stays up, reject the chassis assembly.
- 7.4.3 Attach a rubber band to a tag, write your initials, chassis number, and the date on the tag, and attach it to the chassis at the left front section of the chassis. (See Fig. 3.)

TWIGGY MANUFACTURING INSTRUCTIONS

1.0 TITLE: TWIGGY - MECHANICAL SUB-ASSEMBLY #2A

1.1 Part No.: 064-0242

1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the installation of the stepper motor, kick-out body, rail clamps, D.C. motor, and ascend spring onto the Twiggy chassis.

3.0 REFERENCE DOCUMENTS: - Bill of Materials, p/n 653-5150.

4.0 EQUIPMENT REQUIRED:

QTY.

4.1	standard assembly work bench	1
4.2	standard assembly stool	1
4.3	four-socket electrical power strip	1
4.4	table mat (#3M051)	1
4.5	pneumatic screwdriver set at 6 in-lbs. torque	1
4.6	tweezers	1
4.7	small wire cutter, (Erem 512E)	1
4.8	small bins (Akro #30, 220-2)	6
4.9	medium bins (Akro #230-1)	5

5.0 MATERIALS REQUIRED:

PART NO.

QTY.

5.1	kick-out body	815-5002	2
5.2	kick-out spring	870-0009	1
5.3	kick-out plate	805-0083	1
5.4	rail clamp	805-0100	4
5.5	screw, #6-32 X 1/4, cross recess pan head	400-1604	8
5.6	D.C. motor drive	880-0011	1
5.7	ascend spring	870-0010	1
5.8	stepper motor	880-0009	1

3 PREPARATION PROCEDURE: None

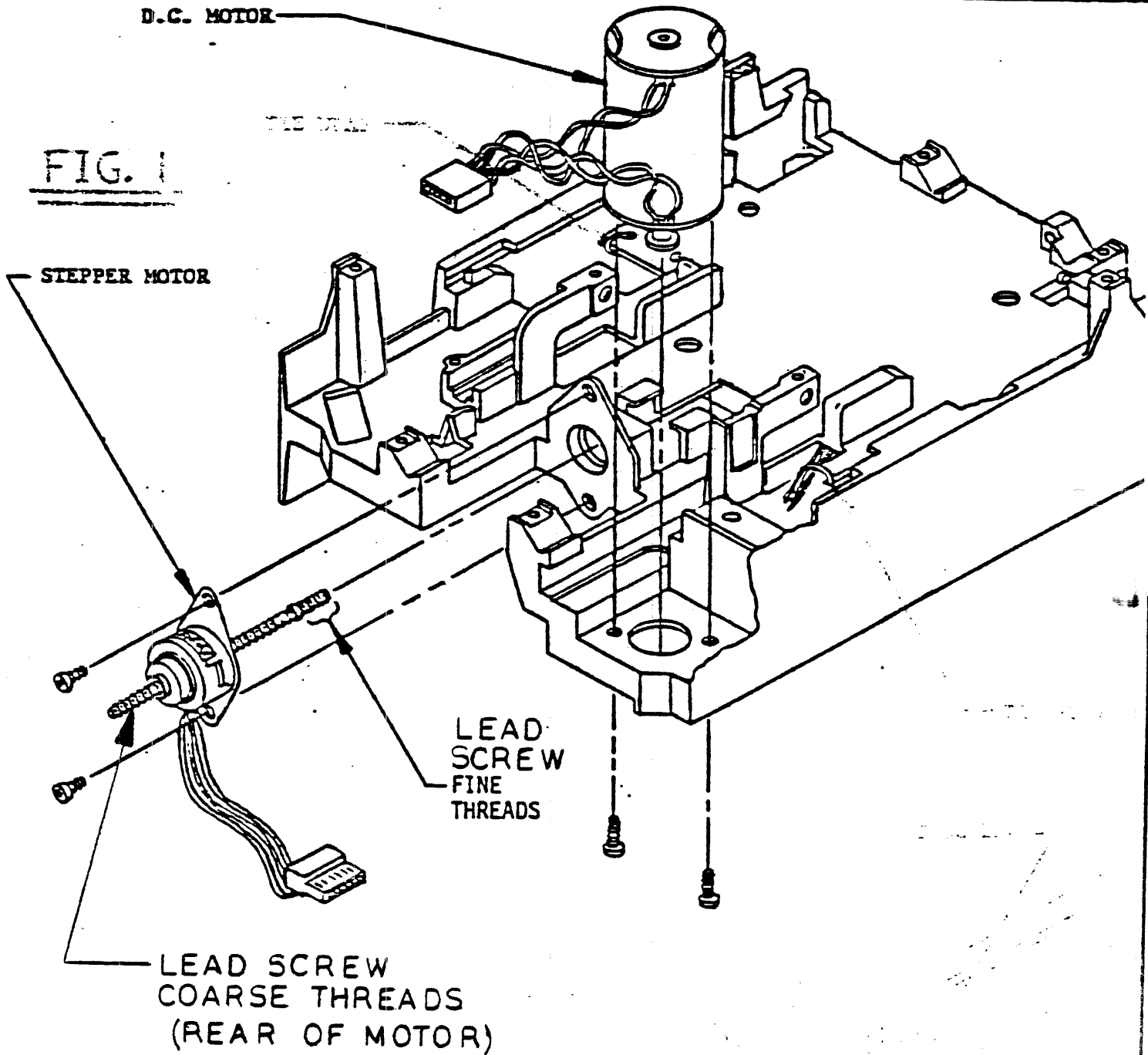


FIG. 1

FIGURE 1. THE INSTALLATION OF THE STEPPER & DC MOTORS (TOP VIEW)

7.0 ASSEMBLY PROCEDURE:

7.1 Stepper Motor Installation:

- 7.1.1 Turn the lead screw through the stepper motor until only 1 in. of coarse threads are visible at the rear of the motor. (see Fig. 1.)
- 7.1.2 Put two screws (6-32 X 1/4 in.) into the motor and place the stepper motor against the rear of the chassis as shown in Fig. 1. Make sure the wires are pointed down.
- 7.1.3 Tighten one screw a few turns, but not completely tight. Fully tighten the second screw using the pneumatic screwdriver set at 6 in-lb. Tighten the first screw to 6 in-lb.

FIGURE 2. THE KICK-OUT BODY & KICK-OUT SPRING

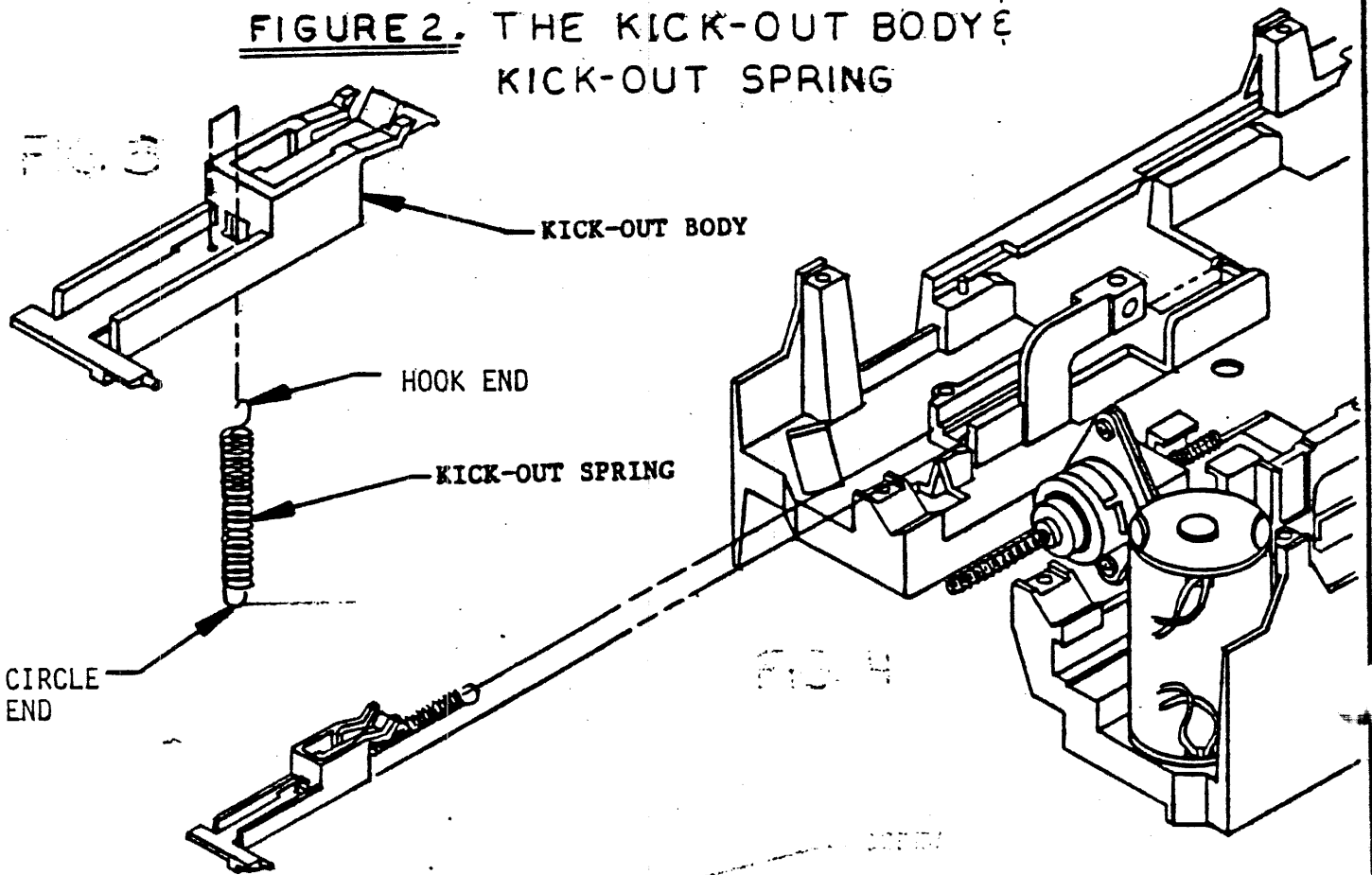
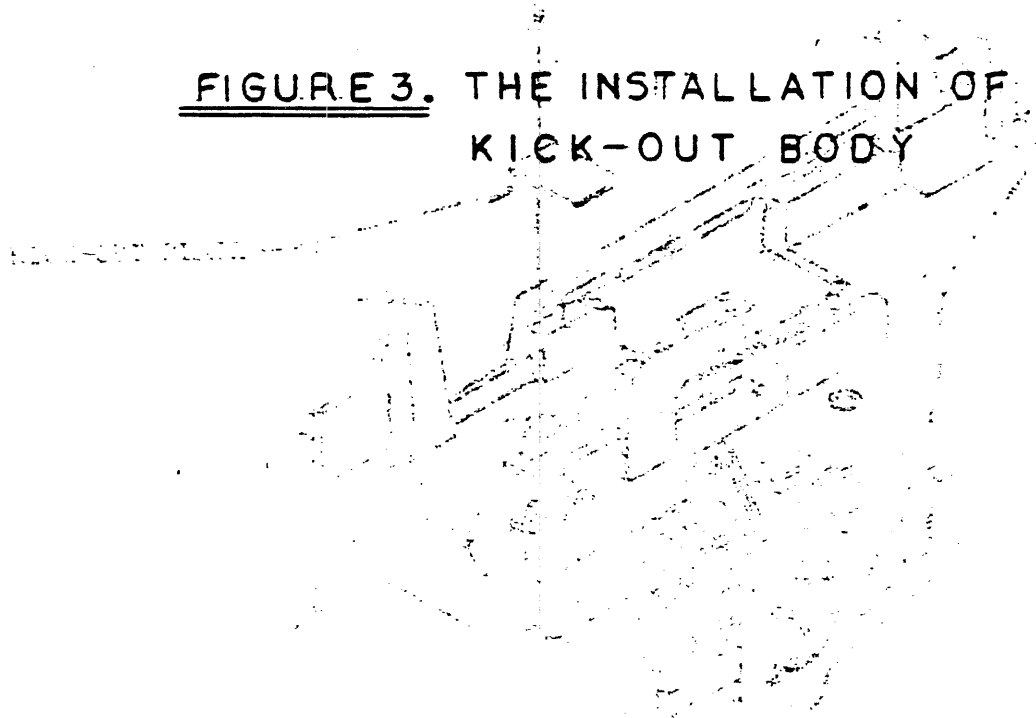


FIGURE 3. THE INSTALLATION OF THE KICK-OUT BODY



7.2 Kick-Out Body/Kick-Out Spring Installation:

- 7.2.1 Attach the hook-end of the kick-out spring into the kick-out body as shown in Fig. 2.
- 7.2.2 Attach the circle-end of the kick-out spring to the chassis, and slide the kick-out body into the slot as shown in Fig. 3.

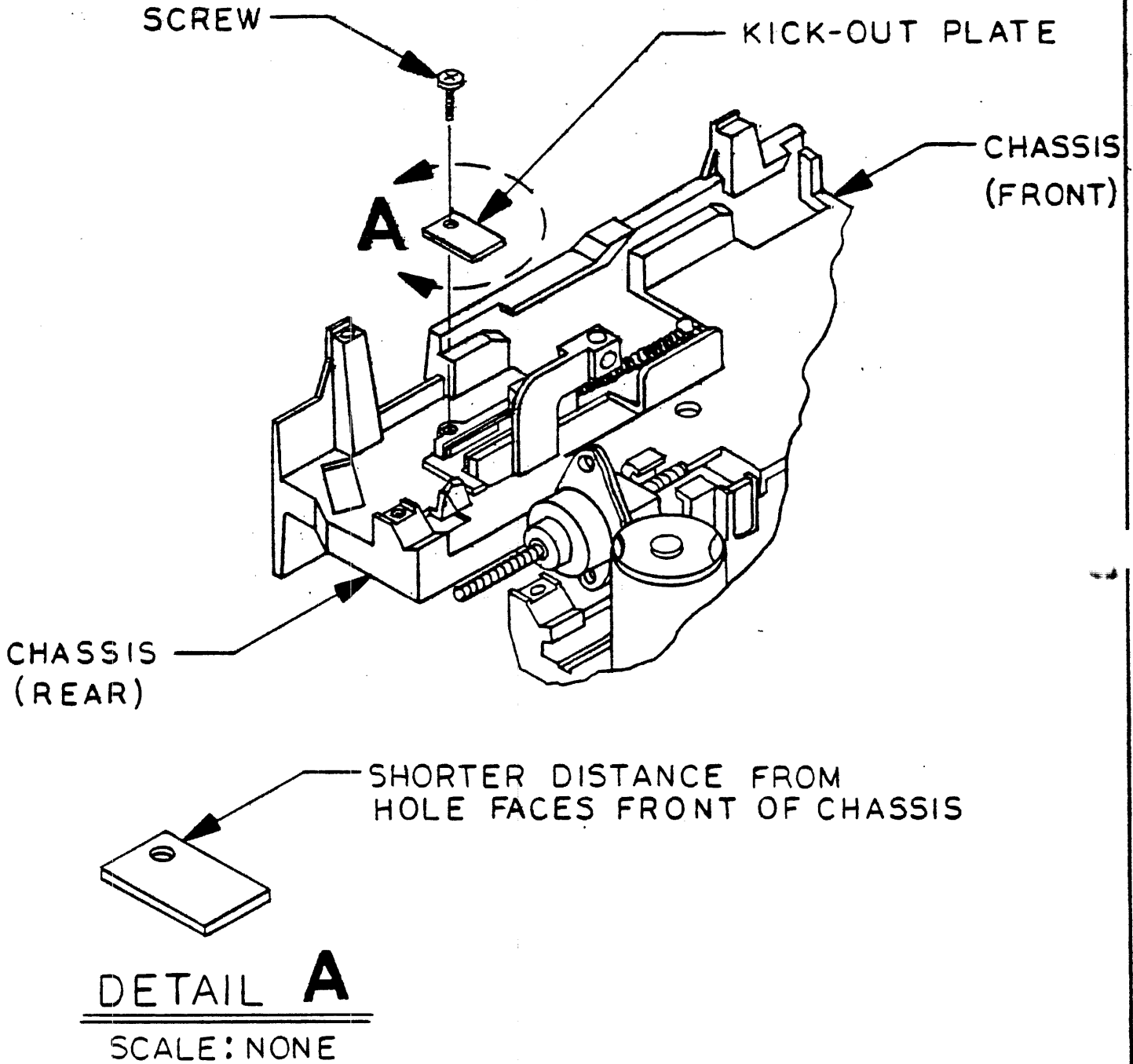


FIGURE 4. THE INSTALLATION OF THE KICK-OUT PLATE

7.3 Kick-Out Plate Installation:

- 7.3.1 Put a screw (6-32 X 1/4 in.) in the kick-out plate and place the plate on the chassis above the kick-out body as shown in Fig. 4. Be sure the edges of the plate are square with the chassis and in accordance with the note below. (See Fig. 4.) Tighten the screw using the pneumatic screwdriver set at 6 in-lb.

*** NOTE *** The kick-out plate has a hole located closer to one edge of the plate than the other edge. The side of the plate that has the shorter distance between the hole and the plate-edge must be positioned towards the front of the chassis.

FIG. 6

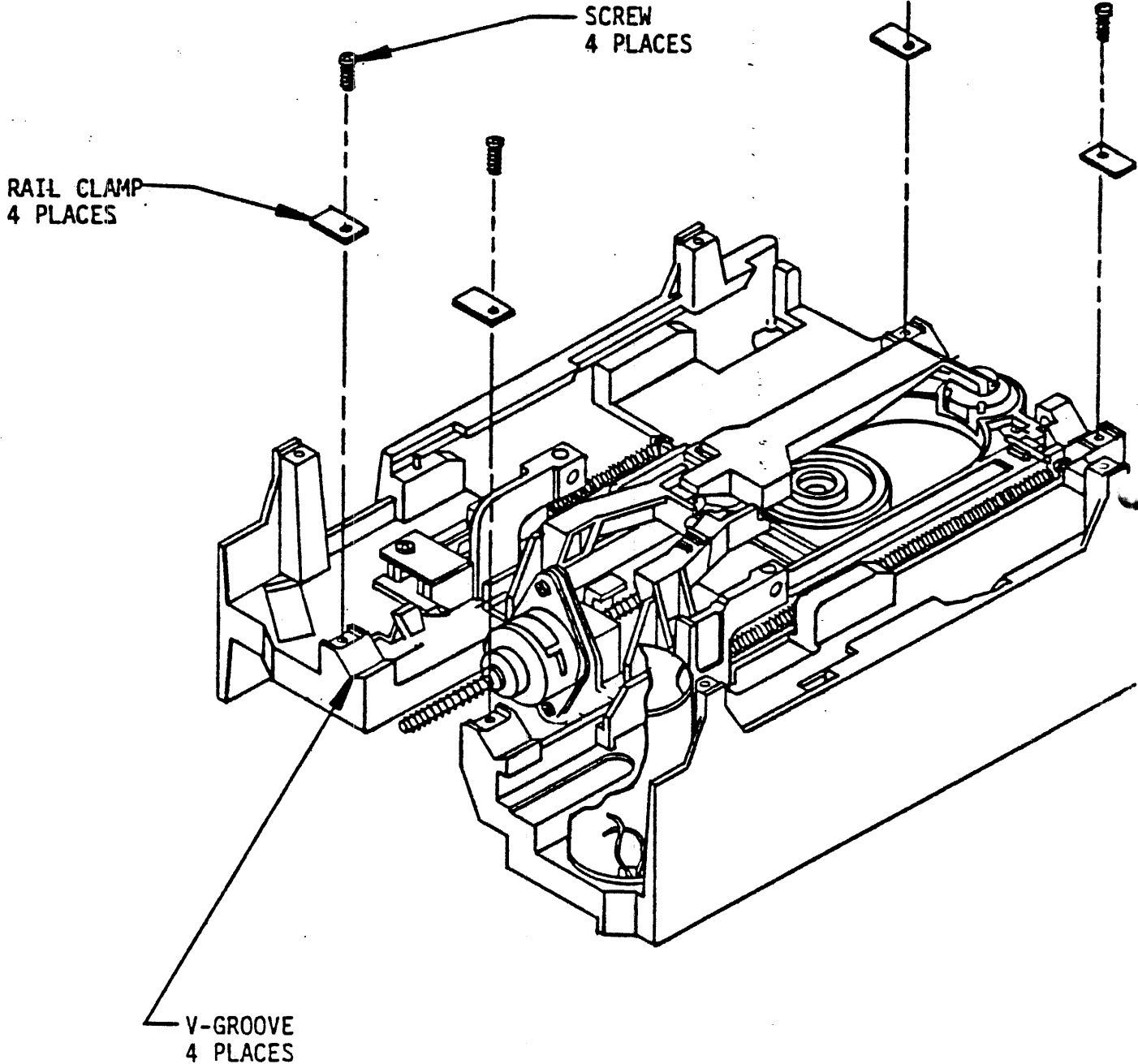


FIGURE 5. THE INSTALLATION OF THE RAIL CLAMPS IN FOUR PLACES (TOP VIEW)

7.4 Rail Clamps Installation:

- 7.4.1 Put a screw in each of the four rail clamps and lightly attach each one to a V-groove on the chassis as shown in Fig. 5. Turn each screw only four turns; do not tighten.

7.5 D.C. Motor Installation:

- 7.5.1 Place the D.C. motor on the chassis as shown in Fig.1. Make sure the wires are out over the edge of the chassis.
- 7.5.2 Hold the motor in place and install the screws through the bottom of the chassis. Tighten one screw (6-32 X 1/4 in.) a few turns, but not completely tight. Fully tighten the second screw using the pneumatic screwdriver set at 6 in-lb. Tighten the first screw to 6 in-lb.

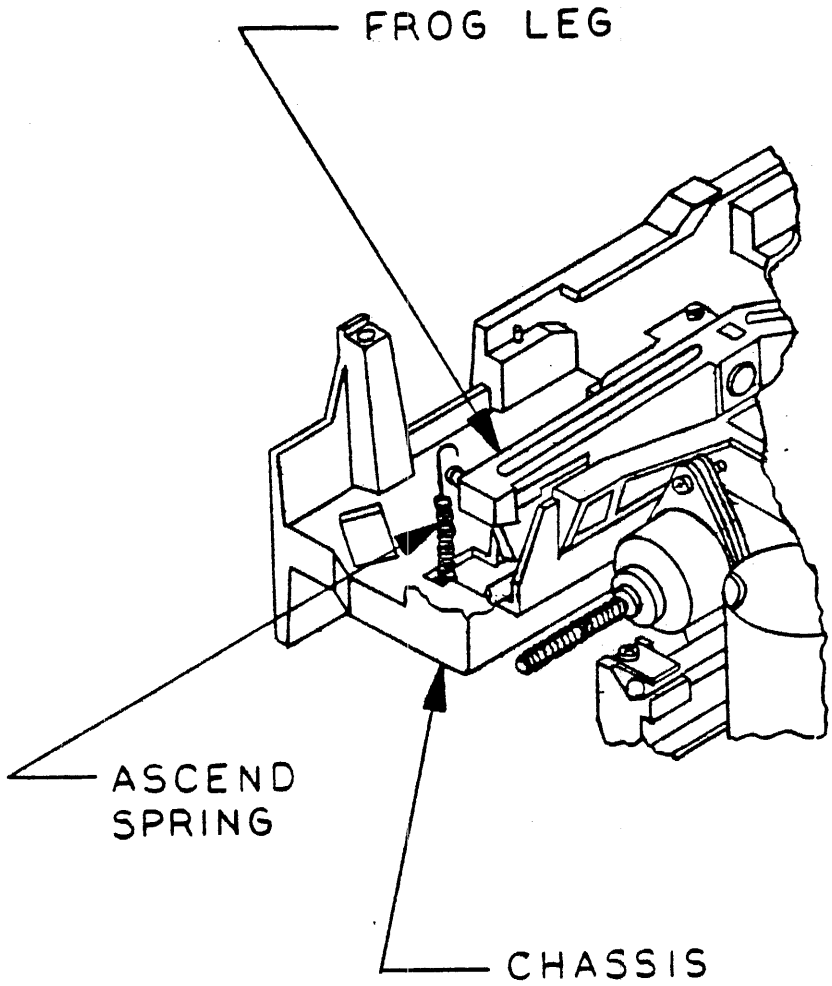


FIGURE 6. THE INSTALLATION OF THE ASCEND SPRING

7.6 Ascend-Spring Installation:

- 7.6.1 Attach one end of the ascend spring to the notch in the ascend spring post on the chassis. (See Fig. 6.) Push the other end through the opening in the chassis so that the spring is hanging straight down from the post.

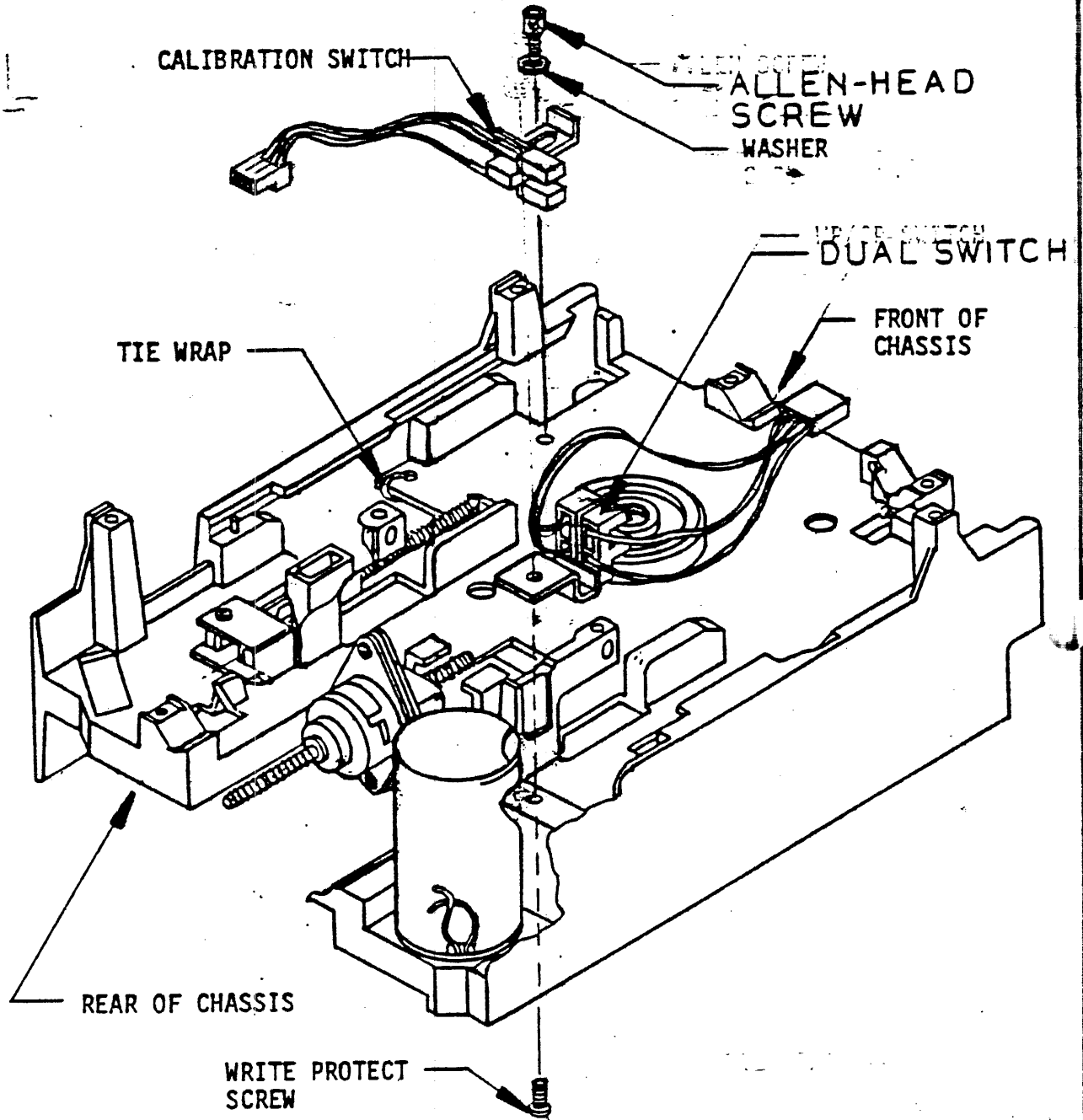


FIGURE 1. THE INSTALLATION OF THE DUAL & CALIBRATION SWITCHES (TOP VIEW)

TWIGGY MANUFACTURING INSTRUCTIONS

1.0 TITLE: TWIGGY - MECHANICAL SUB-ASSEMBLY #2B

1.1 Part No.: 064-0243

1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the installation of the calibration and dual-switches onto the Twiggy chassis.

3.0 REFERENCE DOCUMENTS: - Bill of Materials, p/n 653-5150.

<u>4.0</u> <u>EQUIPMENT REQUIRED:</u>	<u>QTY.</u>
4.1 standard assembly work bench	1
4.2 standard assembly stool	1
4.3 small bins (Akro #30-220)	3
4.4 medium bins (Akro #30-230)	4
4.5 pneumatic screwdriver, set at 6 in.-1b	1
4.6 #1 Phillips screwdriver	1
4.7 3/32 in. hexdriver	1
4.8 tie-wrap gun with multiple settings	1

<u>5.0</u> <u>MATERIALS REQUIRED:</u>	<u>PART NO.</u>	<u>QTY.</u>
5.0 optical switch, dual channel, write protect	653-5110	1
5.1 optical switch, calibration	653-5120	1
5.2 tie-wrap	830-0031	2
5.3 screw, #6-32 X 1/4 in., cross recess	400-1604	1
5.4 screw, #6-32 X 3/8 in., allen-head	405-6640	1
5.5 plain washer, #6	870-0076	1

6.0 PREPARATION PROCEDURE: None

7.0 ASSEMBLY PROCEDURE:

7.1 Dual Switch Installation:

7.1.1 Place a dual switch on the chassis as shown in Fig. 1.

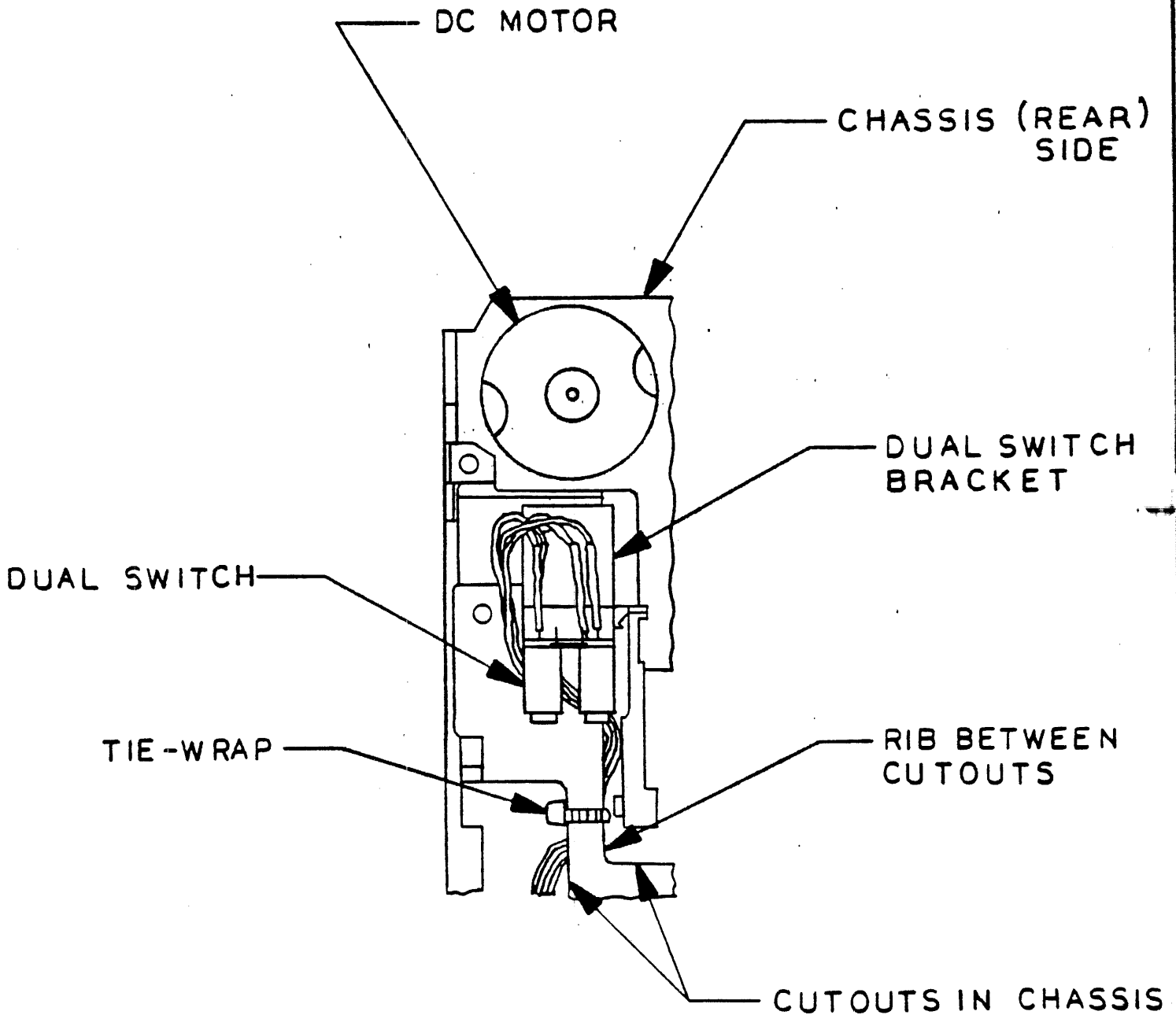


FIGURE 2. THE LOCATION OF THE DUAL SWITCH & ITS WIRING HARNESS (TOP VIEW)

and line up the hole in the switch bracket with the hole in the chassis. While holding the switch in place, insert a screw (6-32 X 1/4 in.) through the bottom of the chassis and into the hole of the switch bracket. Align the edge of the switch bracket so that it is parallel to the edge of the chassis. (See Fig. 2.) Tighten the screw.

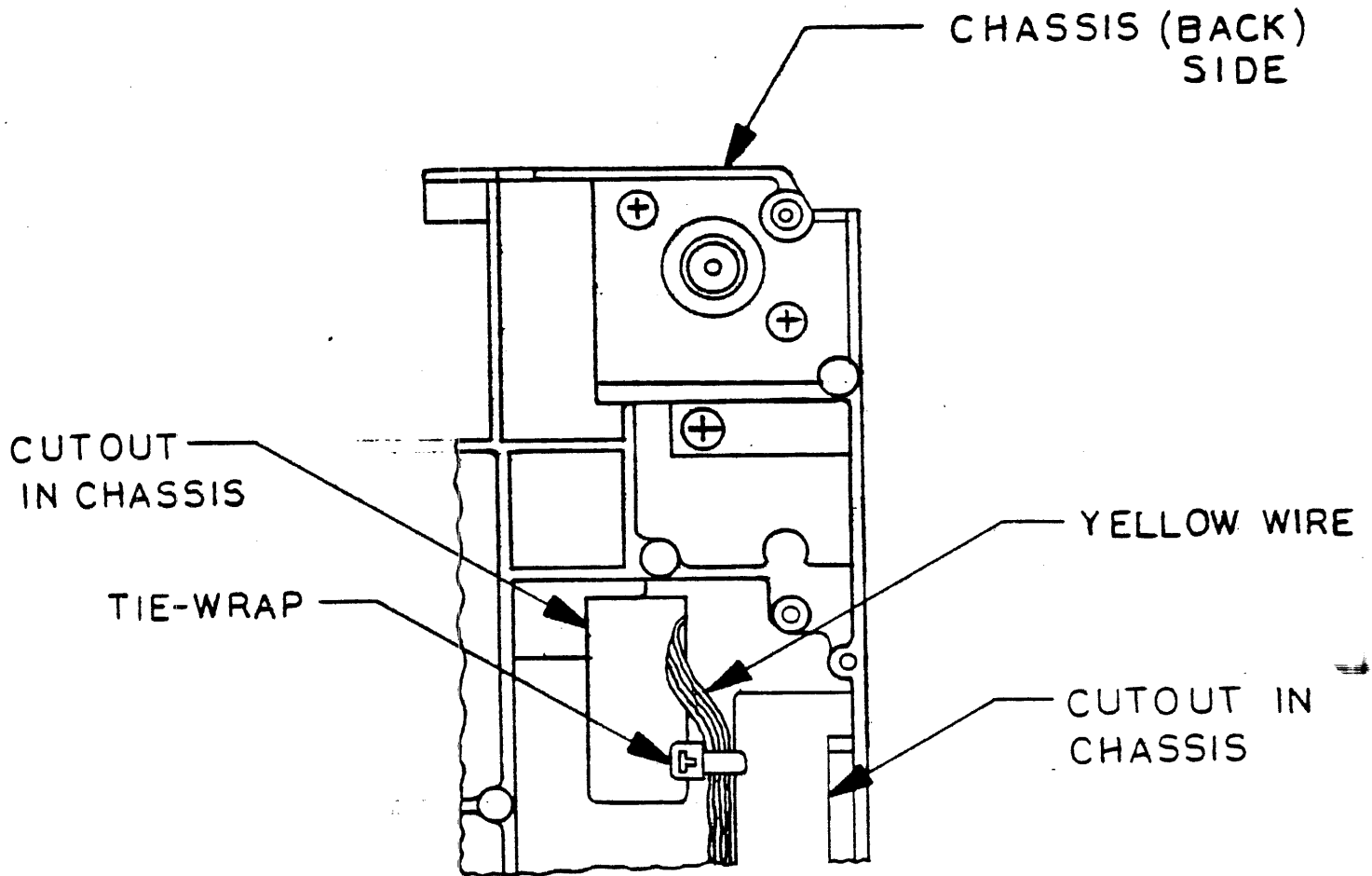


FIGURE 3. THE TIE-WRAPPING OF THE DUAL SWITCH WIRING HARNESS. (BOTTOM VIEW)

- 7.1.2 Place the wires near the base of the switch bracket and down through the rectangular cut-out in the chassis in front of the switch. Using a tie-wrap gun set at 5.5, tie-wrap the wires to the rib between the rectangular cut-outs, so that the wires run along the bottom of the rib. Be sure the yellow wire is closest to the chassis wall, (when the wire harness is viewed from the bottom-side of the chassis.) (See Fig. 3.)

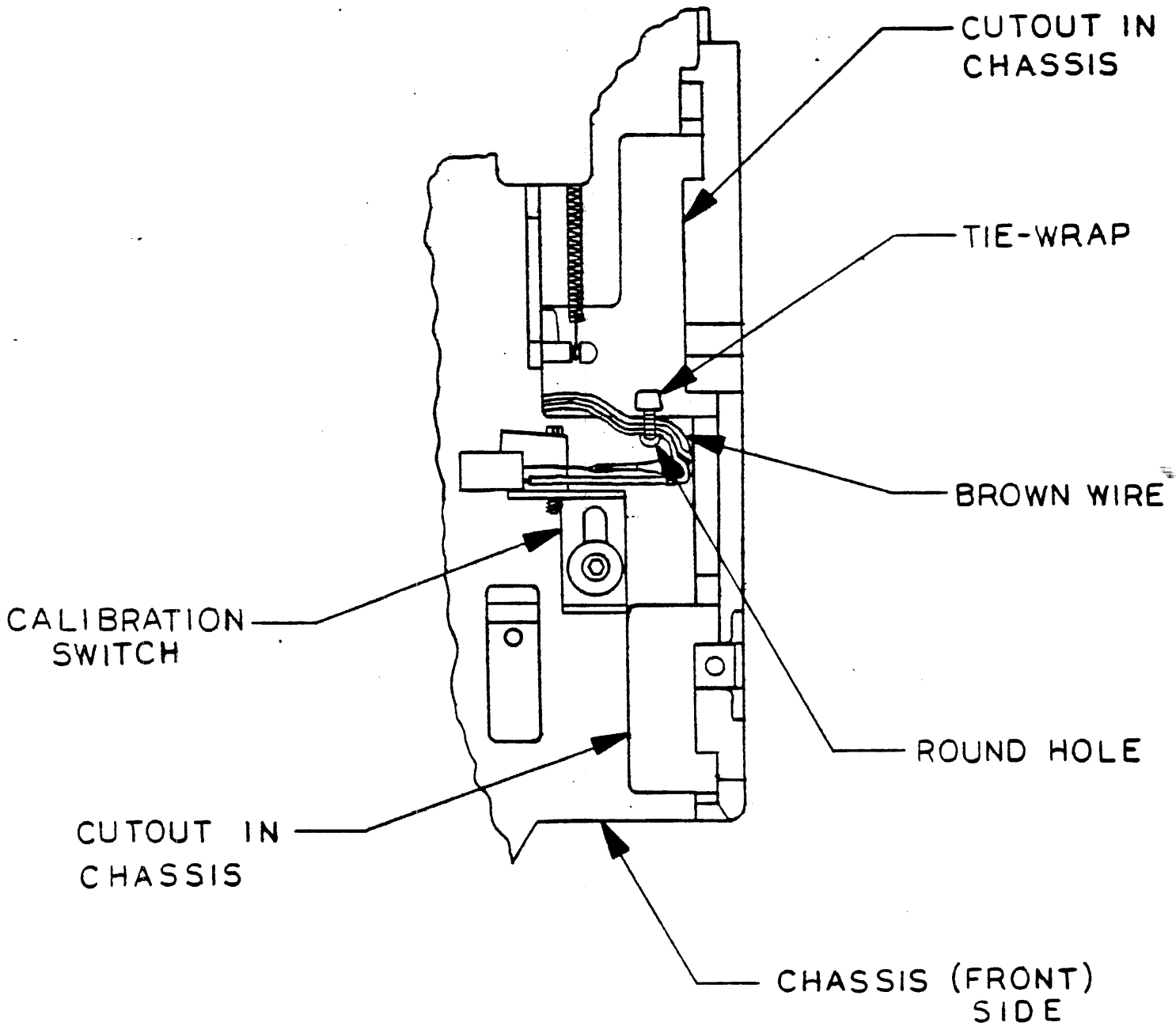


FIGURE 4. THE TIE WRAPING OF THE CALIBRATION SWITCH (TOP VIEW)

7.2 Calibration Switch Installation:

- 7.2.1 Place a calibration switch on the chassis as shown in Fig. 1, and line up the center of the slot in the switch bracket with the hole in the chassis. Place a plain washer on an allen-head screw (6-32 X 3/8 in.) and insert them through the bracket and into the hole in the chassis. Turn the screw four times, but do not tighten it.
- 7.2.2 Extend the wires to the chassis wall and along the opposite side of the round hole in the chassis. (See Fig. 4.) Be sure the brown wire is closest to the chassis wall.
- 7.2.3 Push the calibration switch towards the front of the chassis as far as possible and tighten the screw. (See Fig. 4.) Using a tie-wrap gun set at 2.5, insert a tie-wrap through the round hole and the square cut-out, and tie-wrap the wires there. Insert the wires through the cut-out next to the round hole. Loosen the screw, slide the switch to the other extreme of the slot, (towards the rear of the chassis,) and tighten the screw.

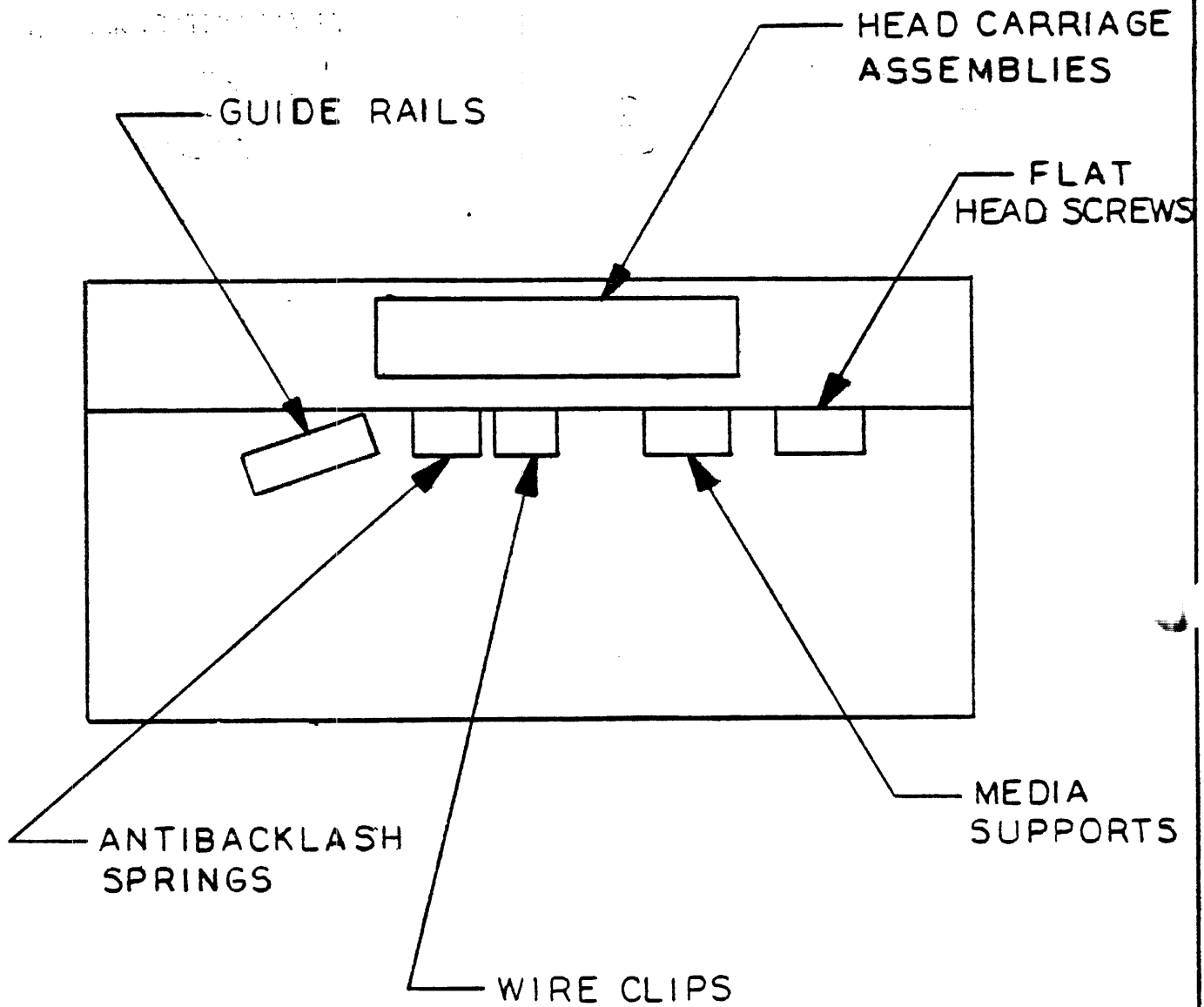


FIGURE 1. THE LAYOUT AT ASSEMBLY STATION #3A
(TOP VIEW)

TWIGGY MANUFACTURING INSTRUCTIONS

1.0 TITLE: TWIGGY - MECHANICAL SUB-ASSEMBLY #3A

- 1.1 Part No.: 064-0244
- 1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the installation of the head-carriage, guide rails, and media support onto the Twiggy chassis.

3.0 REFERENCE DOCUMENTS: - Bill of Materials, p/n 653-5150

4.0 EQUIPMENT REQUIRED:

QTY.

- | | | |
|-----|---|---|
| 4.1 | standard assembly work bench | 1 |
| 4.2 | standard assembly stool | 1 |
| 4.3 | table mat, (#3M051) | 1 |
| 4.4 | tweezers (Erem #00) | 1 |
| 4.5 | small bin (Akro #30,220-2) | 6 |
| 4.6 | medium bin (Akro #230-1) | 2 |
| 4.7 | Pneumatic screwdriver, Posidrive #1 bit set at 6 in-lb. | 1 |
| 4.8 | torque wrench set at 3 in-oz. | 1 |
| 4.9 | T.L.C., grade 22 | 1 |

5.0 MATERIALS REQUIRED:

PART NO.

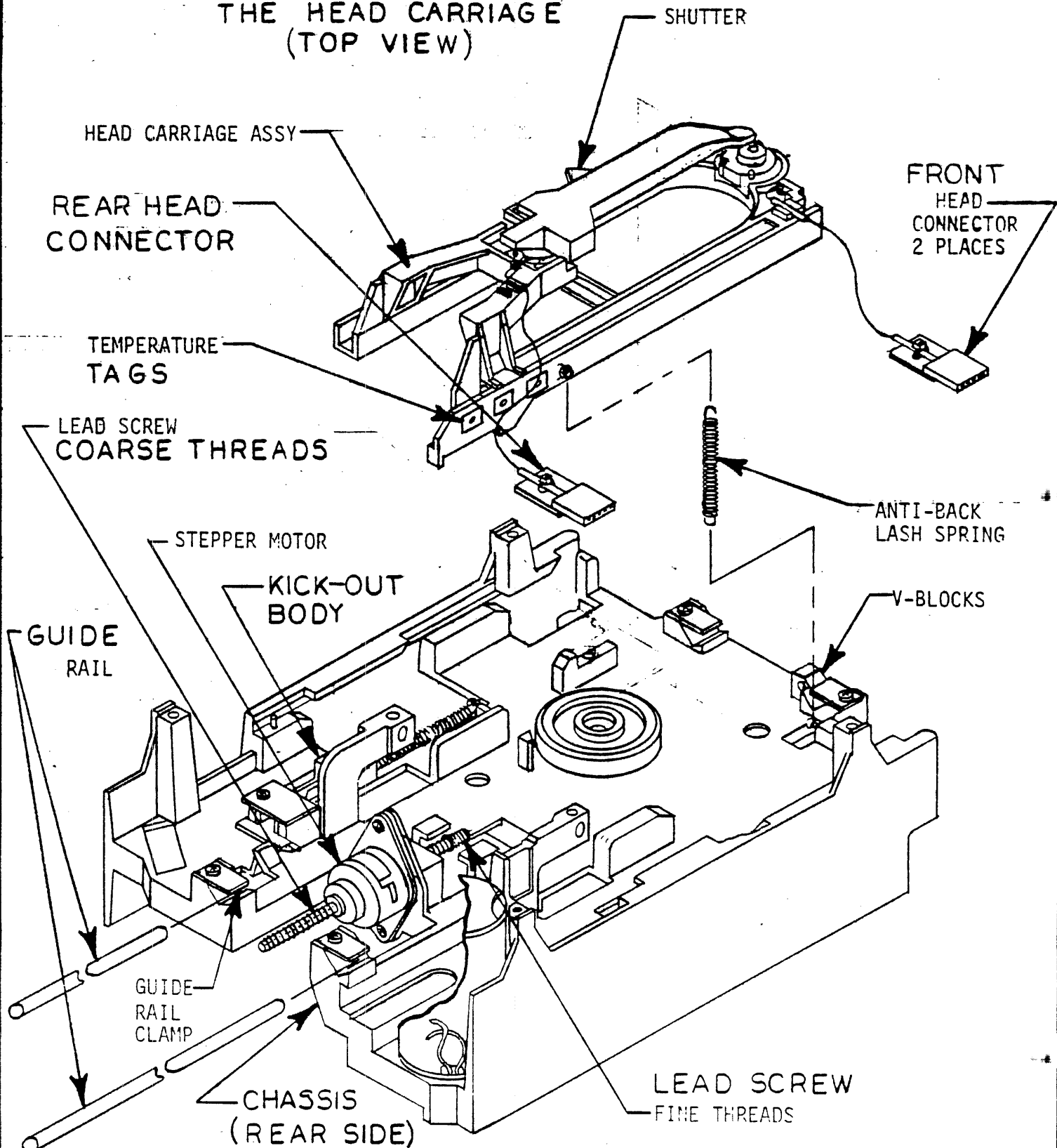
QTY.

- | | | | |
|-----|-----------------------------|----------|---|
| 5.1 | wire clip | 830-0035 | 1 |
| 5.2 | head-carriage assembly | 653-6006 | 1 |
| 5.3 | guide rail | 800-0092 | 2 |
| 5.4 | anti-backlash spring | 870-0007 | 1 |
| 5.5 | flathead screw, #4-40 X 1/4 | 406-3404 | 1 |
| 5.6 | Twiggy disk support | 805-0019 | 1 |

6.0 PREPARATION PROCEDURE:

- 6.1 Layout work station according to Fig. 1.

FIGURE 2. THE INSTALLATION OF THE HEAD CARRIAGE (TOP VIEW)



DRAWN BY *M. Antillon*

OPERATION NO. _____

TITLE **SUB-ASSY-3A.TWIGGY**

7.0 ASSEMBLY PROCEDURE:

7.1 Inspection and Head-Carriage Installation:

- 7.1.1 Place the Twiggy chassis on the work table in the position shown in Fig. 2. Without touching the fine threads, turn the lead screw in the stepper motor so that only fine threads are visible at the front of the motor. (See Fig. 2.)
- 7.1.2 Remove the temperature tags from the head-carriage assembly.
- 7.1.3 Gently gather the head cables connected to the head-carriage assembly and carefully place the assembly onto the chassis as shown in Fig. 2. (Be very careful not to damage the alien or the cables.)

*** NOTE *** Be very gentle whenever handling the head cables. The cables are very sensitive and delicate, and the slightest snagging would make the head unusable. The entire assembly would then have to be rejected.

- 7.1.4 Attach one end of the anti-backlash spring to the spring anchor on the head-carriage. Attach the other end of the spring to the anchor on the chassis as shown in Fig. 2. Lower the head-carriage onto the chassis so that the slots in the carriage are positioned behind the front chassis V-blocks.

7.2 Guide Rail Installation:

- 7.2.1 Make sure the guide rails are teflon coated. Slide a guide rail through a V-groove in the chassis and through the slot in the head-carriage as shown in Fig. 2. Make sure each end of the rail is flush with the edge of the chassis. Insert the second rail in the same way on the other side of the head-carriage.
- 7.2.2 Lift the rail clamps over the ends of the rails. Make sure the clamps are in their recessed slots, perpendicular to the rails, and not cocked. While holding the guide rails, tighten the screws in the rail clamps using a pneumatic screwdriver set at 6 in-lb.

*** NOTE *** If you loosen a rail clamp after it has been tightened, do not re-use the same clamp. Use a new one and discard the old one.

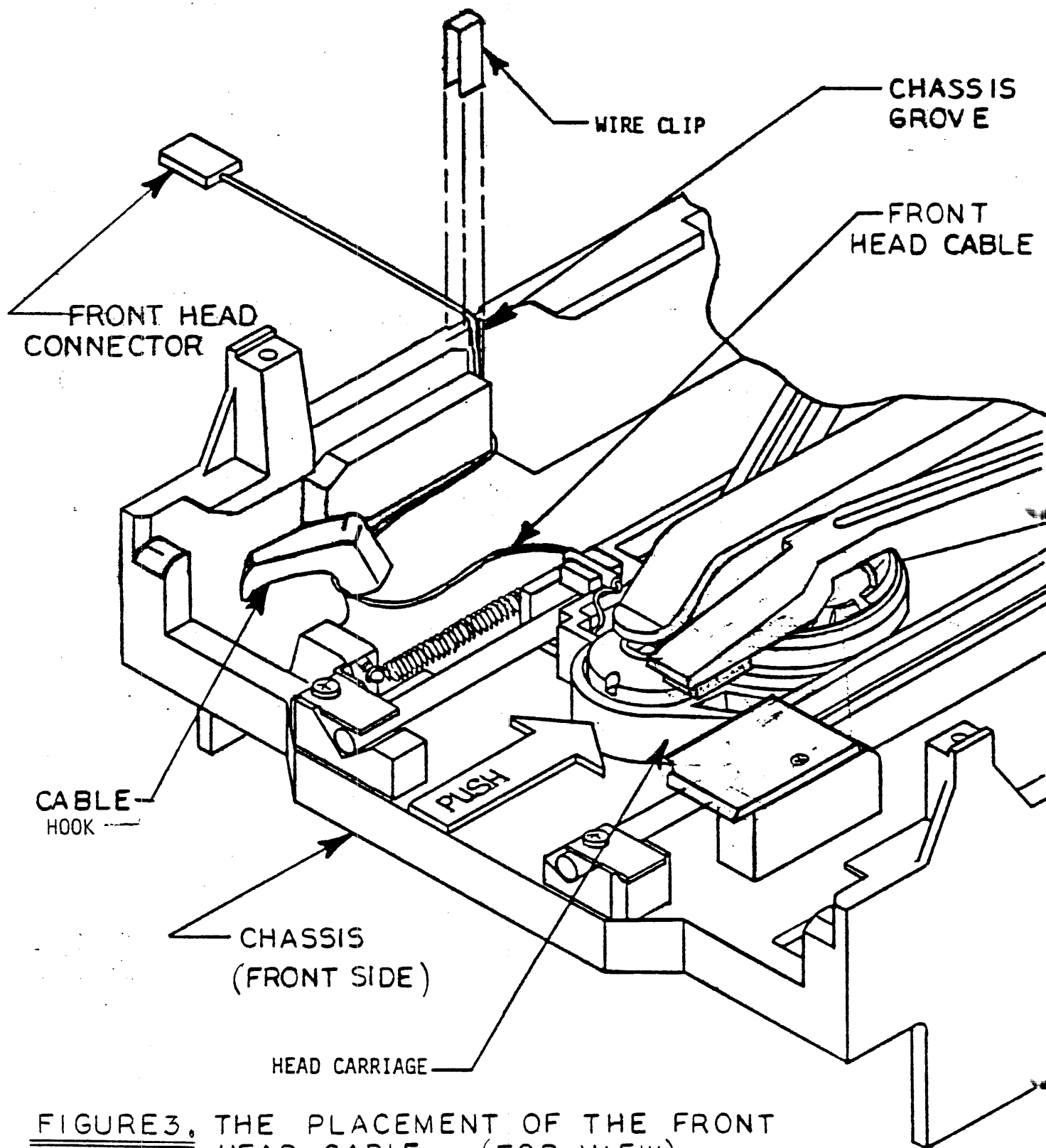


FIGURE 3. THE PLACEMENT OF THE FRONT HEAD CABLE. (TOP VIEW)

7.3 Kick-Out Body and Carriage Movement Inspection:

- 7.3.1 Push the kick-out body towards the rear of the chassis until it locks. Being careful not to touch the heads, slowly move the head-carriage back to eject the kick-out body. (Be sure that only the fine threads of the stepper motor lead screw are visible at the front of the motor.) If the kick-out body does not catch or eject, reject the chassis assembly.

*** NOTE *** Always move the head-carriage gently and slowly. Moving the carriage too fast can damage the alien.

- 7.3.2 When released, the head carriage must slide freely to the front of the chassis. If not, remove the rails, clean them, and recoat them with teflon. The shutter must also pass through the calibration sensor without touching it. If not, loosen the screw, slide the calibration sensor away from the carriage, and tighten the screw again.

7.4 Front-Head Cable Placement:

- 7.4.1 Push the head-carriage towards the rear of the of the chassis until it touches the end. (See Fig.3. Be sure the stepper motor lead screw is not in the way.) Gently place the front-head cable around the cable hook and up to the groove on the chassis wall as shown in Fig. 3. Slide a wire clip halfway into the groove so that the cable is completely under the clip.
- 7.4.2 Slowly slide the the head-carriage back and forth to make sure the cable moves freely. (If necessary, remove the clip and increase the slack on the cable so that the cable is placed around the cable hook, but not touching it.) When the cable is properly placed, press the wire clip completely over the cable and fully into the chassis groove.

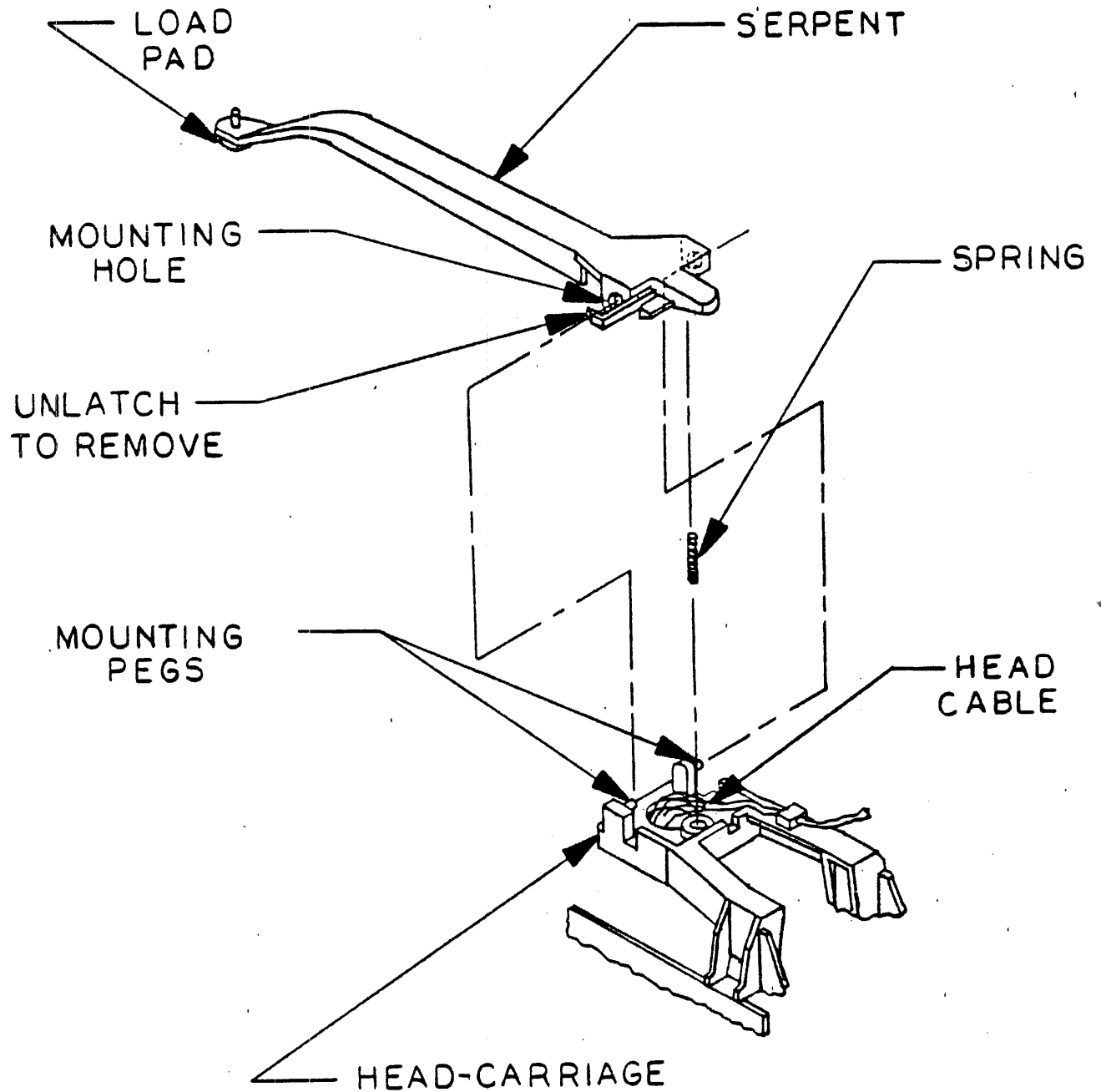


FIGURE 4. THE REMOVAL OF THE SERPENT FROM THE HEAD CARRIAGE.

7.5 Serpent Removal:

- 7.5.1 Detach the serpent from the head-carriage by carefully unlatching the serpent and sliding it off its mounting pegs. (See Fig. 4.) (Do not bend or lose the spring as you remove the serpent.) Check the condition of the serpent's load-pad, the alien, and the head cables. If there is any damage to any of these parts, reject the entire head-carriage assembly.
- 7.5.2 Insert the serpent and its spring into a protective plastic bag. Make sure the bag is put into the same bin compartment at the conclusion of this procedure as the chassis from which it was removed.

*** NOTE *** Each serpent and head-carriage are matched together as complete units. If either of these parts are rejected, then both parts must be rejected.

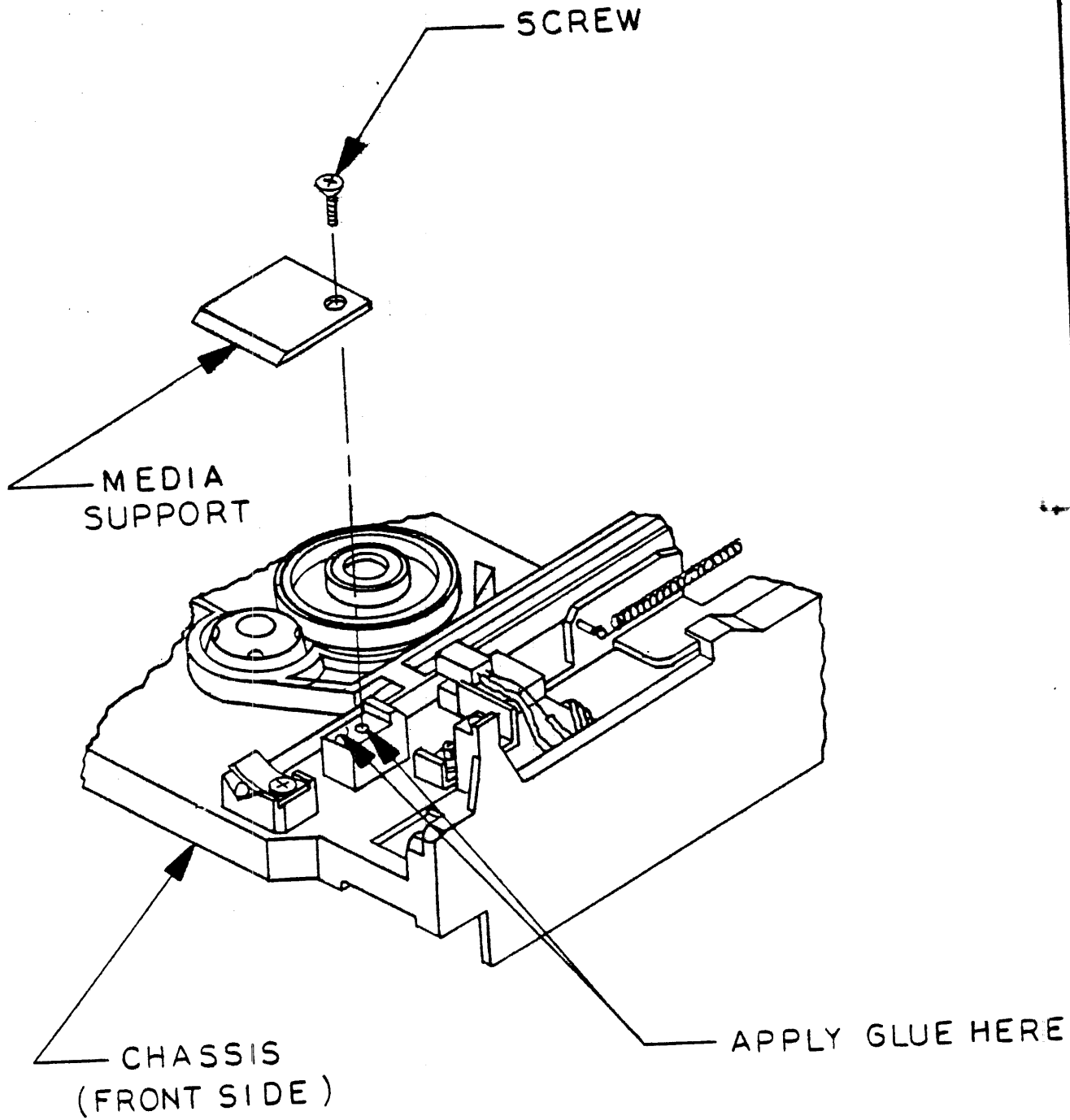


FIGURE 5. THE INSTALLATION OF THE MEDIA SUPPORT

7.6 Media Support Installation:

- 7.6.1 Put a drop of T.L.C. (grade 22) in the retaining hole for the media support and on top of the supporting chassis mount. (See Fig. 5.) Place the media support over the hole so that the support projects towards the bottom head. Insert a flathead screw (4-40 X 1/4 in.) into the support and chassis holes, and tighten it using the torque wrench set at 3 in-oz.

*** NOTE ***

To prevent damage during storage of the chassis, turn the lead-screw of the stepper motor until only 1 in. of coarse threads are visible at the rear of the motor.

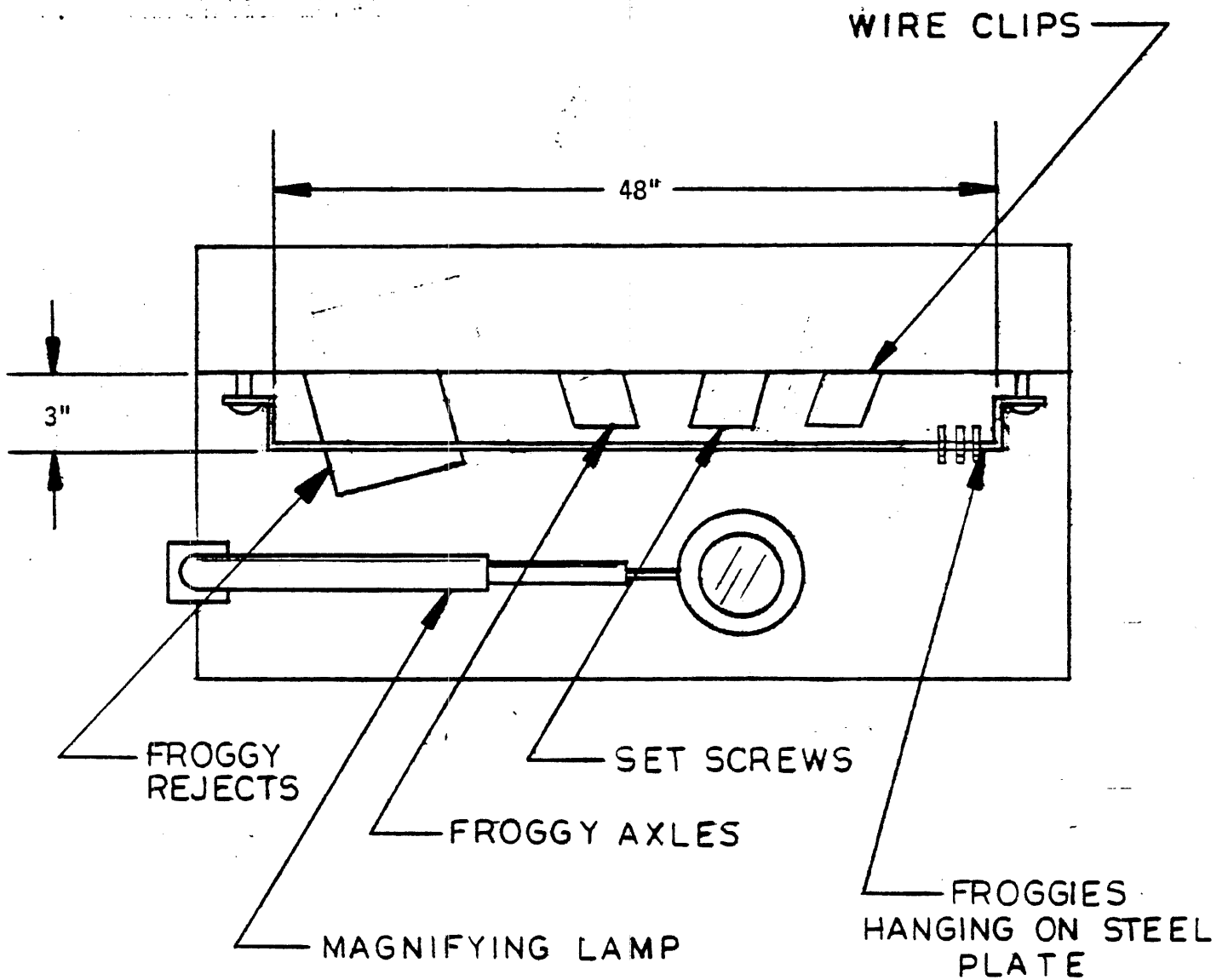


FIGURE 1, THE LAYOUT AT ASSEMBLY STATION #3B.

TWIGGY MANUFACTURING INSTRUCTIONS

1.0 TITLE: TWIGGY - MECHANICAL SUB-ASSEMBLY #3B

1.1 Part No.: 064-0245

1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the inspection and installation of the froggy onto the Twiggy chassis.

3.0 REFERENCE DOCUMENTS: - Bill of Materials, p/n 653-5150.

<u>4.0</u>	<u>EQUIPMENT REQUIRED:</u>	<u>QTY.</u>
4.1	standard assembly work bench	1
4.2	standard assembly stool	1
4.3	table mat, (#3M051)	1
4.4	allen wrench, Xcelite #LN-21 (1/16 in.)	1
4.5	centering tool, (890-0211)	1
4.6	small bin, Akro (#30,220-2)	2
4.7	medium bin, Akro (#230-1)	2
4.8	magnifying lamp	1

<u>5.0</u>	<u>MATERIAL REQUIRED:</u>	<u>PART NO.</u>	<u>QTY.</u>
5.1	frog axle	800-0091	2
5.2	setscrews, #6-32 X .188 in.	450-0200	2
5.3	froggy assembly	653-5130	1
5.4	wire clip	830-0035	1

6.0 PREPARATION PROCEDURE:

6.1 Layout work station according to Fig. 1. Froggy assemblies are hung from a steel plate, 1 in. wide and 3/32 in. thick, that is attached to the front of the work table shelf. It is shaped as shown in Fig. 1.

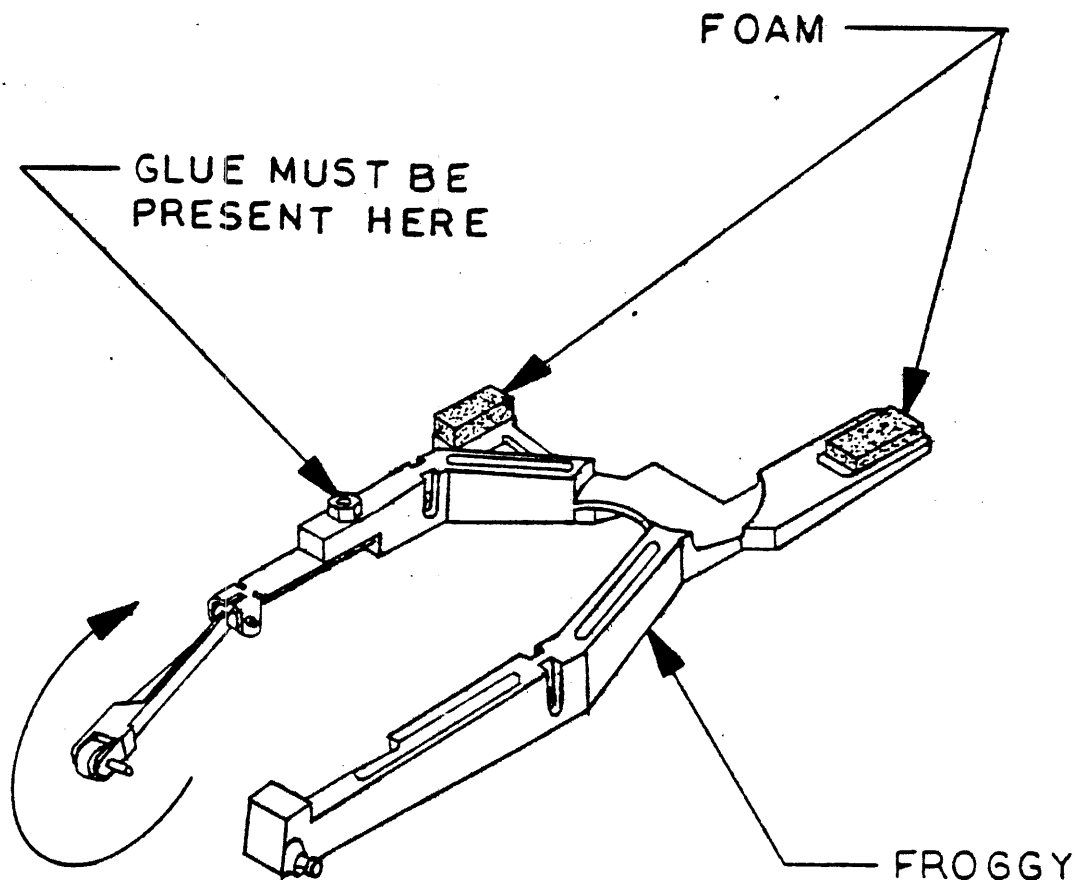


FIGURE 2. THE FROGGY FOAM & FROG LEG (BOTTOM VIEW)

7.0 ASSEMBLY PROCEDURE:

*** NOTE *** Before beginning this procedure, turn the stepper motor lead screw until only fine threads are visible at the front of the motor.

7.1 Froggy Inspection:

7.1.1 Make sure the foam on the bottom of the froggy is straight, and that there is glue on the washer and screw holding the frog leg bracket. (See Fig. 2.) Flip the frog leg up to the top of the froggy to make sure the leg is straight and moves freely. If not, reject the froggy. Flip the frog leg back down.

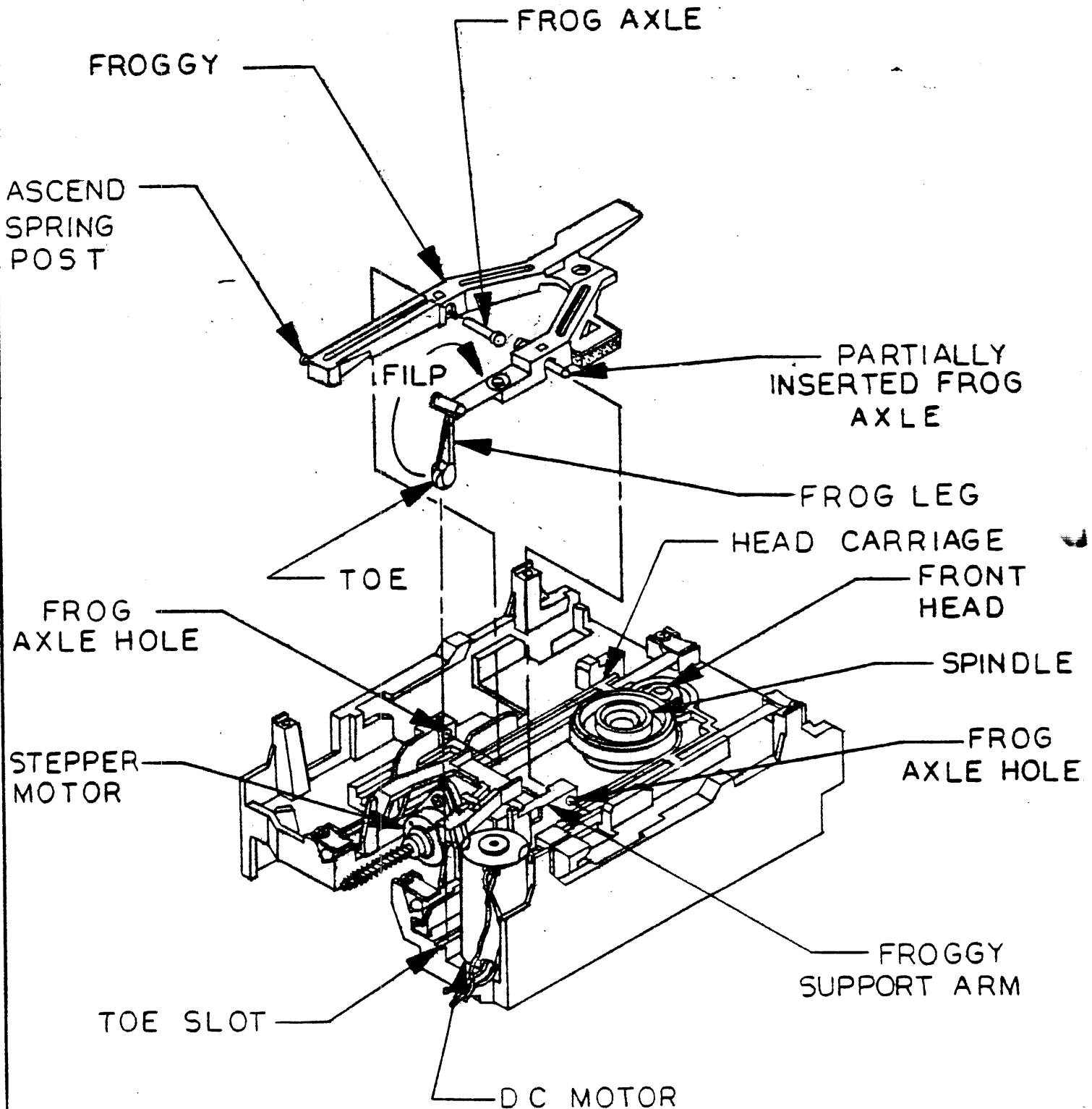


FIGURE 3. THE INSTALLATION OF THE FROGGY.

7.2 Froggy Installation:

- 7.2.1 Hold the froggy over the chassis as shown in Fig. 3. While holding the head-carriage towards the rear of the chassis, insert the frog leg toe into the toe slot located on the side of the head-carriage near the D.C. motor.
- 7.2.2 Partially insert the frog axles into the froggy so that the ends of the axles are flush with the outer edge of the froggy. (See Fig. 3)
- 7.2.3 Line up the frog axles with the holes in the froggy support arms. (See Fig. 3.) Insert the axles fully into the holes.

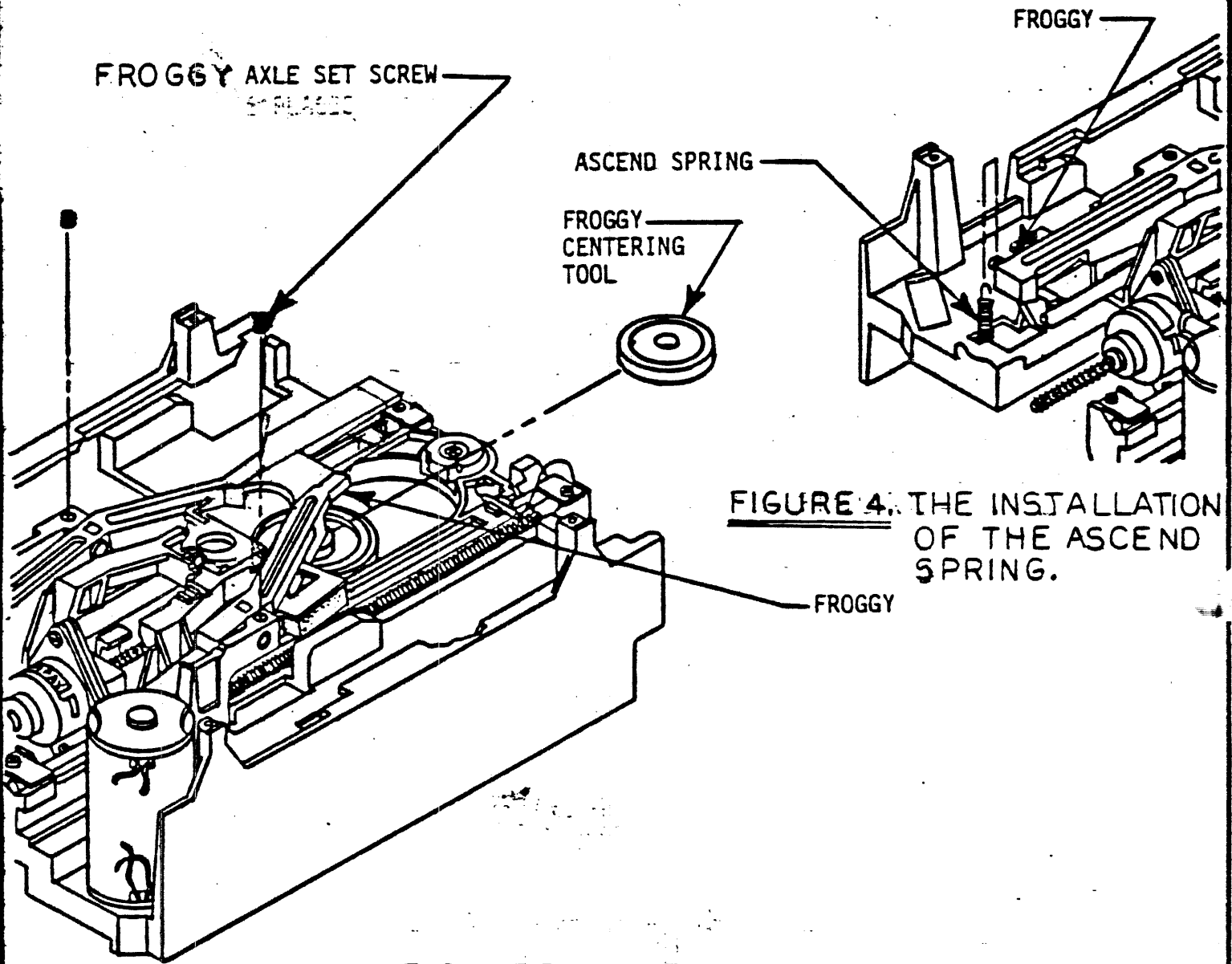


FIGURE 4. THE INSTALLATION OF THE ASCEND SPRING.

FIGURE 5. THE INSTALLATION OF THE FROGGY AXLE SET SCREW & THE CENTERING TOOL.

- 7.2.4 Attach the vacant end of the ascend spring to the post on the rear section of the froggy. Release the head-carriage. (See Fig. 4.)
- 7.2.5 Loosely insert the set screws (6-32 X .188) for the frog axle into the froggy support arms. (See Fig.5.) Insert the centering tool onto the spindle. Slowly move the head-carriage back and forth and make sure the post on the centering tool glides smoothly into the hole in the front of the froggy. (If not, move the froggy on the frog axles until it does.)
- 7.2.6 While holding the froggy down on the centering tool and making sure the frog axles are fully inserted, tighten the set screws on the frog axles. Release the froggy and remove the centering tool.

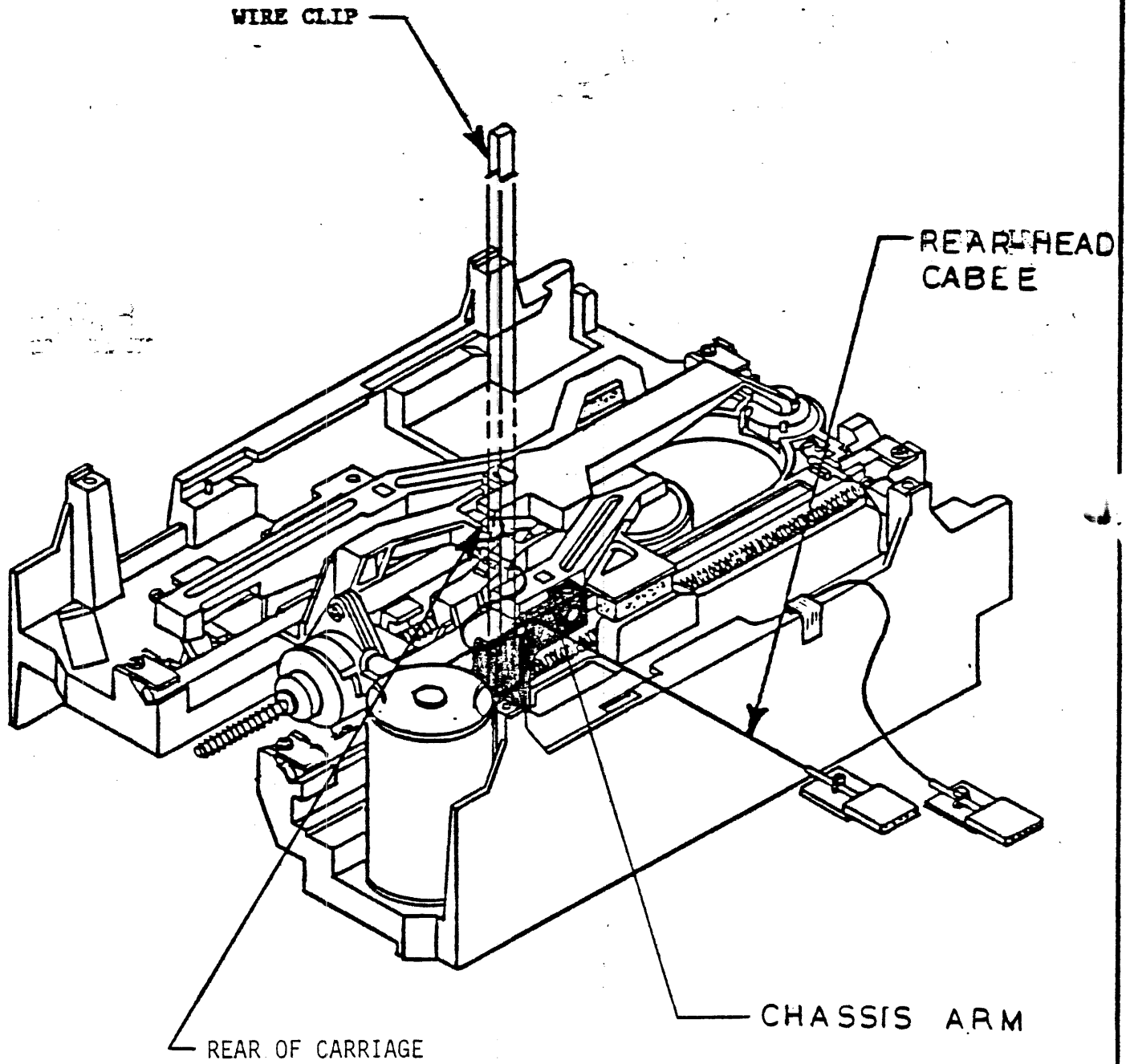


FIGURE 6. THE REAR HEAD CABLE PLACEMENT

7.3 Rear-Head Cable Placement:

- 7.3.1 Push the head-carriage towards the front of the chassis until it touches the end.
- 7.3.2 Gently place the rear-head cable along the top of the chassis arm located next to the dual switch, as shown in Fig. 6. Be sure the cable's loop is short and placed to the side of the chassis arm closest to the head-carriage. Slide a wire clip over the cable and halfway into the chassis groove.
- 7.3.3 Slowly slide the head-carriage back and forth to make sure the cable moves freely and is not strained. When the cable is properly placed, press the wire clip fully into the chassis groove.

*** NOTE *** Turn the lead screw of the stepper motor counter-clockwise until only 1 in. of coarse thread is visible at the rear of the motor.

TWIGGY MANUFACTURING INSTRUCTIONS

1.0 TITLE: TWIGGY - IN-PROCESS QUALITY ASSURANCE - MECHANICAL INSPECTION

1.1 Part No.: 064-0284

1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the installation of the clamper and the serpent onto the Twiggy chassis, and the in-process mechanical inspection of the Twiggy drive.

3.0 REFERENCE DOCUMENTS: - Bill of Materials, p/n 653-5150.

<u>4.0</u> <u>EQUIPMENT REQUIRED:</u>	<u>QTY.</u>
4.1 standard assembly work bench	1
4.2 standard assembly stool	1
4.3 standard table mat, #3M051	1
4.4 small bin, Akro #30,220-2	1
4.5 medium bin, Akro #230-1	1
4.6 large bin, Akro #30-240	1
4.7 small needlenose pliers	1
4.8 centering tool	1
4.9 blank diskette	1
4.10 magnifying lamp	1

<u>5.0</u> <u>MATERIALS REQUIRED:</u>	<u>PART NO.:</u>	<u>QTY.</u>
5.1 clamper assembly	653-5140	1
5.2 Twiggy assembly	653-5150	1

6.0 PREPARATION PROCEDURE: None

7.0 QUALITY ASSURANCE PROCEDURE:

*** NOTE *** Before beginning this procedure, turn the stepper motor lead screw until only fine threads are visible at the front of the motor.

7.1 Inspection:

- 7.1.1 Inspect the head cables and the wiring harnesses for damage. Make sure the wires connected at the rear-head, and pin connectors are not broken or their insulation damaged. Make sure the cables are correctly routed through the chassis.
- 7.1.2 Make sure all of the screws in the top and bottom of the chassis are installed in the proper places and are tightened.
- 7.1.3 Push up on the pulley to make sure there is a small amount of movement in the spindle shaft and only one washer installed next to the pulley. Spin the pulley to make sure it spins freely.
- 7.1.4 Inspect the D.C. and stepper motors for correct installation. Make sure the mounting screws are tight and the wires are not damaged.
- 7.1.5 Inspect the dual-switch and the calibration switch for proper installation. Make sure the mounting screws are tight and the brackets not cocked. Inspect the switch wires for damage and correct routing.
- 7.1.6 Inspect the kick-out body for proper installation. Make sure the mounting screw is tight and the kick-out plate is installed with the correct side facing the front of the chassis. (See section 7.3, sub-assembly procedure #2A.) Make sure the kick-out spring is connected to the kick-out body and the chassis, and that the body moves freely.
- 7.1.7 Inspect the frog leg and foams on the froggy assembly for damage and proper installation. Make sure the foam on the front of the froggy extends to the front of the media support plate. Make sure the alien is not bent and that the rear-head pad is not damaged and contacts the rear-head squarely as the head-carriage is moved.
- 7.1.8 Make sure the ascend spring is attached to the froggy and the chassis. Make sure that the froggy axles are properly installed and their set screws are tight. Check for excessive side movement of the froggy on the froggy axles. Press the froggy assembly down to check for smooth and free movement.
- 7.1.9 Inspect the head-carriage assembly for proper installation. The guide rails must not extend beyond the chassis, and the rail clamps must be tight and not cocked. Carefully move the head-carriage on the rails to be sure the motion is free and smooth, and that the anti-backlash spring returns the carriage to the front of the chassis.
- 7.1.10 Insert the centering tool into the spindle to make sure the spindle is not deformed. Make sure the froggy is centered by pushing it down onto the post on top of the centering tool. Remove the centering tool.

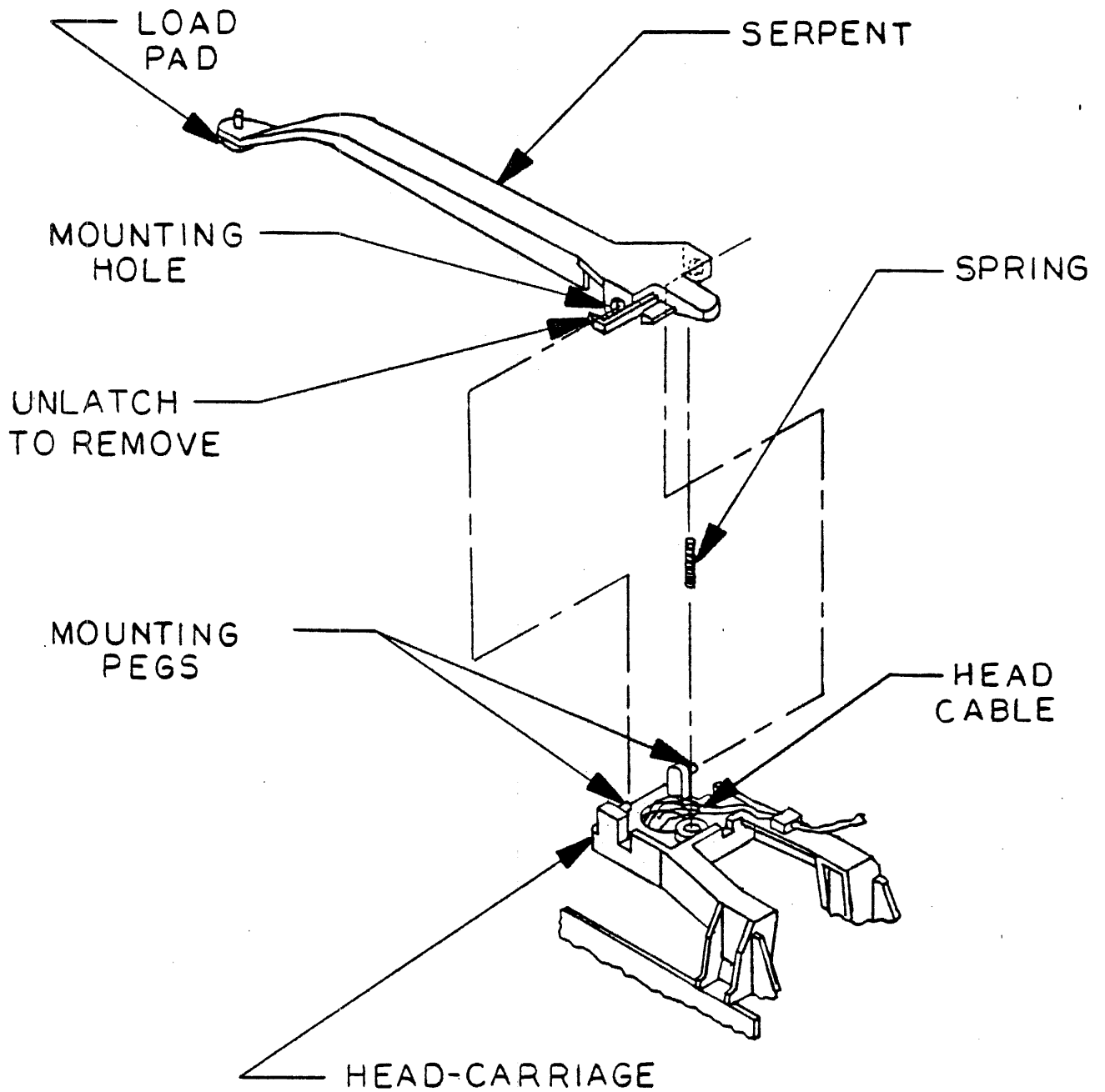


FIGURE 1. THE REMOVAL OF THE SERPENT FROM THE HEAD CARRIAGE.

7.2 Clamper Installation:

- 7.2.1 Place a clamper onto the spindle so that the bearing is facing up. Lower the froggy over the bearing and clamper to center them by moving the head-carriage towards the front of the chassis. Gradually press the froggy onto the clamper until it locks into the froggy.

7.3 Serpent Installation:

- 7.3.1 Check the head load pad on the serpent for damage or loose fibers.
- 7.3.2 Carefully insert the serpent spring onto the post on the serpent behind the mounting holes. While holding the head-carriage near the middle of the chassis, carefully insert the spring into the hole behind the rear head on the carriage.
- 7.3.3 Being careful not to excessively bend the spring, move the serpent's mounting holes onto the mounting pegs on the carriage until the serpent's latch locks onto the mount. (See Fig. 1.)
- 7.3.4 Move the carriage towards the front of the chassis and make sure the front head load pad contacts the front head squarely.

7.4 Ejection Motion Inspection:

- 7.4.1 Move the head-carriage to the rear of the chassis and make sure the head cables are not in the diskette entry area. Insert a diskette into the assembly and make sure the kick-out plate locks into the slot in the disk.
- 7.4.2 Move the carriage forward and make sure the serpent locks down onto the disk surface. Move the carriage to the rear of the chassis to actuate the frog leg, and make sure the kick-out body ejects the disk. Remove the diskette.

*** NOTE *** Push the carriage towards the front of the chassis and turn the lead screw of the stepper motor until only 1 in. of coarse thread is visible at the rear of the motor.

TWIGGY MANUFACTURING INSTRUCTIONS

1.0 TITLE: TWIGGY - MECHANICAL EXERCISE

1.1 Part No.: 064-0220

1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the installation of the pulley belt and the 12-hour mechanical exercise of the Twiggy drive.

3.0 REFERENCE DOCUMENTS: - Bill of Materials, p/n 653-5150.

*** NOTE *** The following procedure describes the set-up for a single testing rack. The quantities of equipment and assemblies must be multiplied by the number of testing racks used.

<u>4.0 EQUIPMENT REQUIRED:</u>	<u>QTY.</u>
4.1 Apple II Plus computer	1
4.2 Twiggy exerciser/power supply	3
4.3 Twiggy exerciser connector panel	3
4.4 Apple II Twiggy controller board	1
4.5 flat cables, 36 wire	33
4.6 Disk II drive	1
4.7 Disk II interface card	1
4.8 Twiggy 12-hour Mechanical Exerciser Diskette (See step #6.7 below)	min. 1
4.9 digital circuit board (Apple 653-0401)	min. 30
4.10 metro shelf module (testing rack)	1
4.11 power strip, 20 amp, at least four outlets	1
4.12 screw driver, #1 Phillips (Xcelite #102)	1
4.13 screw, #6-32 X 1/4 (Apple 400-1604)	min. 60
4.14 standard assembly work bench	1
4.15 standard assembly stool	1
4.16 standard table pad	1
4.17 Kick-out stop-clip	min. 30
4.18 needle-nose pliers	1
4.19 scrap diskettes	min. 30
4.20 Tri-Flow lubricating fluid	A/R
4.21 isopropyl alcohol	A/R
4.22 Q-tips	A/R

<u>5.0</u>	<u>MATERIALS REQUIRED:</u>	<u>PART NO.</u>	<u>QTY.</u>
5.1	pulley belt	880-0010	1
5.2	Twiggy assembly	653-5150	1

6.0 PREPARATION PROCEDURE:

- 6.1 The metro shelf module (testing rack) has seven shelves (18 in. by 60 in.) on 9 in. centers. The vertical supports are 60 in. long.
- 6.2 The computer, disk drive, and monitor are located on the top shelf. A power supply and connector panel are located on the other shelves. One 15 amp, 115 VAC line is required for each set-up.
- 6.3 Switch the power OFF on the Apple II and the power supplies.
- 6.4 Insert the Twiggy controller card into the Apple II at slot #4. Insert the disk drive interface card into the Apple II at slot #6.
- 6.5 Connect the 36-pin cable from the Twiggy controller board to the top Twiggy exerciser connector panel. The red line on the cable indicates the pin #1 location. The panels are daisy chained to the first.
- 6.6 Connect the wires from the power supplies to the connector panels. Connect ten cables to the connector panel, and route five of these to each of the two shelves the panel serves.
- 6.7 Refer to the Revision Level Sheet for a list of the latest version of the test diskettes.

FIG. 2

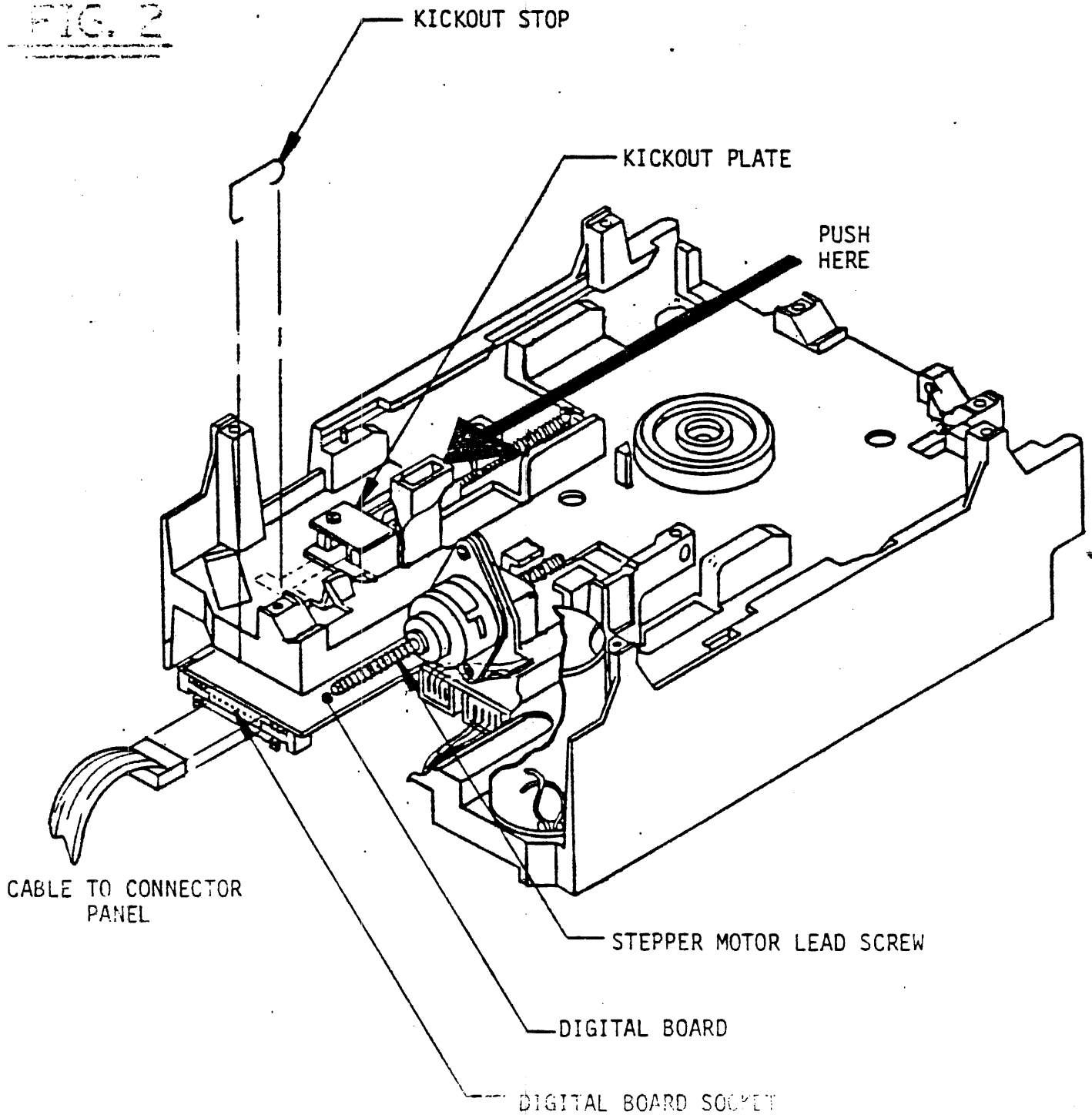


FIGURE 1. THE INSTALLATION OF THE KICK-OUT STOP-CLIP

7.0 EXERCISE PROCEDURE:

7.1 Mechanical Exercise Preparation (both set-ups):

- 7.1.1 Clean the fine threads on the stepper motor lead screw with a Q-tip lightly dipped in alcohol. Lightly lube the coarse threads of the lead screw with Tri-Flow.
- 7.1.2 Move the head-carriage towards the rear of the chassis and turn the lead screw into the hole on the carriage.
- 7.1.3 Insert the kick-out stop-clip onto the kick-out body and the rear chassis wall. (See Fig. 1.)

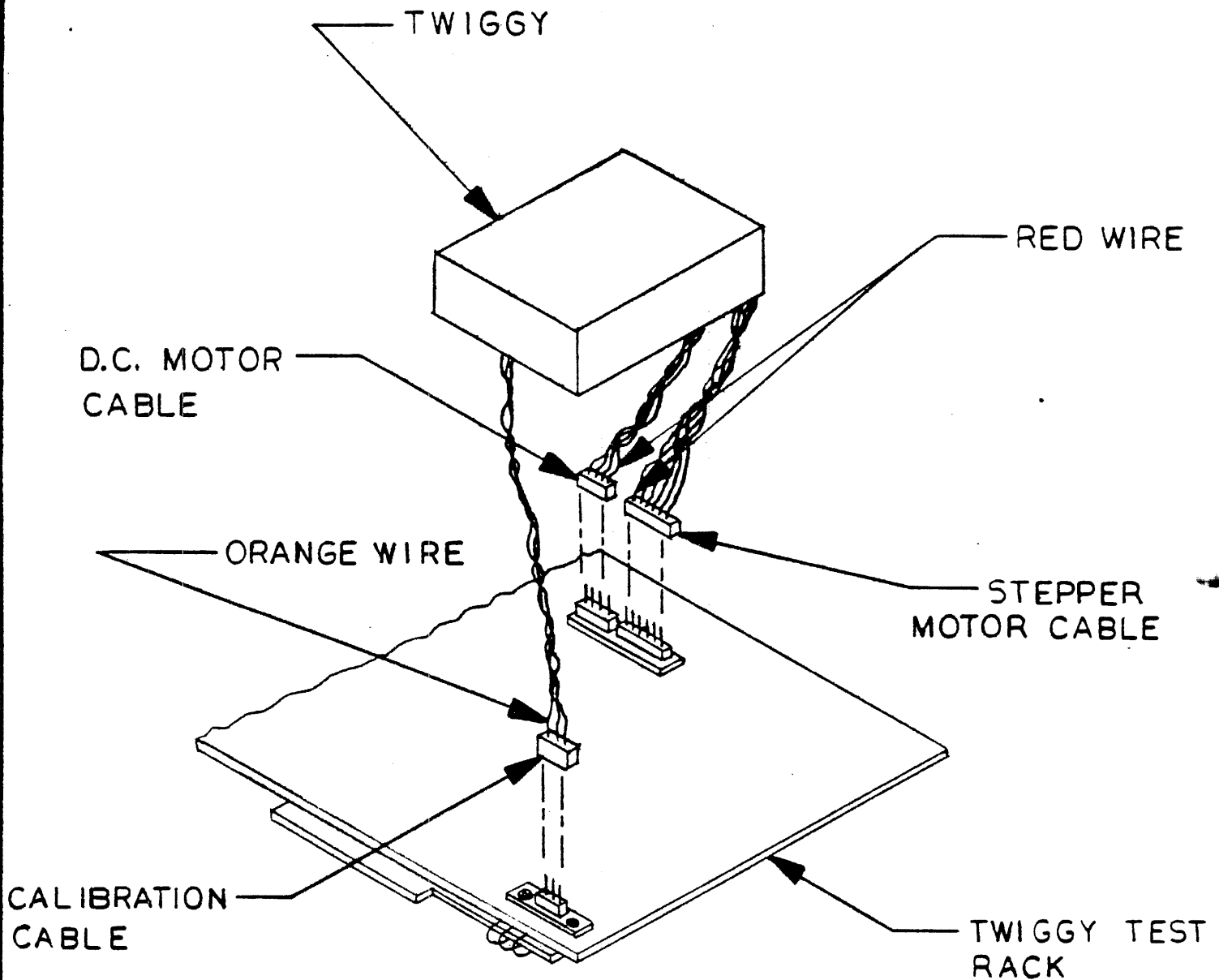


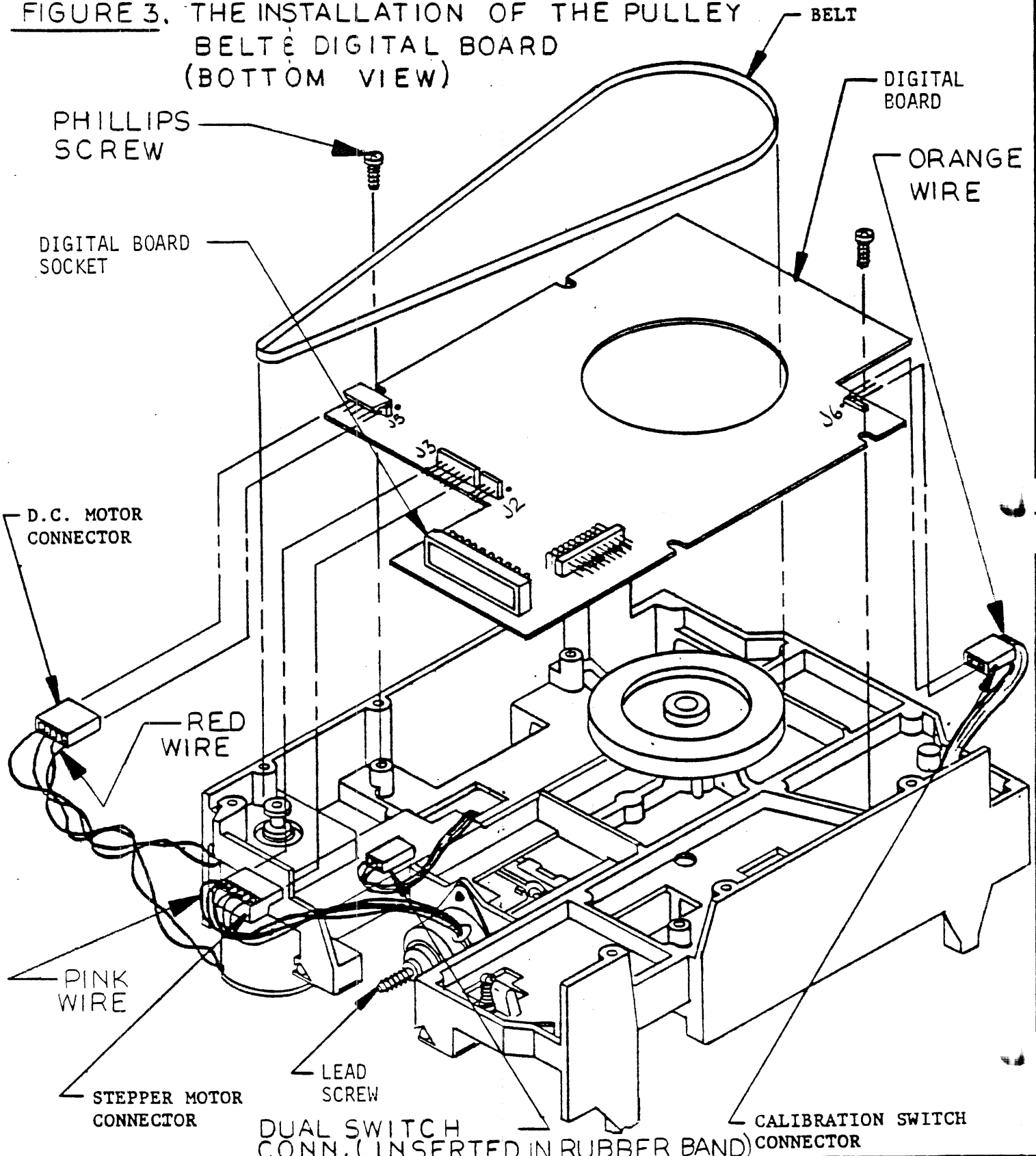
FIGURE 2. THE MECHANICAL EXERCISE SET UP FOR THE RACK-INSTALLATION DIGITAL BOARD.

*** NOTE *** The first procedure below (section #7.2) pertains to the use of a digital board that is permanently installed on the testing rack. The second procedure below (section #7.3) pertains to the use of a digital board that is temporarily installed on the Twiggy assembly.

7.2 Mechanical Exercise Set-up (rack-installed digital board):

- 7.2.1 Flip the chassis over to its bottom side. Install the pulley belt around the pulley and the D.C. motor so that the letters printed on the belt are located on the outside. Insert a scrap diskette into the Twiggy assembly.
- 7.2.2 Place the Twiggy assembly onto the rack shelf. Connect the wiring harnesses from the D.C. and stepper motors to the harnesses on the shelf as shown in Fig. 2. The two connectors for the motors are located on the rear section of the shelf. (Be sure to install the connectors so that the red wires on each connector are located next to each other. (See Fig. 2.)
- 7.2.3 The calibration switch connector is located on the front of the shelf. Insert the connector for the calibration switch so that the orange wire is on the extreme left. (See Fig. 2.) Do not connect the dual-switch. (Be sure the head cables are not in the path of the head-carriage.)
- 7.2.4 Repeat the above procedures on each twiggy assembly until all of the available connectors on the testing rack are used. Then proceed with the exercise procedure (#7.4) below.

FIGURE 3. THE INSTALLATION OF THE PULLEY BELT & DIGITAL BOARD (BOTTOM VIEW)



7.3 Mechanical Exercise Set-Up (assembly-installed digital board):

- 7.3.1 Follow the above preparation procedure (#7.1).
- 7.3.2 Place the dual-switch wiring harness through the rubber band holding the identification tag to prevent the harness from contacting the belt.
- 7.3.3 Place a digital board on the chassis as shown in Fig. 3. (Be sure the board has mylar insulators at the screw holes.) Install two screws at the locations shown in Fig. 1.
- 7.3.4 Insert the connector from the D.C. motor onto the board connector labeled J5. The red wire must face the nearby connector J2. Insert the connector from the stepper motor onto the board connector J2. The pink wire must face the nearby connector J3. Insert the connector from the calibration switch onto the board connector labeled J4. The orange wire must face the pulley. (See Fig. 3.)
- 7.3.5 Install the pulley belt so that the white letters printed on the belt face the outside. Make sure the belt is not touching any wires or components.
- 7.3.6 Place the assembly on the rack and insert the cable from the connector panel to the J1 connector on the digital board.

7.4 Mechanical Exercise Procedure (both above set-ups):

- 7.4.1 Make sure the 12-hour Mechanical Exerciser Diskette is inserted in the disk drive. Switch on the Apple II. Type the word "RUN", press the "RETURN" key, and then press the "SPACEBAR".
- 7.4.2 Turn on the power supply switch located on the unit behind the shelf. Observe each assembly for the following items:
 - A) clamper: Make sure the froggy moves the clamper completely up and down and seats the clampers properly.
 - B) stepper motor: Make sure the stepper motor is operating consistently and quietly.
 - C) D.C. motor: same as stepper motor.
 - D) serpent: Make sure the serpent slides smoothly over the disk surface.
 - E) load pads: Make sure the front and rear load pads squarely contact the disk surface.

- 7.4.3 Record all defects in each assembly on a tag and attach it to the assembly. Reject the defective assemblies.
- 7.4.4 After the 12-hour exercise is completed, press the "SPACEBAR" to restart the exercise program. Allow the program to complete at least five test loops. Check again for defective assemblies.
- 7.4.5 Disconnect the assemblies from the connectors on the racks. (Remove the digital board from each assembly that has a board installed on it. Remove the pulley belt and the digital board. Re-install the belt.) Remove the scrap diskette.
- 7.4.6 Inspect each assembly that passed the 12-hour exercise. Make sure the clamper, alien, and the front and rear head load pads are in place and not damaged.
- 7.4.7 Remove the kick-out stop clip by using the needle-nose pliers. Unscrew the stepper motor lead screw from the head-carriage.

TWIGGY MANUFACTURING INSTRUCTIONS

1.0 TITLE: TWIGGY - ALIGNMENT AND CALIBRATION

- 1.1 Part No.: 064-0214
- 1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the alignment and calibration of the Twiggy drive.

3.0 REFERENCE DOCUMENTS: - None.

4.0 EQUIPMENT REQUIRED: QTY.

4.1	Apple III	1
4.2	Monitor III	1
4.3	Twiggy alignment test fixture (Twiggy assembly attached to a Twiggy Demux board, Twiggy Demux board, Apple III interface cable, and a Align and Calibrate Test Box)	1
4.4	storage oscilloscope (Tektronix #T912, modified for auto-erase)	1
4.5	digital multimeter with leads (Fluke #8012A)	1
4.6	Alignment-Calibration Station diskette (See step #6.6 below)	min. 1
4.7	Twiggy Smart Routines board	min. 1
4.8	calibration adjustment tool	1
4.9	screwdriver (Xcelite #R-184)	1
4.10	lead screw tool	1
4.11	3/32 in. hexdriver	1
4.12	Twiggy controller circuit board	1
4.13	Twiggy demultiplexer circuit board (653-4104)	1
4.14	controller, Demux Digital cable, 25 pin (590-0015)	1
4.15	ribbon cable, Demux Digital, 26 pin (590-0112)	1
4.16	froggy weight, lead	1
4.17	standard work table	1
4.18	standard work stool	1
4.19	standard table mat	1
4.20	Q-tips	A/R

5 MATERIALS REQUIRED: PART NO.: QTY.

5.1	Loctite glue, Super Bonder 420	907-0049	1
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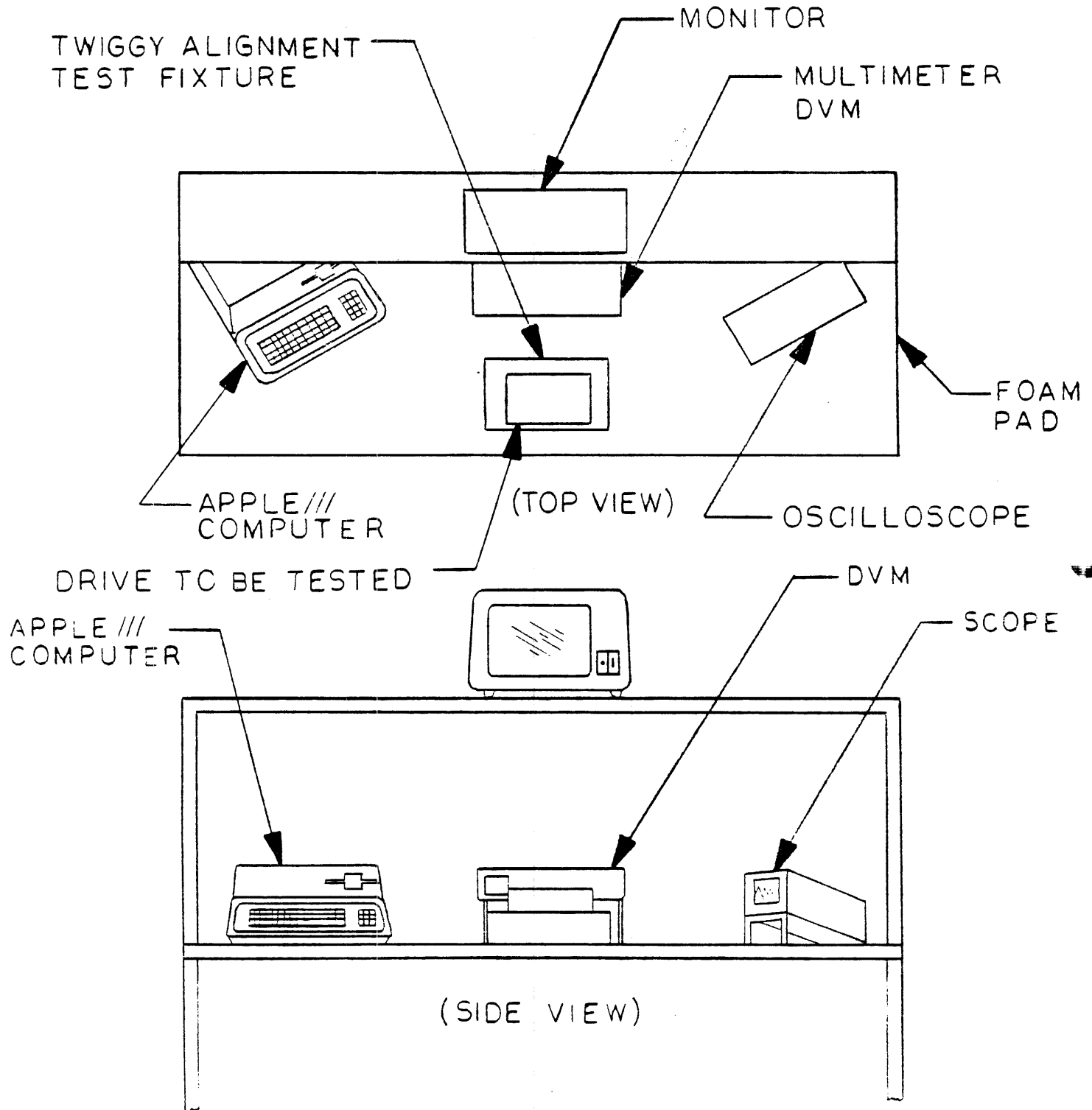


FIGURE 1. THE LAYOUT AT STATION "ALIGNMENT & CALIBRATION"

6.0 PREPARATION PROCEDURE:

- 6.1 Lay-out work station as shown in Fig. 1.
- 6.2 Make sure the power switch on the glass stand test box is turned "OFF". Turn "ON" the power switch on the computer and boot it up using the "Alignment-Calibration Station" diskette.
- 6.3 Turn "ON" the power switch on the scope. Set both switches below the two controls for the Volts/Div to the setting labeled "gnd". Adjust either control knob labeled "position" until the signal on the scope is on the line labeled 0% (zero per cent.) Set both switches back to A.C.
- 6.4 Set-up the oscilloscope in the following way:
- 6.4.1 CHANNEL 1 (labeled "Y"): 1X probe (connected inside the glass box to one side of C12 on the analog board)
 - 6.4.2 CHANNEL 2 (labeled "AMP"): 1X probe (connected inside the glass box to the other side of C12)
 - 6.4.3 TRIGGERING: SOURCE - INT
MODE - NORMAL
 - 6.4.4 SEC/DIV: .1 sec., CH 1 & CH 2
 - 6.4.5 VOLT/DIV: A.C., 5m CH 1 & CH 2
(Use 2m if the amplitude is insufficient to attain signal strength of 100 %)
 - 6.4.6 CHANNEL 1 SELECT: DIFF
 - 6.4.7 STORE: PUSHED-IN
 - 6.4.8 SLOPE: OUT
 - 6.4.9 POWER: ON

*** NOTE *** If you have any problems setting-up the oscilloscope, or do not understand the above procedure, consult the "Skills Specialist." It is impossible to correctly align the Twiggy unless the oscilloscope is properly set-up.

- 6.5 The multimeter must be set-up in the following way:
- 6.5.1 Plus (+) lead is connected to J6, Pin 1 Digital board.
Negative lead is connected to ground on the Analog board.
- 6.6 Refer to the Revision Level Sheet for a list of the latest version of the test Diskettes.

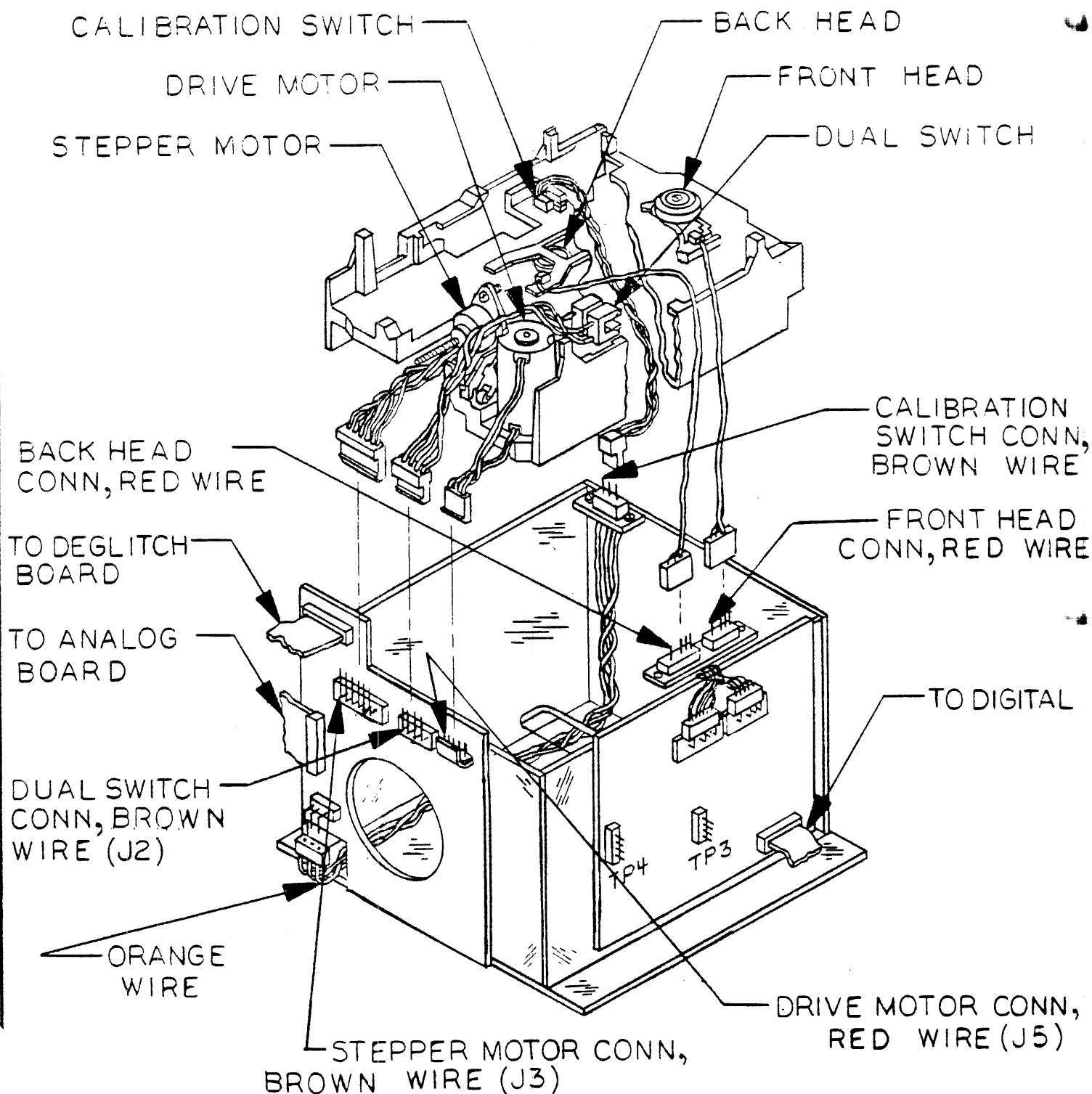


FIGURE 2. THE CONNECTION OF THE TWIGGY ASSEMBLY TO THE GLASS STAND.

7.0 ALIGNMENT AND CALIBRATION PROCEDURE:

7.1 Test Set-Up:

- 7.1.1 Make sure the power switch on the glass stand is turned "OFF" and the computer is booted up on the "Alignment-Calibration Station" diskette.
- 7.1.2 Using the lead screw tool, turn the stepper motor lead screw until it is flush with the front end of the head-carriage insert. Then turn it counter-clockwise two revolutions.
- 7.1.3 Place the Twiggy assembly onto the glass stand. Connect the wires from the stepper motor, D.C. motor, heads, calibration switch and dual-switch as shown in Fig. 2. Be sure to connect the various colored wires exactly as shown in Fig. 2.

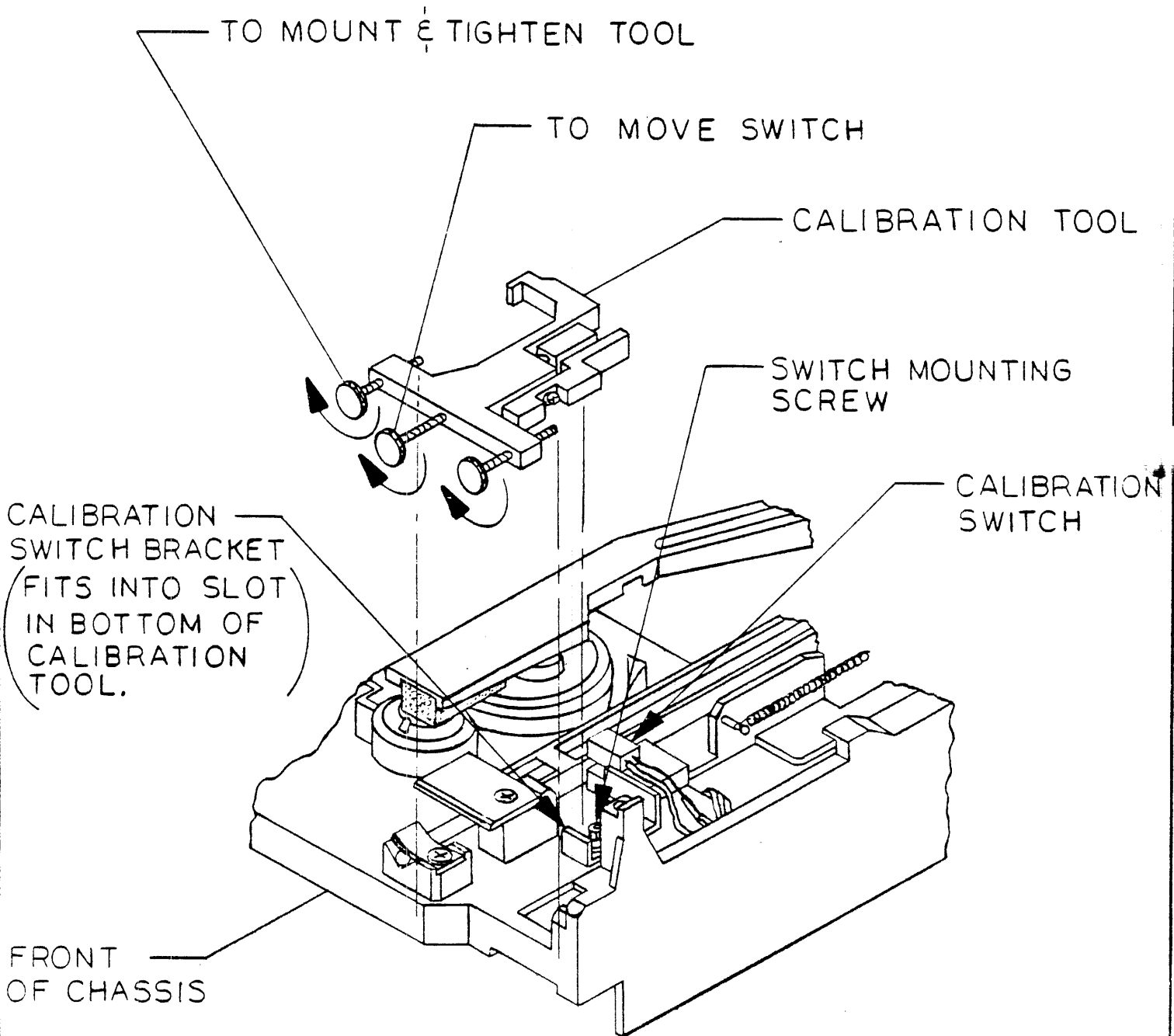


FIGURE 3. THE INSTALLATION OF THE CALIBRATION TOOL

- 7.1.4 Install the calibration tool onto the drive as shown in Fig. 3. Turn the adjusting screw on the calibration tool clockwise until the calibration switch is as far as possible towards the rear of the chassis. Turn the power on to the glass stand.

*** NOTE ***

If the Twiggy clamps down immediately after turning the power on to the glass stand, the dual-switch is defective. Always inspect the Alignment Diskette carefully before performing this procedure. If there are any scratches on the media surface or dents in the protective jacket, reject the diskette. A damaged Alignment Diskette will result in an incorrect alignment.

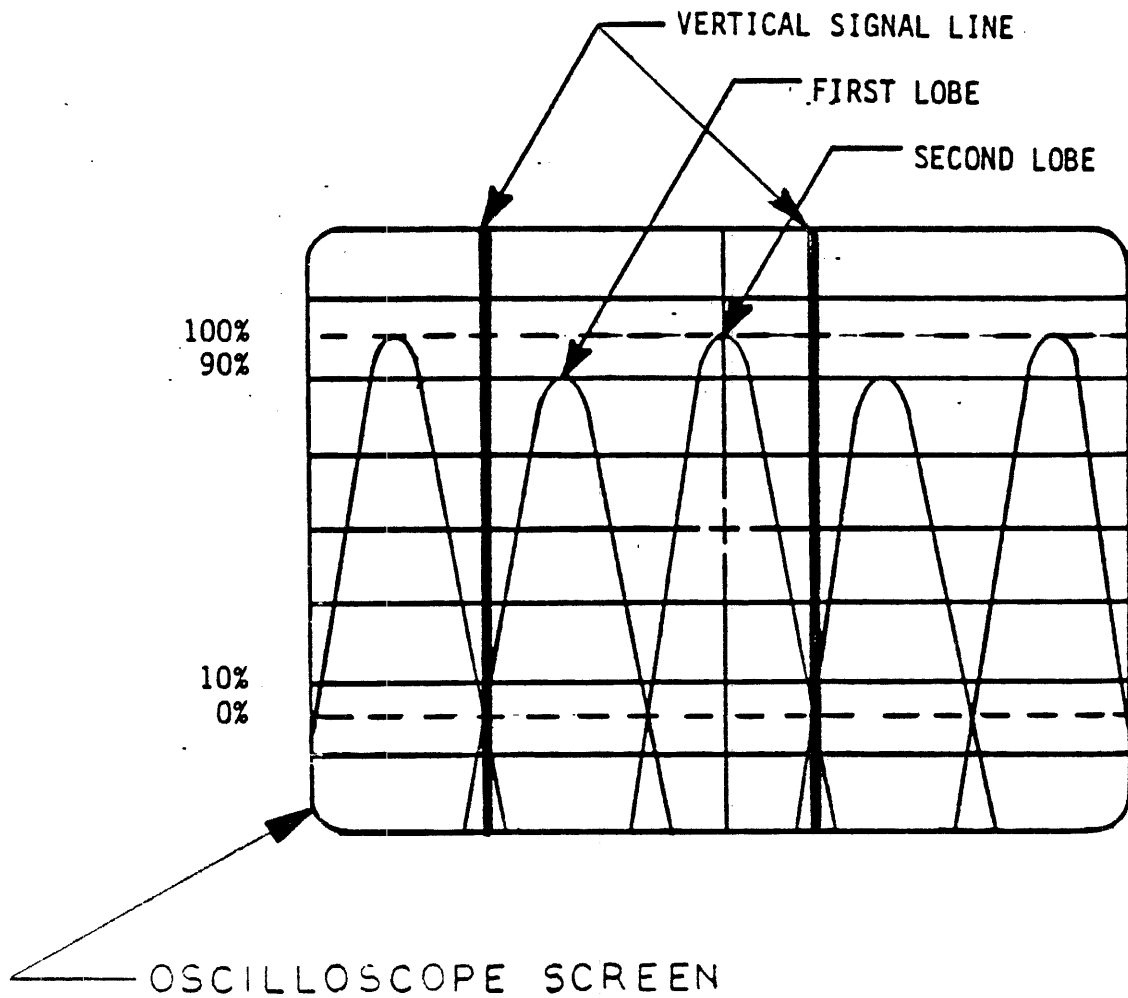


FIGURE 4. THE CORRECT CAT'S EYE WAVEFORM SIGNAL

7.2 Test Procedure:

- 7.2.1 Insert the Alignment Diskette into the Twiggy when the status line on the monitor screen reads, "INSERT MEDIA." The drive will then clamp down.
- 7.2.2 Alternately press "R" on the computer keyboard while turning the adjusting screw on the calibration tool counter-clockwise to attain the "cat's eye" waveform on the oscilloscope screen. (The cat's eye is a term referring to the waveform shape on the oscilloscope that indicates the calibration switch and the heads are correctly aligned. (See Fig. 4.)
- 7.2.3 Repeat the above step (7.2.2) until an approximate cat's eye waveform appears on the oscilloscope screen.
- 7.2.4 Observe the cat's eye for differences in amplitude between the first and second lobes. (See Fig. 4.) If the second lobe is higher in amplitude than the first, turn the stepper motor lead screw clockwise while alternately pressing "R." If the second lobe is lower, turn the lead screw counter-clockwise while alternately pressing "R." Perform this adjustment until each waveform amplitude is as close as possible to 100%.
- 7.2.5 Press "U" on the keyboard to unclamp and remove the diskette. Insert the diskette again to make sure it was properly clamped during the previous adjustment. If necessary, adjust the alignment again according to 7.2.4 above.

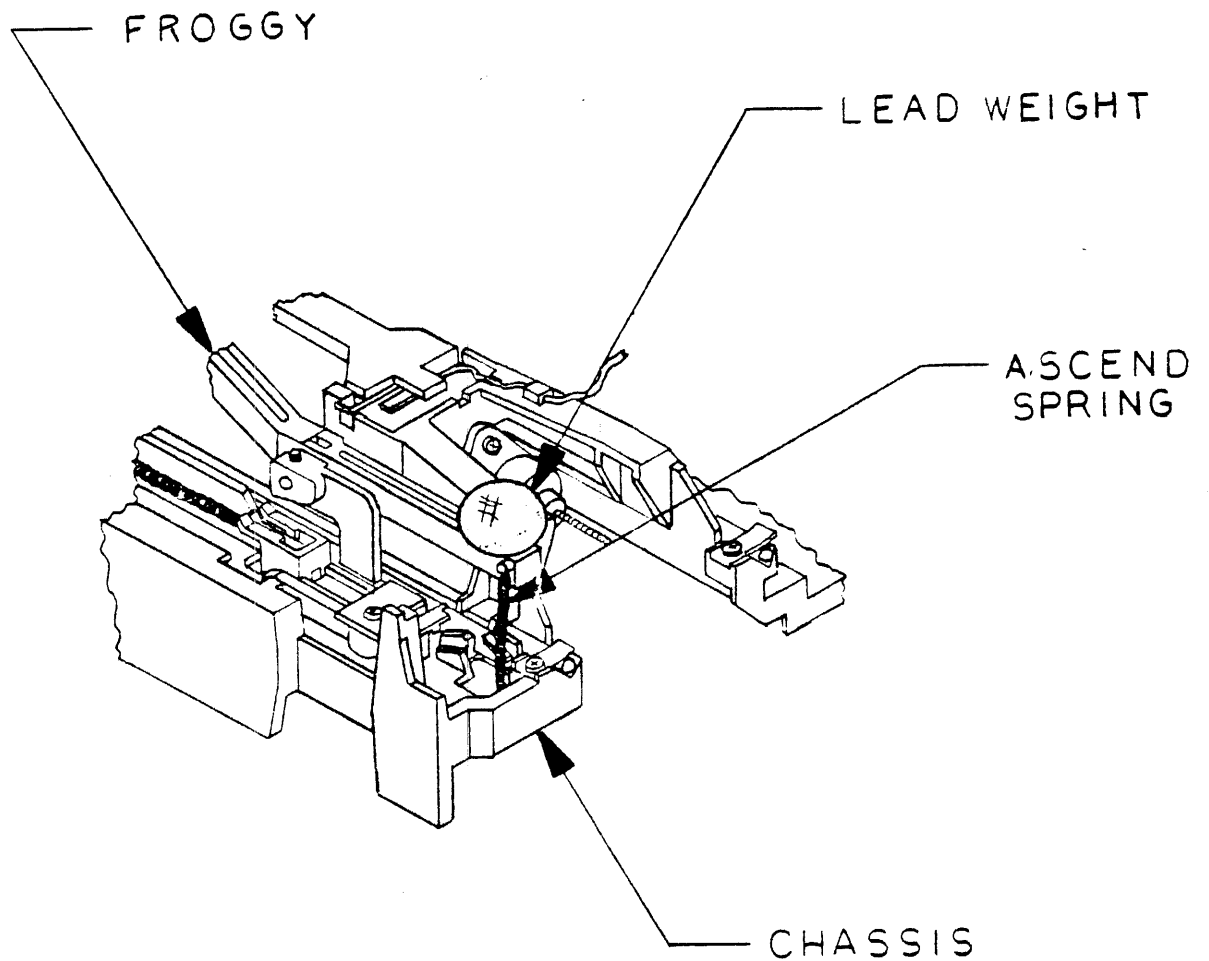


FIGURE 5. THE PLACEMENT OF THE LEAD WEIGHT ON THE FROGGY IN THE MODULATION TEST

7.3 Modulation Test:

7.3.1 Press "M" to begin the modulation test.

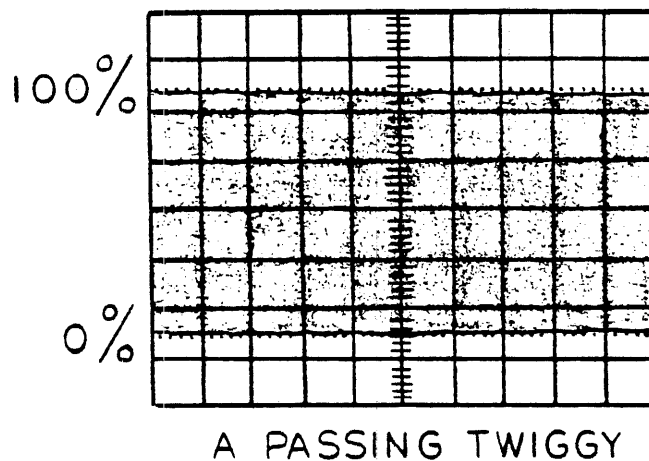
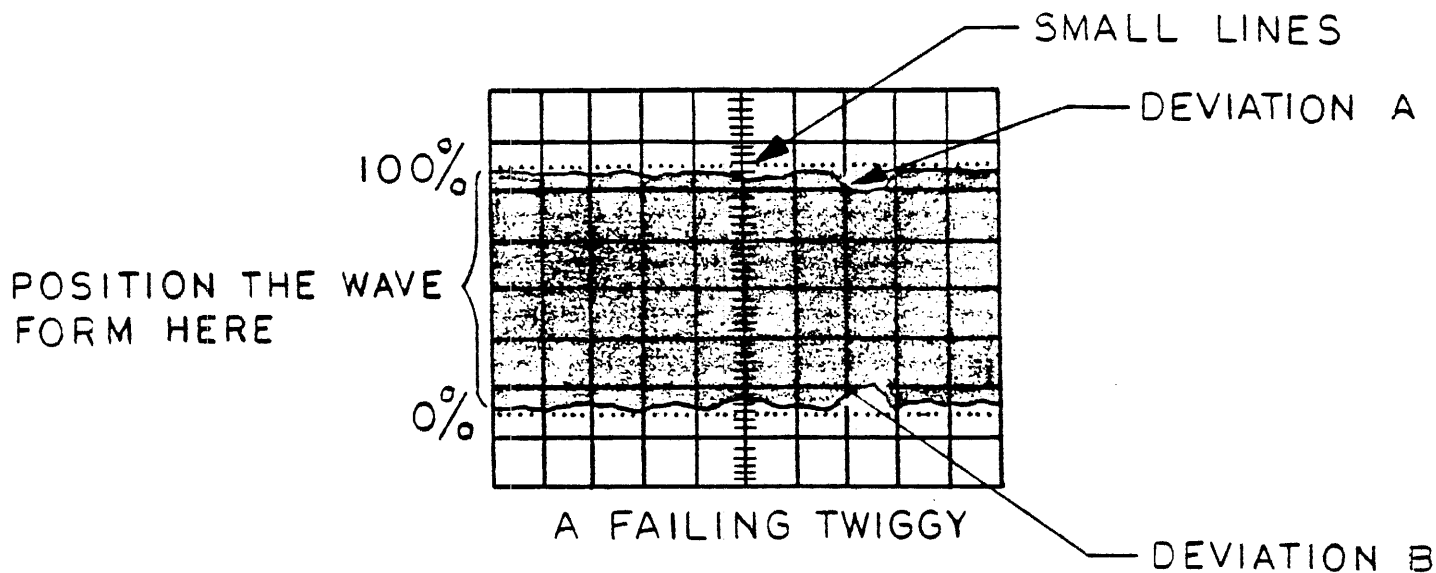
7.3.2 Adjust the oscilloscope settings in the following way:

A) Volts/Div: 10 m (both channels)

B) set the selector below the Volts/Div to "GND". Adjust the "position" controls so that the signal dot is located over the "50%" line on the oscilloscope screen (center line or X-axis)

C) set the selector below the Volts/Div back to "AC". Adjust both red variable controls for Volts/Div so that the waveform ranges between the dotted lines on the oscilloscope screen labeled 0% and 100%.

7.3.3 Place the lead weight onto the froggy near the ascend spring as shown in Fig. 5, so that the edge of the weight is flush with the edge of the froggy.



TOTAL DEVIATION = DEVIATION A + DEVIATION B

THE TOTAL DEVIATION MUST BE LESS THAN 3,5 SMALL LINES FOR THE TWIGGY TO PASS THE MODULATION TEST.

FIGURE 6 THE EVIDENCE OF MODULATION ON THE OSCILLOSCOPE SCREEN.

- 7.3.4 Observe the waveform on the oscilloscope screen for evidence of excessive modulation. The wave must not deviate from the dotted 0% and 100% lines a total amount more than 3.5 of the small lines printed on the screen. (See Fig. 6.)
- 7.3.5 Remove the weight. Press "U" to unclamp and remove the diskette. Insert the diskette again to make sure it was properly clamped during the first modulation test. Press "M" to begin the test. Place the weight on the froggy again. If the drive does not exhibit evidence of modulation in the second test, continue with step # 7.3.6. If it does exhibit modulation, reject the drive.
- 7.3.6 Reset the oscilloscope as described in step # 6.4 above. (Set the Volts/Div control back to 5m.)
- 7.3.7 Remove the weight. Press "U" to unclamp and remove the diskette. Turn the power "OFF" to the glass box and disconnect the Twiggy assembly.
- 7.3.8 Turn the assembly over to the bottom-side and carefully glue the lead screw to the insert. (Do not drop glue on the alien or any other parts of the assembly.)
- 7.3.9 After waiting 10 seconds, reconnect the Twiggy assembly to the glassbox as shown in Fig. 2. Insert the alignment diskette and recheck the cat's eye waveform. If the waveform is not within specifications (90% to 100%), then reject the assembly. If the waveform is within specifications, continue with the procedure below.

7.4 Voltage Test:

- 7.4.1 Press "U" on the keyboard to unclamp and remove the diskette. Disconnect the dual-switch (four pin connector) and the drive should clamp down.
- 7.4.2 Press "L" on the keyboard to perform the LOW voltage adjustment. (The monitor screen will read "TRACK 1/4.") Loosen the calibration switch mounting screw slightly to allow movement. Turn the adjusting screw on the calibration tool and observe the voltage readings on the voltmeter. Adjust the switch until the voltage reads 1.5 volts or less.
- 7.4.3 Press "H" on the keyboard to perform the HIGH voltage adjustment. (The monitor screen will read "TRACK 3/8.") Turn the adjusting screw on the calibration tool until the HIGH voltage reading is 2.8 volts or more. Press "L" again to make sure the LOW voltage is less than 1.5 volts and readjust the switch if necessary. If the switch is readjusted, recheck the HIGH voltage again. When both LOW and HIGH voltages are correct, tighten the

switch mounting screw and make sure the voltages have not changed.

- 7.4.4 Remove the calibration tool. Press "U" to unclamp and after the froggy is completely unclamped, turn off the power to the glass box. Connect the dual-switch and turn on the power to the glass box. Insert the alignment diskette and recheck the cat's eye for correct alignment.(90% to 100%.)
- 7.4.5 Press "Q" to perform the auto-calibration switch test. Follow the procedure below:
 - A) If "PASS" appears on the monitor screen, skip to step #7.4.6 below.
 - B) If "FAIL" appears, remove the diskette, disconnect the dual-switch, and press "RETURN." Re-install the calibration tool, and repeat step #7.4.2. Reset the LOW voltage to a lower value.
- 7.4.6 Press "U" to unclamp and remove the alignment diskette. Turn the power "OFF" to the glass box and disconnect the Twiggy assembly. Pass the assembly to the next station.

TWIGGY MANUFACTURING INSTRUCTIONS

1.0 TITLE: TWIGGY - SUB-ASSEMBLY #4A

1.1 Part No.: 064-0286

1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the application of Torque Seal on the Twiggy chassis.

3.0 REFERENCE DOCUMENTS: - None.

4.0 EQUIPMENT REQUIRED:

QTY.

4.1	standard assembly work bench	1
4.2	standard assembly work stool	1
4.3	table mat, #3M051	1
4.4	eight-socket electrical power strip	1
4.5	U.V. light, 100 watt, 365 nm, Spectroline #B-100	1
4.6	measuring gauge, 1.9 in.	1
4.7	tweezers	1
4.8	Torque Seal	1
4.9	Tri-Flow lubricant	1

5.0 MATERIALS REQUIRED:

PART NO.:

QTY.

5.1	polarizing keys	xxx-xxxx	1
5.2	Twiggy assembly	653-5150	1

6.0 PREPARATION PROCEDURE: None

7.0 INSPECTION AND SEALING PROCEDURE:

7.1 Inspection:

7.1.1 Hold the stepper motor lead-screw under the ultraviolet light. Check for the presence of Tri-Flow lubricant on the rear section of the lead-screw, which will appear blue under the light. If there is no lubricant present, apply Tri-Flow to the screw.

7.1.2 Adjust the length of the loop of the rear head-cable

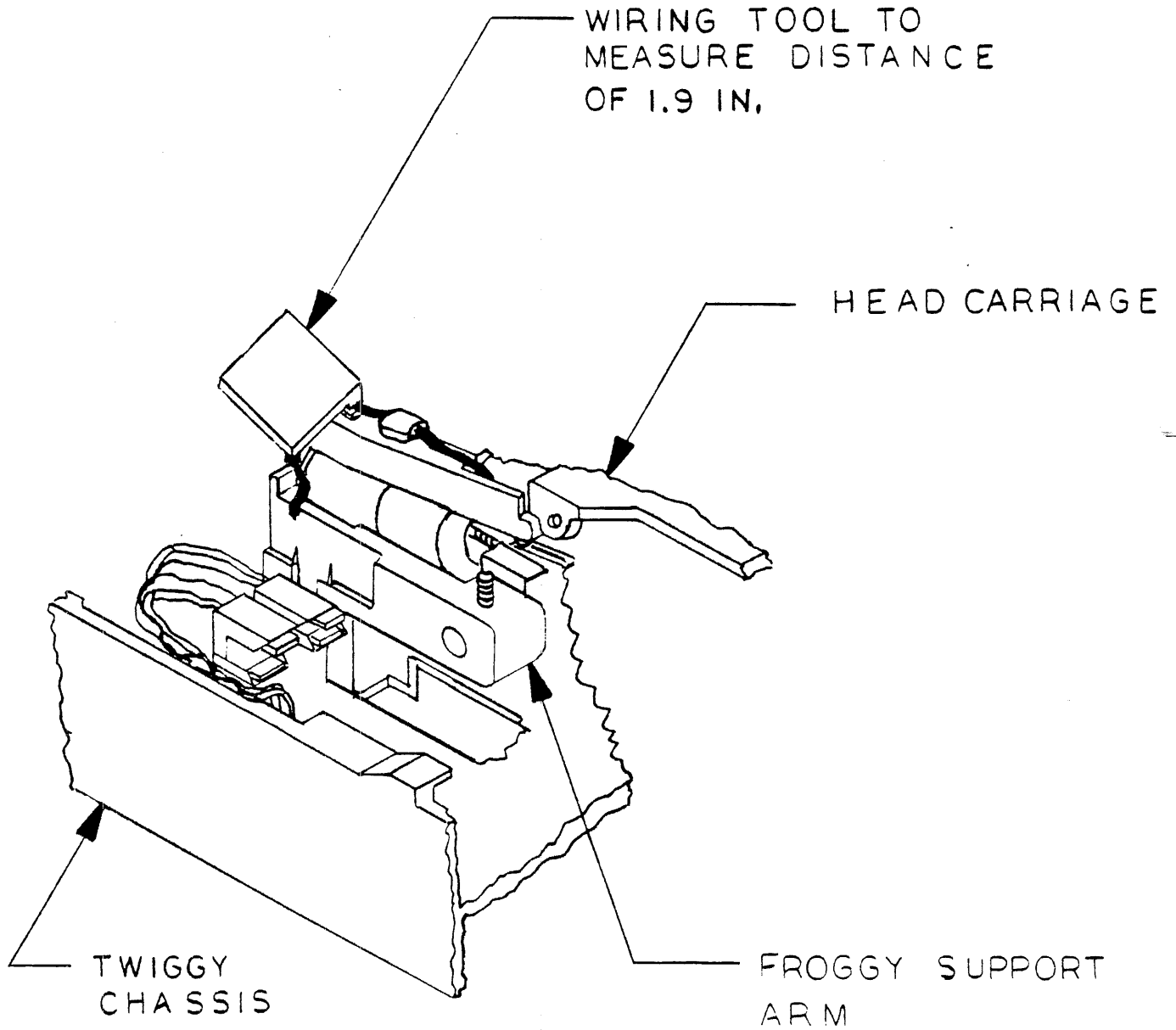
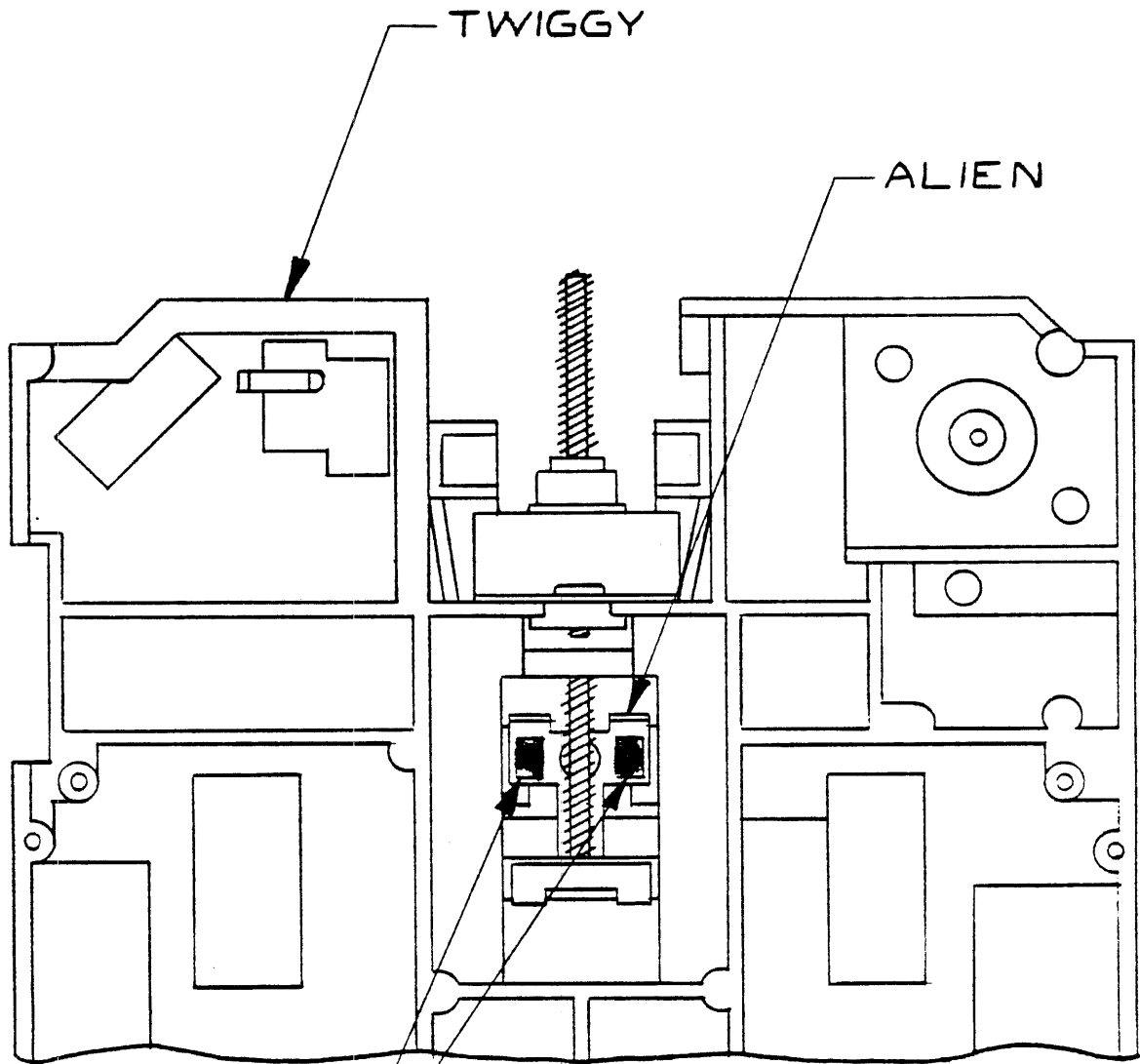


FIGURE 1. THE USING OF TOOL FOR MEASURING
CABLE LOOP LENGTH

by using the 1.9 in. measuring gauge. The loop from the head to the wire clip must be the same length as the gauge, 1.9 in. (See Fig. 1.)



ALIEN PAD PLACEMENT
(IF NOT ALREADY ON ASSY)

FIGURE 2. THE ALIEN PADS

7.2 Sealing Procedure:

- 7.2.1 Apply a small amount of torque seal to the side of the following screws:
- A) D.C. motor screws
 - B) dual switch mounting screw
 - C) stepper motor mounting screw (top)
- 7.2.2 Turn the Twiggy assembly over and apply torque seal to the following screws:
- A) two guide rail mounting screws on the rear of the chassis.
 - B) stepper motor mounting screw (bottom)
 - C) kick-out plate mounting screw
 - D) two froggy axle set screws
 - E) the two remaining guide rail mounting screws on the front of the chassis.
- 7.2.3 Make sure there are two alien pads on the alien. If not apply them as shown in Fig. 2. Peel off the adhesive backing with tweezers, and mount both pads on the top-side of the alien.
- 7.2.4 Make sure there are two polarizing keys on connector J1 on the digital board. If not, insert them in the proper place.

TWIGGY MANUFACTURING INSTRUCTIONS

1.0 TITLE: TWIGGY - SUB-ASSEMBLY #4B

1.1 Part No.: 064-0171

1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the installation of the analog and digital boards onto the Twiggy chassis.

3.0 REFERENCE DOCUMENTS: - Bill of Materials, p/n 653-6110.

4.0 EQUIPMENT REQUIRED:

QTY.

4.1 standard assembly work bench	1
4.2 standard assembly work stool	1
4.3 table mat, #3M051	1
4.4 screwdriver, Xcelite #102	1
4.5 small bin, Akro #30-220	1
4.6 medium bins, Akro #30-230	2
4.7 large bins, Akro #30-240	2

5.0 MATERIALS REQUIRED:

PART NO.

QTY.

5.1 analog to digital cable	590-0006	1
5.2 analog board assembly	653-4101	1
5.3 digital board assembly	653-4102	1
5.4 screws, 6-32 X 1/4 in.	400-1604	8
5.5 Twiggy assembly	653-5150	1

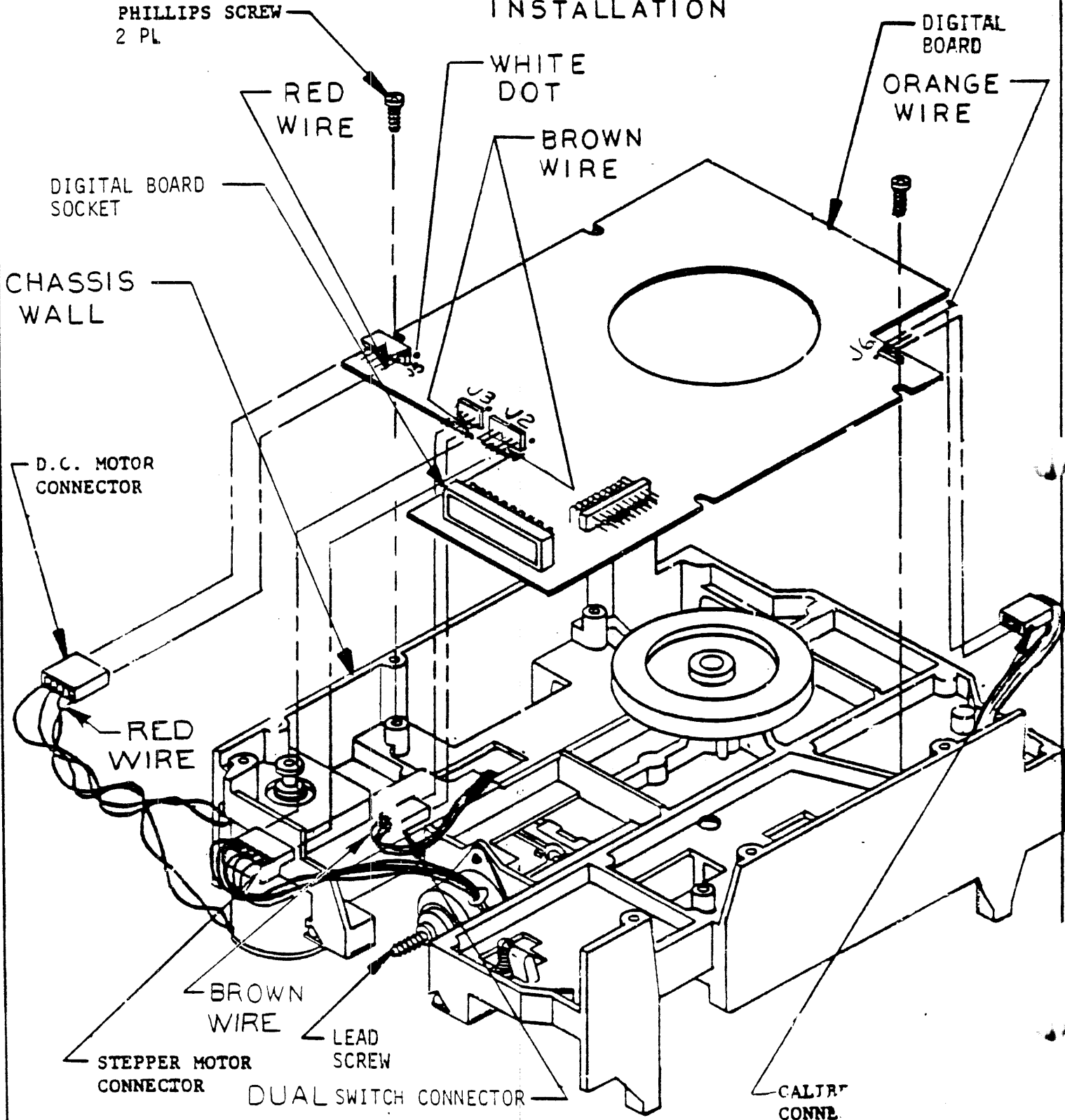
6.0 PREPARATION PROCEDURE: None.

7.0 BOARD INSTALLATION:

7.1 Board Inspection:

7.1.1 Check the components on the analog and digital boards for obvious physical damage. Carefully cut the ends of any long leads on the bottom of the the analog board. (Ask a "Skills Specialist" if you are unsure about the proper lengths of leads.)

FIGURE 1. THE DIGITAL BOARD INSTALLATION



7.2 Digital Board Installation:

- 7.2.1 Carefully remove the belt from the pulley and the D.C. motor. Place the stepper motor and calibration wiring harnesses so that they hang at the rear side of the chassis.
- 7.2.2 Slide the digital board over the pulley and place it onto the chassis so that the board components face up. Match up the screw slots in the board with the screw mounting holes in the chassis. (See Fig. 1.)
- 7.2.3 Partially insert the screws (6-32 X 1/4 in.) into the mounting holes. Position the digital board so that there is equal clearance between the pulley belt and the J3 and J5 connectors on the digital board, near each side of the belt. Tighten the screws.
- 7.2.4 Plug the connectors into the board in the following way (See Fig. 1.):
 - A) D.C. MOTOR CONNECTOR to J5; red wire to white dot.
 - B) STEPPER MOTOR CONNECTOR to J2; brown wire to the white dot.
 - C) DUAL SWITCH CONNECTOR to J3; brown wire to the white dot.
 - D) CALIBRATION SWITCH CONNECTOR to J6; orange wire to the white dot.
- 7.2.5 Carefully install the belt around the pulley and the D.C. motor so that the white lettering printed on the belt faces out.

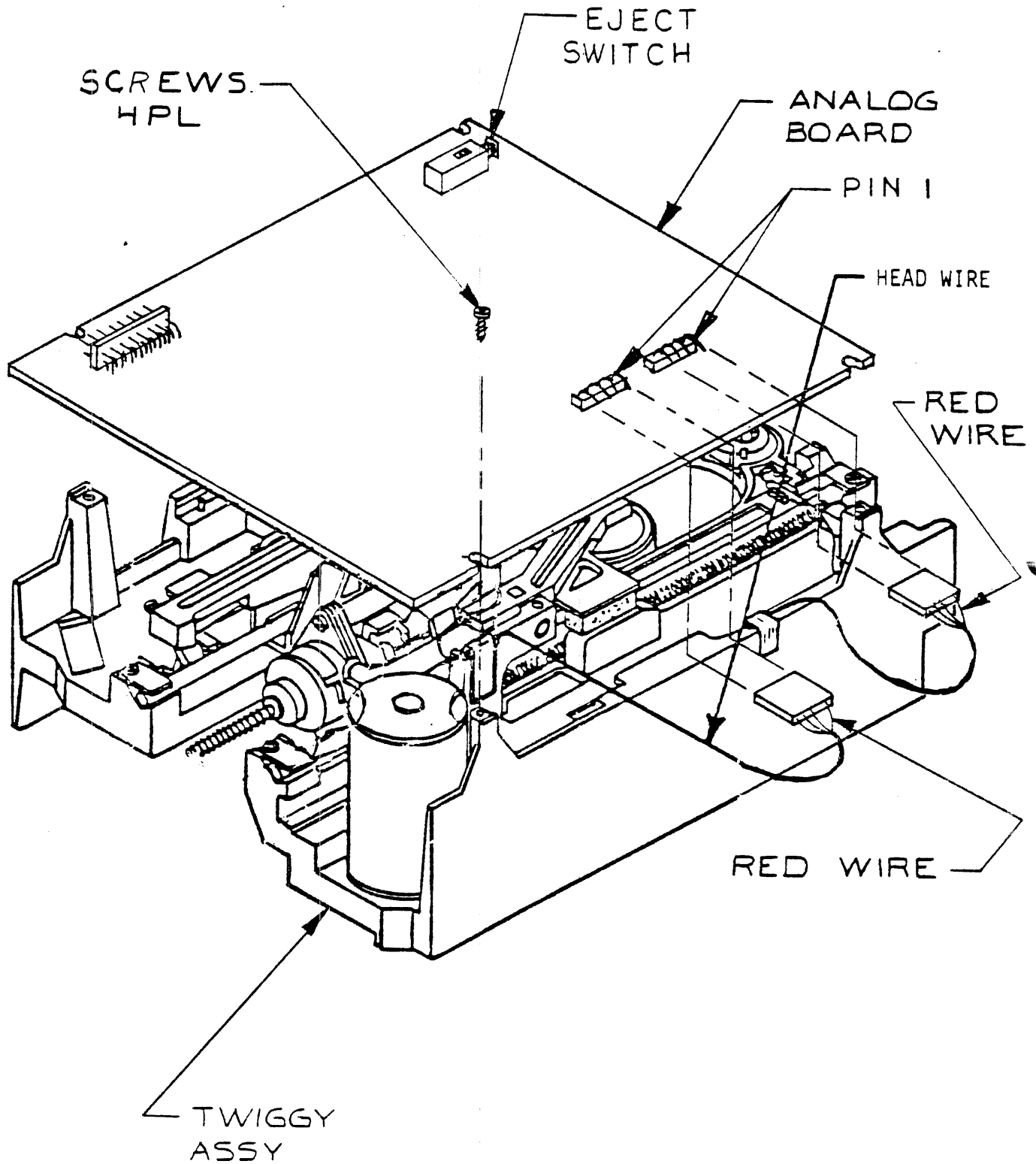


FIGURE 2. THE INSTALLATION OF THE ANALOG BOARD.

7.3 Analog Board Installation:

- 7.3.1 Install the analog board on the top-side of the chassis so that the board components face up as shown in Fig. 2. The eject switch labeled S1 must be positioned at the front of the chassis.
- 7.3.2 Partially insert the screws into the mounting holes and center the board on the chassis posts. Tighten the screws.
- 7.3.3 Connect the head cables to the board in the following way (See Fig. 2.):
 - A) The REAR HEAD CONNECTOR to J2; so that the red wire on the connector lines up with the pin labeled 1 on the board.
 - B) The FRONT HEAD CONNECTOR to J3, so that the red wire on the connector lines up with the pin labeled 1 on the board.

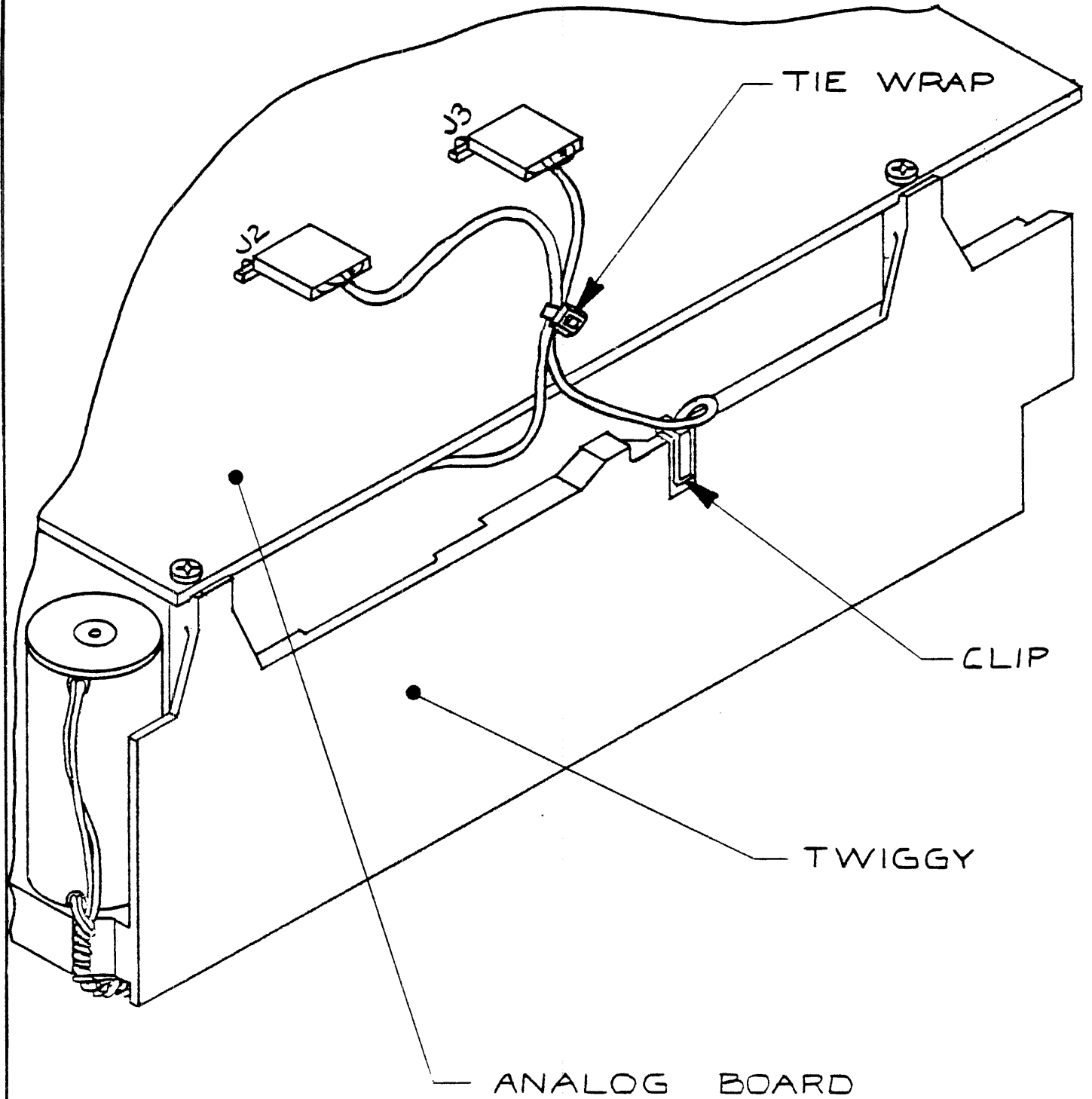


FIGURE 3. THE CORRECT TIE-WRAP OF THE HEAD CABLES

7.3.4 Tie wrap the head cables together as shown in Fig. 3.

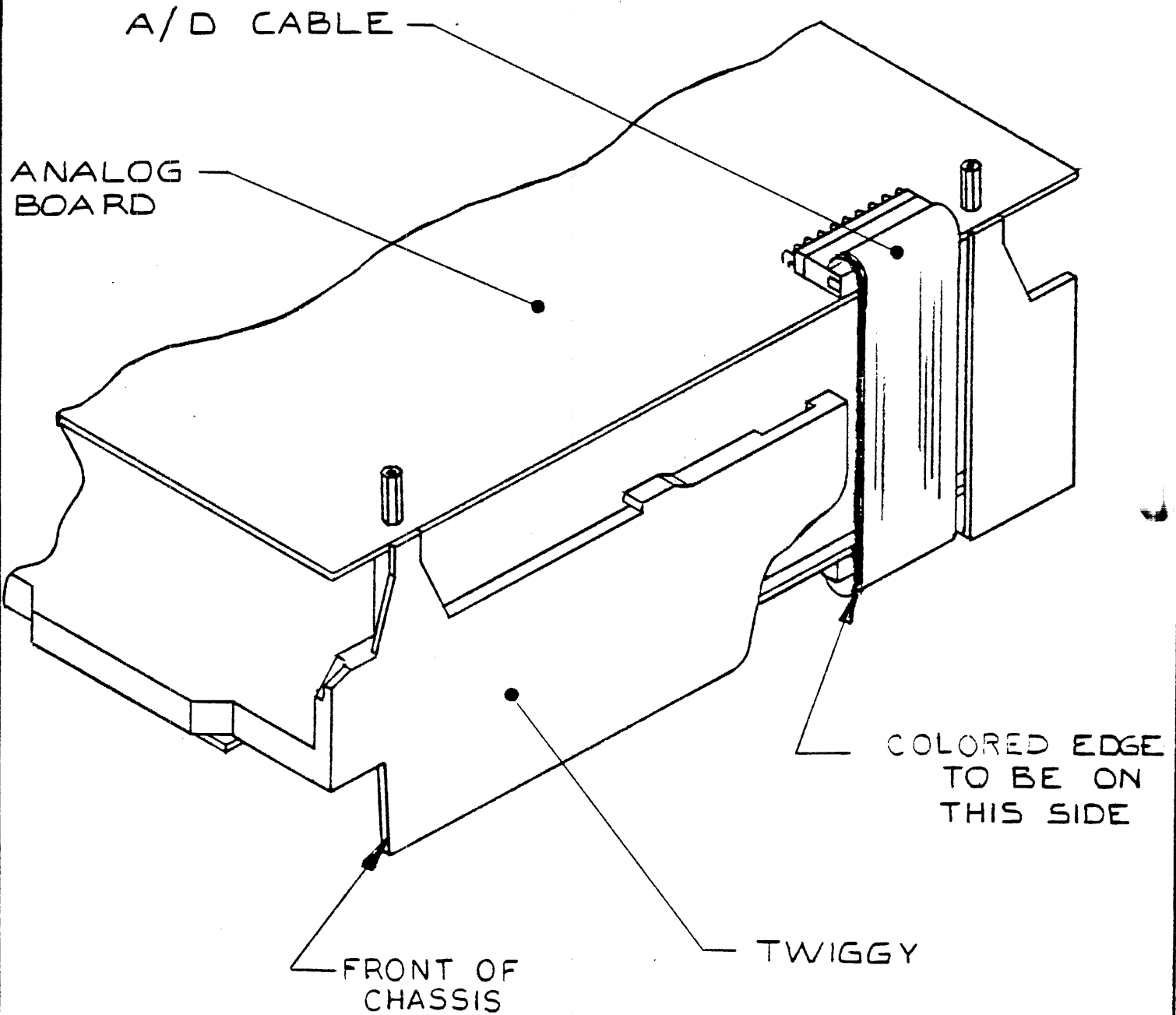


FIGURE 4. THE INSTALLATION OF THE ANALOG TO DIGITAL CABLE,

- 7.3.5 Connect the analog to digital cable to the J1 connector on the analog board so that the colored edge is lined up with pin #1 on the board. Connect the other end of the cable to the J4 connector on the digital board, so that the colored edge also lines up with pin #1. (The colored edge will be closest to the front of the chassis.) (See Fig. 4.)

TWIGGY MANUFACTURING INSTRUCTIONS

1.0 TITLE: TWIGGY - PRE-TEST

- 1.1 Part No.: 064-0219
- 1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the pre-test of the Twiggy drive.

3.0 REFERENCE DOCUMENTS: - None.

<u>EQUIPMENT REQUIRED:</u>	<u>QTY.</u>
4.1 Apple III computer (with power cable)	2
4.2 video monitor and cable	2
4.3 Twiggy Demultiplexer circuit board (653-4104)	2
4.4 Twiggy Controller circuit board (653-4103)	2
4.5 Twiggy Certified Media diskette, (not write-protected)	min. 1
4.6 Twiggy Certified Formatted Media diskette	min. 1
4.7 oscilloscope, (Tektronix #265B)	1
4.8 oscilloscope probe, 10X (Tektronix #P6106)	2
4.9 standard work table	1
4.10 standard work stool	1
4.11 standard work pad	1
4.12 System Pretest Station diskette (See step #6.3 below)	1
4.13 Margin Test - Data Handling diskette (See step #6.3 below)	1
4.14 Data Handling Margin Test fixture	1
4.15 Controller/Demux cable, 25-pin	1
4.16 Demux/Digital ribbon cable, 26-pin	1

<u>MATERIALS REQUIRED:</u>	<u>PART NO.:</u>	<u>QTY.</u>
5.1 Twiggy Assembly	653-5150	1

6.0 PREPARATION PROCEDURE:

6.1 The computer must be set up in the following way:

- A) The Twiggy Controller board is in slot #2 and is connected to the Demux board with the 25-pin cable.
- B) The Demux board is connected to the Twiggy assembly with the 26 pin cable.
- C) The "System Pre-Test Station" Diskette is in the drive and the door is closed.

6.2 Oscilloscope settings:

6.2.1	CHANNEL 1:	1X, A.C.
6.2.2	CHANNEL 2:	1X, A.C.
6.2.3	TRIGGER CHANNEL A:	2
6.2.4	TRIGGER CHANNEL (B dly'd):	STARTS AFTER DELAY
6.2.5	VOLTS/DIV:	1, A.C., (both channels)
6.2.6	20 MHz BW LIMIT:	ON
6.2.7	TIME/DIV:	1 uSec
6.2.8	HORIZONTAL DELAY TIME:	0.5 uSec
6.2.9	HORIZONTAL DELAY DISPLAY:	B dly'd
6.2.10	TRIGGER MODE:	NORMAL
6.2.11	TRIGGER HOLDOFF:	NORMAL
6.2.12	A TRIGGER SLOPE:	PLUS
6.2.13	A TRIGGER LEVEL:	MINUS
6.2.14	COUPLING:	A.C.

- 6.3 Refer to the Revision Level Sheet for a list of the latest version of the test diskettes.

7.0 TEST PROCEDURE:

7.1 Speed Test:

- 7.1.1 Connect the pre-test cable to the J1 connector on the digital board on the Twiggy assembly.
- 7.1.2 When the main menu appears on the monitor screen, press "RETURN" to begin the switch test.
- 7.1.3 Insert a write-protected FIV diskette into the Twiggy drive when the message "INSERT FORMATTED DISKETTE" appears on the monitor screen. The test program will automatically begin the speed test and a table listing eight speed classes will appear on the monitor.

*** NOTE *** Speed test diskettes must be formatted FIV media. If a drive fails, use another test diskette to be sure the test diskette is good. Bad diskettes must be reformatted. Diskettes for the asymmetry test must be write-enabled blank media and can be used repeatedly.

- 7.1.4 Observe the figures listed in the column titled "% deviation". Adjust the speed pot labeled R45 on the digital board so that the "% deviation" is between +0.5 and -0.5 for each "speed class". Adjust the speed as close as possible to 0.00%.
- 7.1.5 Place the drive on its side so that the head wires are facing up. Apply Torque Seal to the speed pot.
- 7.1.6 Place the drive flat on the bench again and allow the speed test to continue to make sure the speed pot is properly adjusted.
- 7.1.7 Press "Q". If the drive passes the speed test, the test program will automatically advance to the switch test. Proceed with step #7.2 below.
- 7.1.8 If the drive fails the speed test, press "RETURN" and the test program will automatically return to the beginning of the speed test. Re-insert a different formatted diskette to restart the speed test. If the drive fails the speed test a second time, reject the drive.

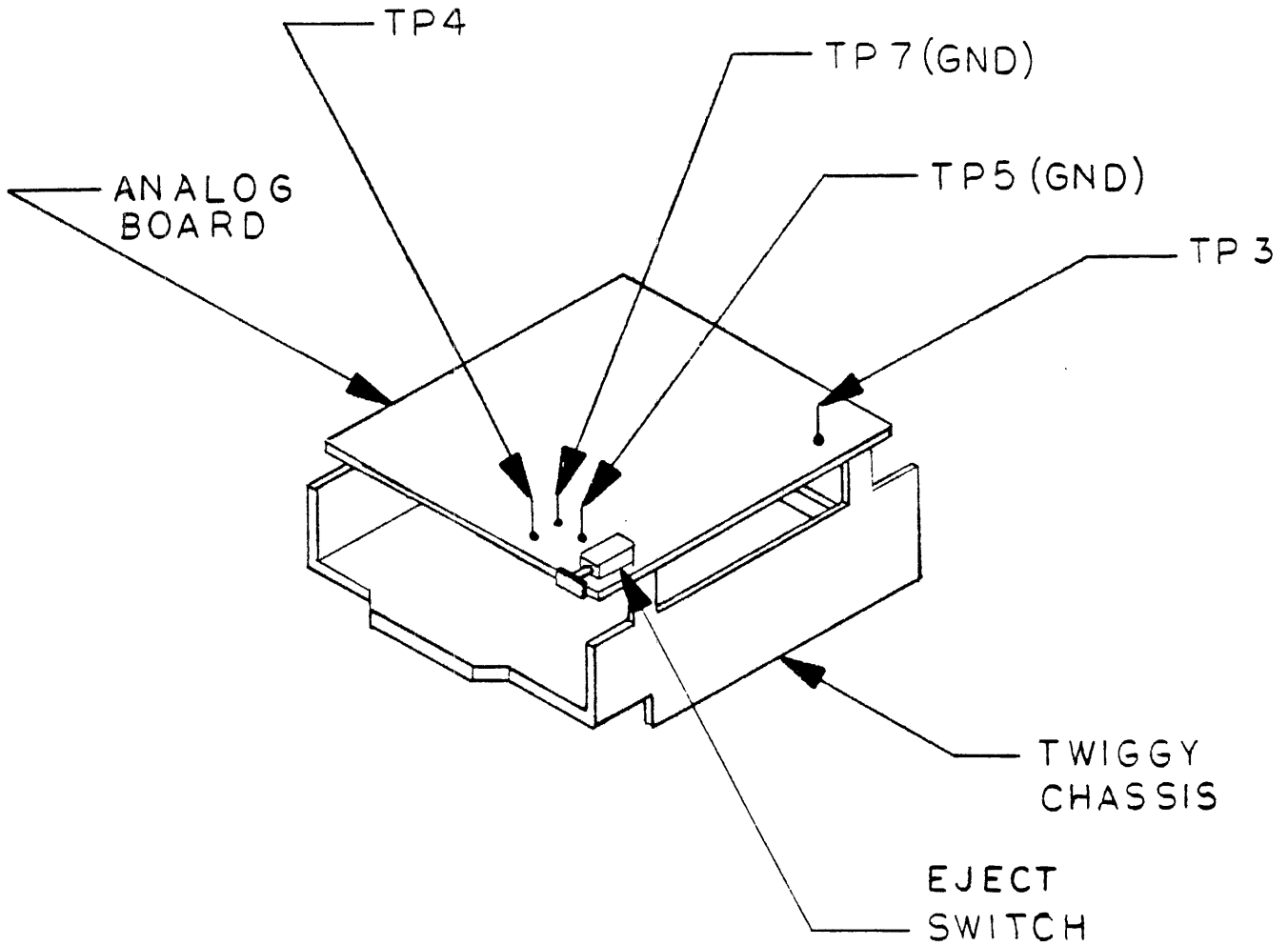


FIGURE 1. THE ANALOG BOARD.

7.2 Switch Test:

7.2.1 After the speed test is passed, the test program will automatically eject the diskette. The message "INSERT WRITE PROTECTED DISKETTE" will appear on the monitor screen. Re-insert the write protected FIV diskette into the drive to begin the switch test.

7.2.2 The drive will clamp and unclamp, and a PASS or FAIL message will appear next to the switch listed on the monitor screen.

*** NOTE ***

If a FAIL message appears on the monitor screen after any of the switch tests, the test can be repeated to verify the result by pressing "I" and re-inserting the proper diskette for each switch test before pressing "Q" to quit the switch test. The proper diskette for each switch test is listed on the monitor screen.

7.2.3 After the message "INSERT WRITE ENABLED DISC" appears on the monitor screen, insert a write-enabled (non-write-protected) blank diskette into the Twiggy drive. The drive will clamp and a PASS or FAIL message will appear on the monitor screen.

7.2.4 After the message "PRESS FRONT BUTTON" appears on the monitor screen, press the eject switch on the analog board (See Fig. 1.) to unclamp and eject the diskette. A PASS or FAIL message will appear on the monitor.

7.2.5 If the drive fails any of the switch tests, repeat the test according to the note above and reject the drive if it fails again.

7.2.6 If the drive has passed all three switch tests, AND a PASS message appears on the monitor screen after ALL three tests, press "Q" to quit the switch tests. The test program will automatically advance to the asymmetry test below.

7.3 Asymmetry Test:

7.3.1 Connect the oscilloscope in the following way (See Fig. 1):

A) Connect the channel 1 probe from the scope to TP3 on the analog board and the probe ground to TP5.

B) Connect the channel 2 probe from the scope to TP4 on the analog board and the probe ground to TP7.

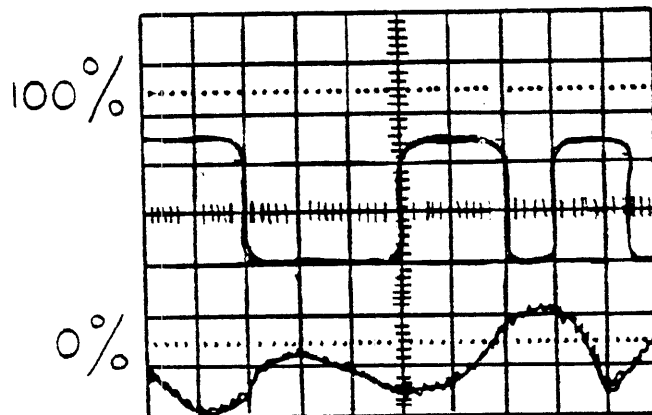


FIGURE 2. THE 2F SIGNAL ON THE OSCILLOSCOPE SCREEN.

- 7.3.2 After the message "INSERT WRITE-ENABLED DISKETTE" appears on the monitor screen, re-insert the write-enabled blank diskette into the drive. ("HEAD 0" will first appear on the monitor screen, indicating that the program is testing the rear head.)
- 7.3.3 Observe the waveform on the oscilloscope screen. It must look like the 2F signal shown in Fig. 2. The question "CAN YOU SEE THE 2F PATTERN?" will appear on the monitor screen. If so, press "Y" (for "YES") and continue with the asymmetry test.
- 7.3.4 If not, reject the drive, press "N" (for "NO"), and restart the test program with another drive.

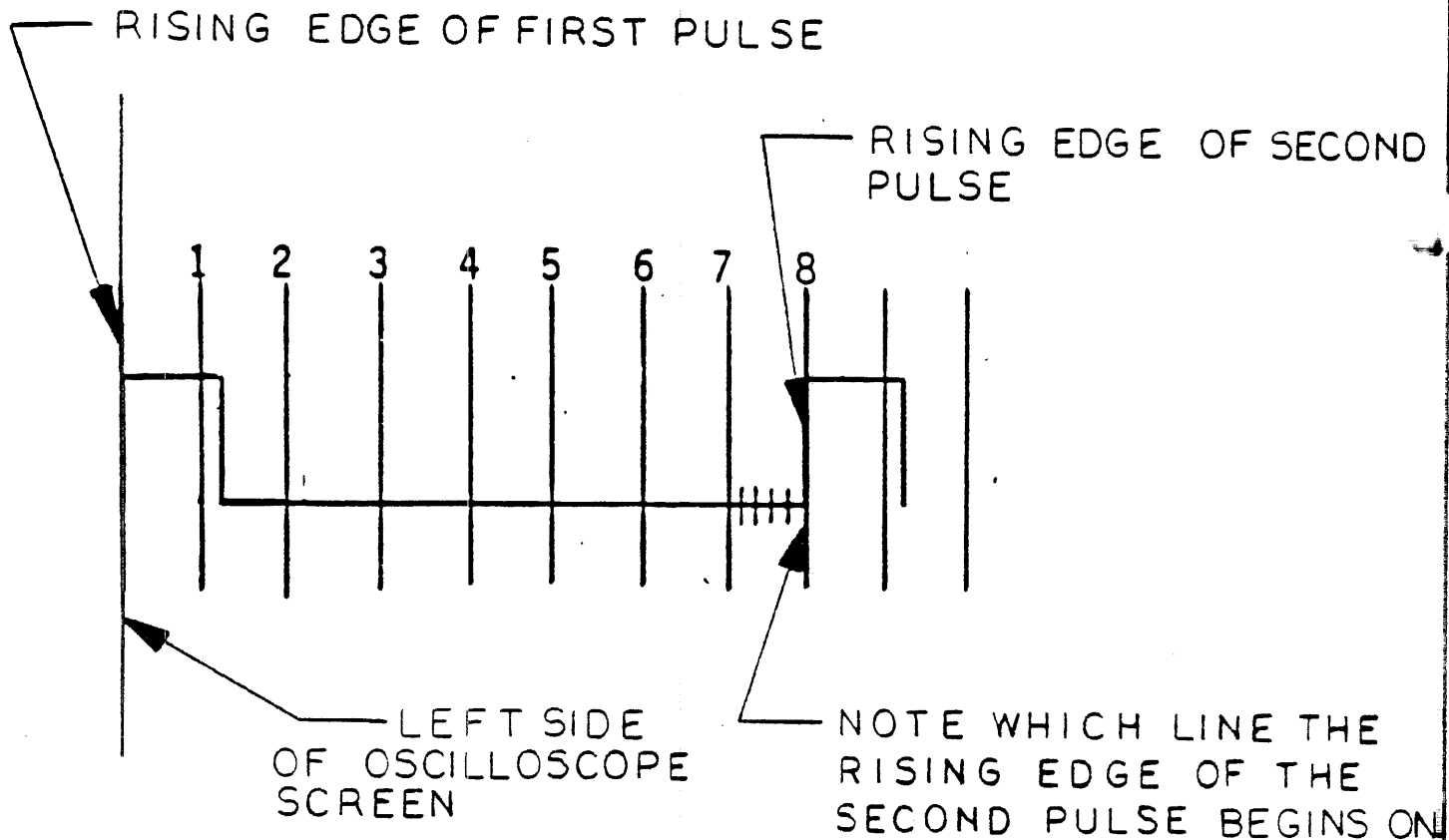


FIGURE 3. THE RISING EDGE OF THE FIRST PULSE ALIGNED WITH THE LEFT SIDE OF THE OSCILLOSCOPE SCREEN.

- 7.3.5 Turn the control on the oscilloscope labeled "time delay" and line up the rising edge of the first pulse with the left edge of the scope. (See Fig. 3.)
- 7.3.6 Note which line the rising edge of the second pulse begins on.
- 7.3.7 Turn the "time delay" control until the rising edge of second pulse is at the left edge of the scope.

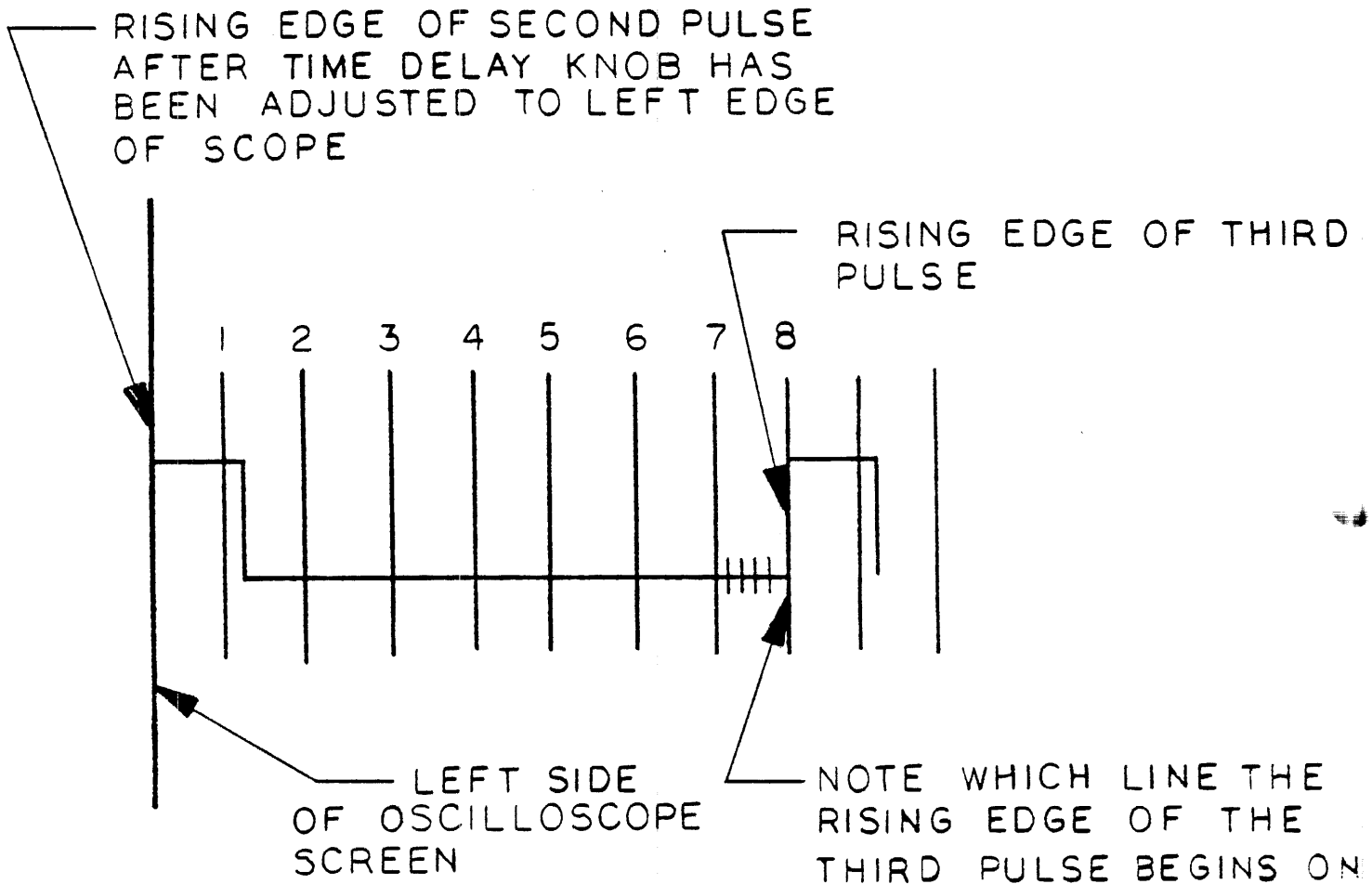


FIGURE 4. THE RISING EDGE OF THE SECOND PULSE
ALIGNED WITH THE LEFT SIDE OF THE
OSCILLOSCOPE SCREEN.

- 7.3.8 Note which line the rising edge of the third pulse begins on. (See Fig. 4.)
- 7.3.9 Count the number of small lines between 7.3.6 and 7.3.8 above. If the number is three lines or less, press "Y" (for "YES") to answer the question "IS ASYMMETRY LESS THAN 300 NSEC?" and continue with the test. (Three lines are equal to three nanoseconds.) If that number is more than three lines, press "N" (for "NO") and reject the Twiggy assembly.
- 7.3.10 If "Y" was pressed the program will then automatically test the asymmetry of Head 1. ("HEAD 1" will appear on the monitor screen indicating the front head is being tested.) Repeat steps 7.3.3 through 7.3.9. A PASS or FAIL message will appear on the monitor. Press "Q" to quit the program and start it again from the beginning.

7.4 Margin Test:

- 7.4.1 After the Twiggy drive has passed the tests above, connect it to the margin board cable on a computer that is booted on the Margin Test - Data Handling Diskette.

*** NOTE ***

ALWAYS turn "OFF" the power switch on the margin board before connecting and disconnecting the margin board cable. The power switch is the toggle switch next to the labels "ON" and "OFF".

- 7.4.2 If you are using the green margin board, be sure that only dip switches #7 and #4 are turned "ON". If you are using the beige margin board, be sure that only dip switches #4 and #3 are turned "ON". The remainder of the switches must be turned "OFF".
- 7.4.3 Insert a FIV diskette into the Twiggy assembly. The program will automatically test the Twiggy until it fails or 1000 transfers have occurred. A PASS or FAIL message will appear on the monitor screen.
- 7.4.4 If the Twiggy assembly fails, use a different FIV diskette. If it fails again, replace the diskette once more. If the Twiggy assembly fails three times, reject the assembly.

TWIGGY MANUFACTURING INSTRUCTIONS

1.0 TITLE: TWIGGY - DATA HANDLING TEST

- 1.1 Part No.: 064-0217
- 1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the data handling test of the Twiggy chassis.

3.0 REFERENCE DOCUMENTS: - Bill of Materials, p/n 653-6110.

4.0 EQUIPMENT REQUIRED:

QTY.

- | | | |
|------|---|----------------|
| 4.1 | Apple III | 1/Twiggy drive |
| 4.2 | video monitor | A/R |
| 4.3 | switch box | A/R |
| 4.4 | Twiggy controller board, (653-4103) | 1/Twiggy drive |
| 4.5 | Twiggy demultiplexer board, (653-4104) | 1/Twiggy drive |
| 4.6 | Twiggy Data Handling diskette
(See step #6.3 below) | 1/Twiggy drive |
| 4.7 | Twiggy FIV "good" diskette | A/R |
| 4.8 | cable, controller/demux, 25 pin, (590-0115) | 1/Twiggy drive |
| 4.9 | cable, demux/digital, 26 pin, (590-0112) | 1/Twiggy drive |
| 4.10 | video cable, RCA | A/R |
| 4.11 | golden drives | A/R |
| 4.12 | burn-in rack, 5 ft tall,
eight shelves, (5 ft by 1.5 ft), 8 in spacing between
shelves. | A/R |
| 4.13 | diskette tubs | A/R |
| 4.14 | data handling log | A/R |

5.0 MATERIALS REQUIRED:

PART NO.:

QTY.

- | | | | |
|-----|-----------------|----------|---|
| 5.1 | Twiggy assembly | 653-6110 | 1 |
|-----|-----------------|----------|---|

6.0 PREPARATION PROCEDURE:

- 6.1 Insert the Twiggy controller board into slot #2 of the Apple III board. Connect the 25 pin cable between the controller board and the demux board.
- 6.2 Insert one 26 pin cable into J2 of the demux board and another cable into J3 of the demux board.

6.3 Refer to the Revision Level Sheet for a list of the latest version of the test diskettes.

7.0 TEST PROCEDURE:

7.1 Insert a FIU "good" diskette into each drive to be tested.

*** NOTE *** Never place a diskette on top of the drive or on any electrical device. The diskette will be damaged by the magnetic forces or heat present near the devices.

7.2 Connect a 26 pin cable from the demux board to the J1 connector on the digital board on the Twiggy drive.

7.3 Insert the "Twiggy Data Handling" diskette into the Apple III and turn the power switch "ON". Set the switch box control to the number corresponding to the appropriate Apple III station. After a short time, the data handling screen will appear.

*** NOTE *** If the data handling screen does not appear, make sure the switch box control is set to the correct station. If it is, check the cable connections between the Apple III and the switch box, and the video cable connections between the switch box and the monitor. If the connections are good, or the monitor shows a message stating the computer or controller card is bad, call a maintenance technician.

7.4 After the data handling screen appears, the drive will begin to write, read and compare data.

7.5 If ZERO ERRORS OF ANY TYPE occur, the test will run and stop when 300,000 (300 k) blocks have been transferred. If FROM 1 TO 25 SOFT ERRORS occur, the test will continue until 600,000 (600 k) blocks have been transferred. In both of these cases, the drive has passed the test.

7.6 If ONE HARD ERROR or 25 OR MORE SOFT ERRORS occur, the program will eject the diskette and a FAIL message will appear on the screen. Remove the diskette and insert another "good" diskette.

- 7.7 If the drive fails again, try one more "good" diskette.
IF THE DRIVE FAILS ON THREE DIFFERENT "GOOD" DISKETTES,
THEN REJECT THE DRIVE.

TWIGGY MANUFACTURING INSTRUCTIONS

1.0 TITLE: TWIGGY - FINAL INSPECTION:

- 1.1 Part No.: 064-0280
- 1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the final inspection of the Twiggy disk drive.

3.0 REFERENCE DOCUMENTS: - Bill of Materials, p/n 653-6110.

<u>4.0</u> <u>EQUIPMENT REQUIRED:</u>	<u>QTY.</u>
4.1 standard assembly work bench	1
4.2 standard assembly work stool	1
4.3 table mat	1
4.4 screwdriver	1
4.5 scissors	1
4.6 wire cutters	1
4.7 felt pen	1
4.8 tie wraps	A/R
4.9 Q-tips	A/R
4.10 alcohol	A/R
4.11 plastic tape	A/R

<u>5.0</u> <u>MATERIALS REQUIRED:</u>	<u>PART NO.:</u>	<u>QTY.</u>
5.1 Twiggy assembly	653-6110	1

6.0 PREPARATION PROCEDURE: None.

7.0 INSPECTION PROCEDURE:

7.1 Analog Board Inspection:

7.1.1 Determine the revision level of the analog board by locating the letter written on the board in black felt ink. Refer to the revision level sheet and make sure the analog board has the proper components.

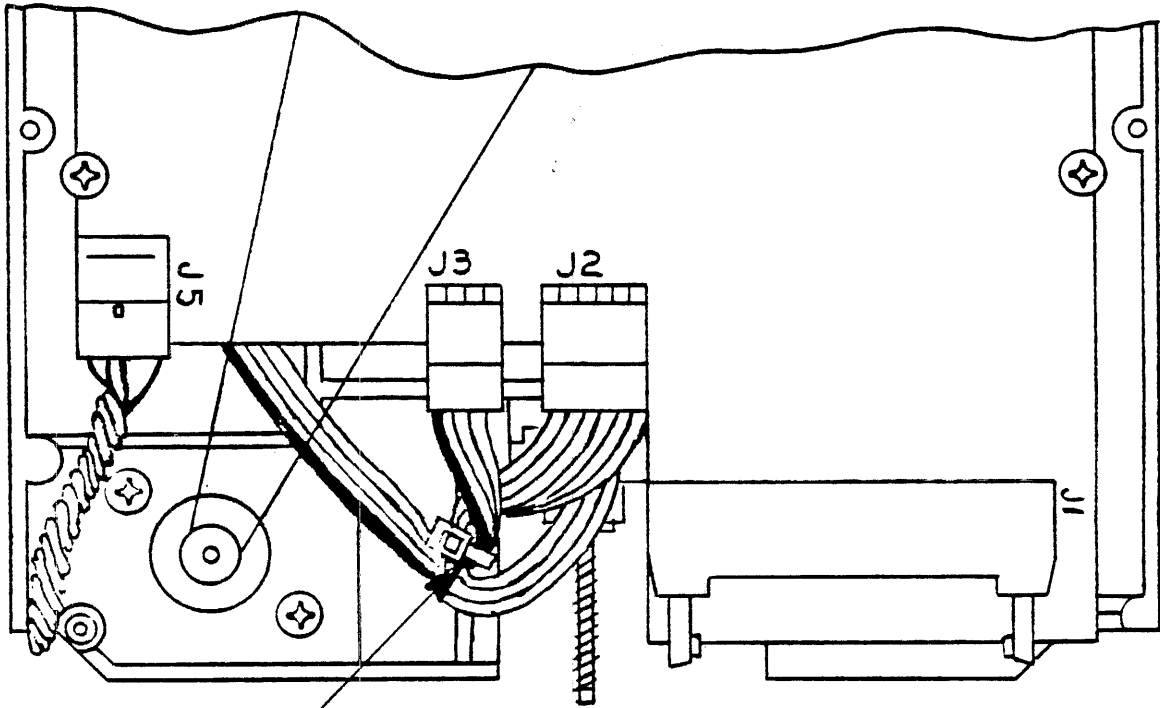
7.1.2 Check the installation of the following components:

- A) analog to digital connector
- B) head connectors
- C) foam pads
- D) anti-backlash spring
- E) kick-out spring
- F) ascend spring
- G) I.C.'s (fully inserted)
- H) load pads on the alien

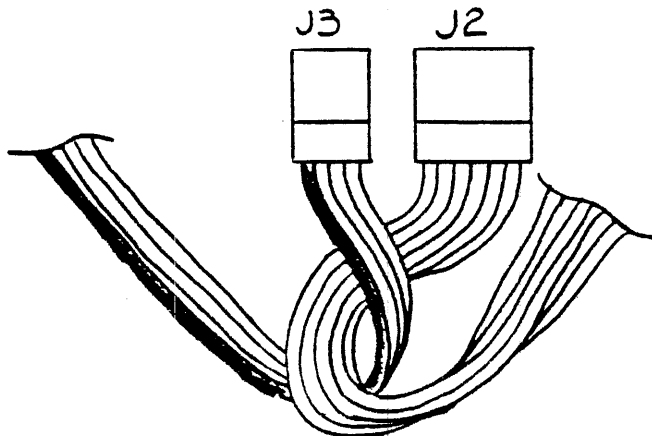
7.1.3 Make sure the test pins are not bent.

7.1.4 Make sure the froggy does not touch the bottom of the analog board.

7.1.5 Make sure the analog board mounting screws are tight.



TIE WRAP



HOOK WIRES TOGETHER
AS SHOWN HERE
BEFORE TIE WRAPPING

FIGURE 1. THE CORRECT TIE-WRAP OF THE STEPPER MOTOR & THE DUAL SWITCH WIRING HARNESSSES.

7.2 Digital Board Inspection:

- 7.2.1 Determine the revision level of the digital board and make sure the board has the proper components.
- 7.2.2 Check the installation of the following components:
 - A) calibration switch connector
 - B) dual-switch connector
 - C) stepper motor connector
 - D) D.C. motor connector
 - E) I.C.'s (fully inserted)
- 7.2.3 Make sure the pulley belt does not touch any components.
- 7.2.4 Make sure the J1 connector has polarizing keys.
- 7.2.5 Make sure the C2 cap is not broken.
- 7.2.6 Make sure the digital board mounting screws are tight.
- 7.2.7 Tie wrap the dual-switch and stepper motor wires as shown in Fig. 1. Make sure the dual switch wires intertwine with the stepper motor wires.

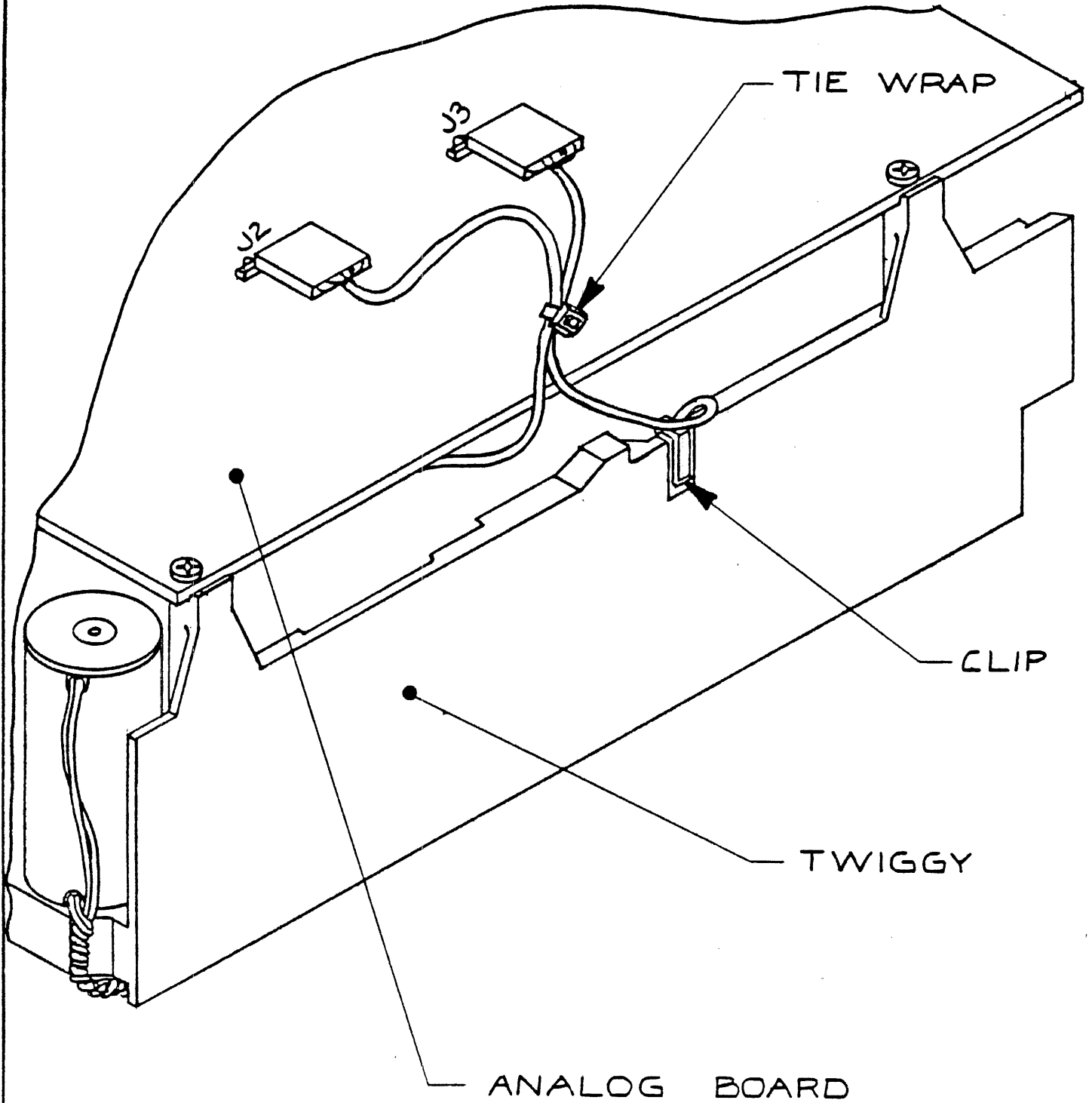


FIGURE 2. THE CORRECT TIE-WRAP OF THE HEAD CABLES

7.3 Assembly Inspection:

- 7.3.1 Check the serial number of the chassis.
- 7.3.2 Check the head cables for damage. Make sure they are not disconnected from the carriage and attached to the chassis at the proper places.
- 7.3.3 Make sure the head cables are tie wrapped as shown in Fig. 2.
- 7.3.4 Check the torque seals at the speed pot, the load pad, and on 12 screws.
- 7.3.5 Remove any extra felt pen marks on the boards with Q-tips and alcohol. DO NOT REMOVE THE REVISION LEVEL LETTER.
- 7.3.6 When the inspection is completed, apply a serial number and the appropriate revision level number to the side of the chassis where the head cables are located. Use plastic tape to affix the labels.

TWIGGY MANUFACTURING INSTRUCTIONS

1.0 TITLE: QUALITY ASSURANCE - CALIBRATION AND ALIGNMENT TEST
PROCEDURE FOR THE TWIGGY DISK DRIVE

1.1 Part No.: 064-0281

1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the visual inspection and the calibration and alignment tests on the Twiggy Disk Drive.

3.0 REFERENCE DOCUMENTS: - Bill of Materials, p/n 653-5150.
- Bill of Materials, p/n 653-6110.

<u>4.0</u> <u>EQUIPMENT REQUIRED:</u>	<u>QTY.</u>
4.1 Apple III	1
4.2 video monitor	1
4.3 demux board	1
4.4 controller board	1
4.5 oscilloscope, Tektronix #T912-01	1
4.6 oscilloscope probes, 1X, Tektronix #P6028	2
4.7 QA Alignment Station diskette (See step #6.2 below)	1
4.8 torque screwdriver, Mountz, 8 in.-oz	1
4.9 cable, demux/digital, 26-pin	1
4.10 modulation test stand	1
4.11 standard assembly work bench	1
4.12 standard assembly work stool	1
4.13 table mat	1

<u>5.0</u> <u>MATERIALS REQUIRED:</u>	<u>PART NO.:</u>	<u>QTY.</u>
5.1 Twiggy assembly	* 653-6110	1

6.0 PREPARATION PROCEDURE:

6.1 Set up the oscilloscope in the following way:

- 6.1.1 CHANNEL 1 (labeled "Y"): 1X probe
- 6.1.2 CHANNEL 2 (labeled "AMP"): 1X probe
- 6.1.3 TRIGGERING: SOURCE- INT
MODE- NORMAL
- 6.1.4 SEC/DIV: .1 CH 1 & CH 2
- 6.1.5 VOLT/DIV: AC, 5m, CH 1 & CH 2 (Use 2m if
the amplitude is insufficient
to attain signal strength of
100 %.)
- 6.1.6 CHANNEL 1 SELECT: DIFF
- 6.1.7 STORE: PUSHED-IN
- 6.1.8 SLOPE: OUT
- 6.1.9 POWER: ON

6.2 Refer to the Revision Level Sheet for a list of the latest version of the test diskettes.

* NOTE *** The following section #6.3 is required on initial power on only. Press RETURN for continual testing of drives.

6.3 Turn off the power to the Apple III. Insert the Align and Cal Test diskette into the Apple III drive and turn the power on.

7.0 INSPECTION AND TEST PROCEDURE:7.1 Inspection Procedure:

- 7.1.1 Make sure the pulley belt is not damaged and installed so that the white lettering printed on the belt is facing out. Make sure the belt does not touch the J3 connector or any other components.
- 7.1.2 Make sure the froggy foam pads are not cocked, loose, or damaged.
- 7.1.3 Make sure the serpent is squarely aligned to the front head. The load pad must not be loose or damaged.
- 7.1.4 Inspect the alien load pad for damage or looseness.
- 7.1.5 Make sure the following springs are properly installed and not damaged:
 - A) Kick-out spring. - Kick-out assembly to chassis.

- B) ascend spring. - froggy assembly to chassis.
 - C) anti-backlash spring. - carriage assembly to chassis.
- 7.1.6 Make sure there is torque seal on the following screws:
- A) guide rails - four screws
 - B) stepper motor - two screws
 - C) D.C. motor - two screws
 - D) kick-out assembly - one screw
 - E) dual-switch - one screw
 - F) froggy axle set screws - two screws
- 7.1.7 Make sure the chassis number, serial number, and revision level number on the assembly and the boards are correct and legible. Verify the numbers on the attached tag.
- 7.1.8 Inspect the following items on the digital and analog boards:
- A) sufficient torque seal on the speed pot
 - B) mylar insulation between the digital board and chassis
 - C) plastic keys installed on J1 connector on digital board
 - D) components properly installed and not damaged
 - E) four mounting screws for each board; not loose or damaged
 - F) no solder bridges or excessive voids; check soldering for complete wetting and fillet.
- 7.1.9 Make sure all connectors to the digital board are installed according to the following directions. Check all wiring for insulation damage, correct routing, looping, and tie-wrapping.
- A) stepper motor to J2; brown wire to white dot
 - B) dual-switch to J3; brown wire to white dot
 - C) analog/digital cable to J4; colored edge to pin #1 or front of chassis
 - D) D.C. motor to J5; red wire to white dot
 - E) calibration switch to J6; orange wire to white dot

7.1.10 Make sure all connectors to the analog board are installed according to the following directions. Check all wiring for insulation damage, correct routing, looping, and tie-wrapping.

- A) analog/digital cable to J1 on the analog board; colored edge to pin #1 or front edge of chassis
- B) rear-head cable to J2; red wire to pin #1
- C) front-head cable to J3; red wire to pin #1

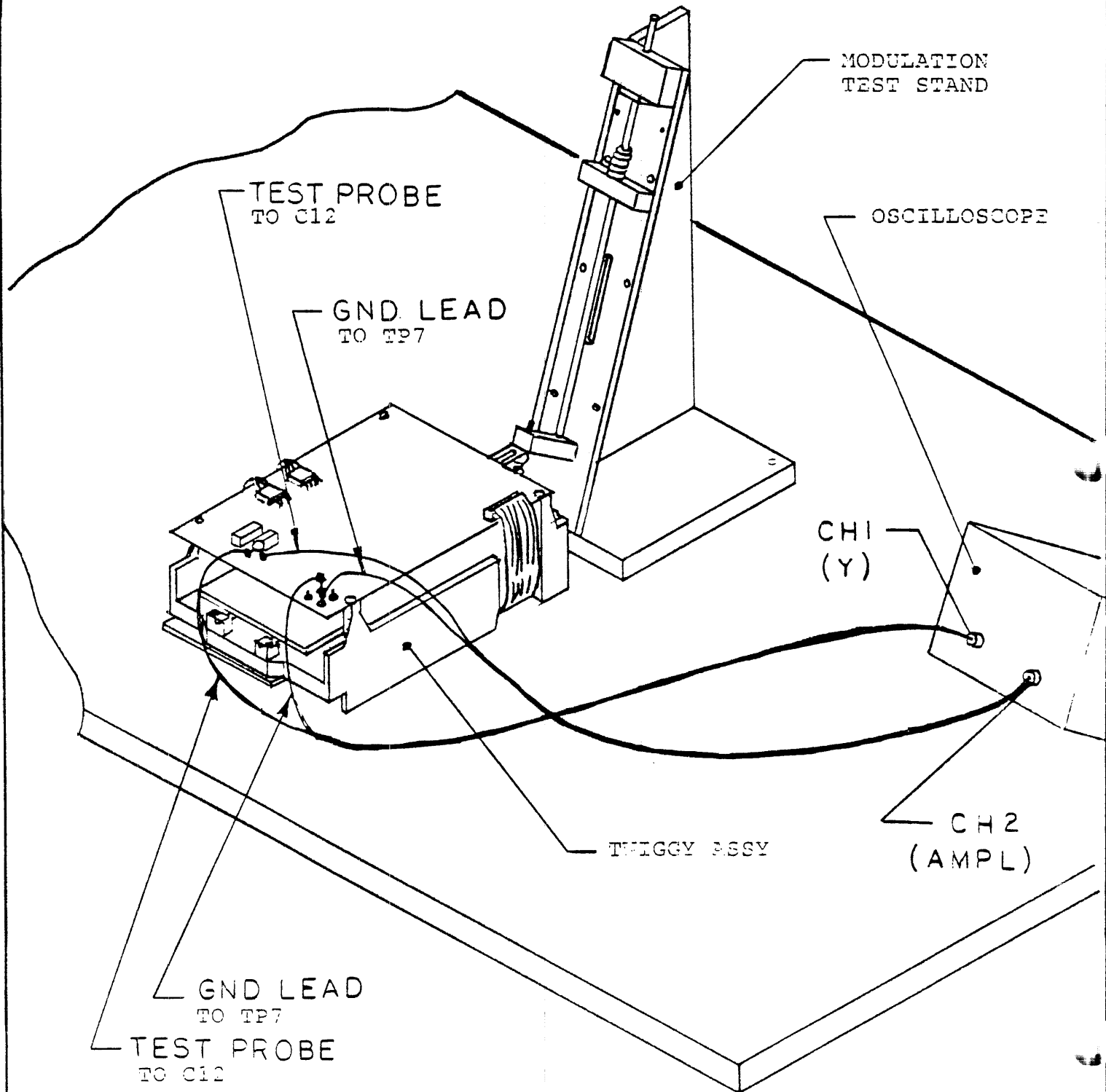


FIG. 1: PLACEMENT OF MODULATION TEST STAND

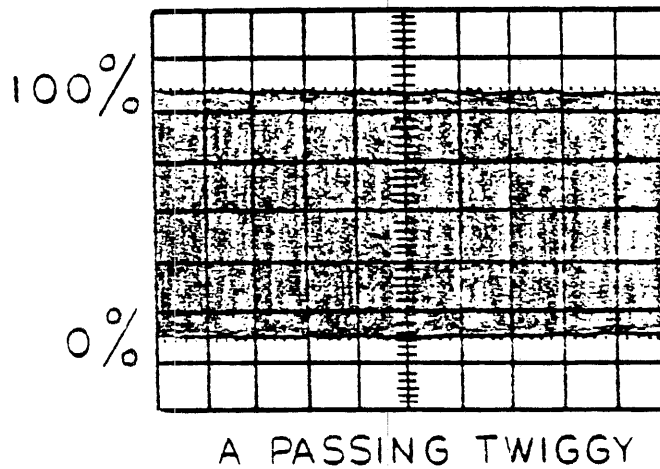
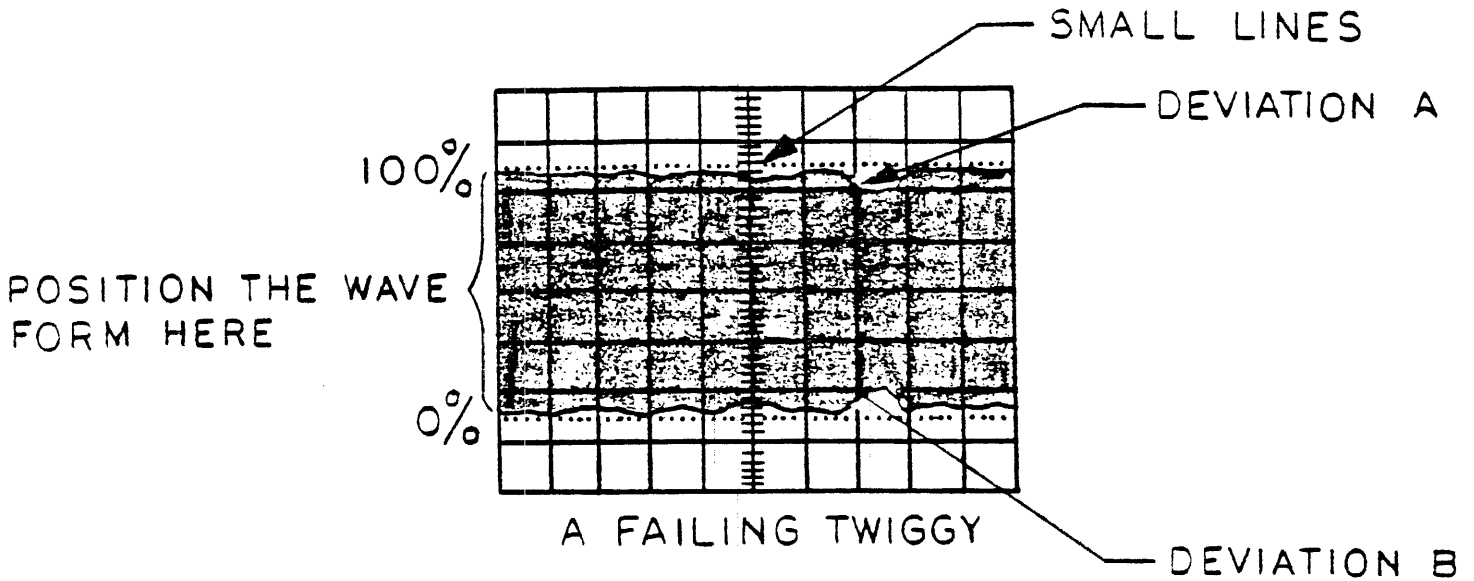
7.2 Alignment Test Procedure:

- 7.2.1 Insert the interface cable from the demux board to the J1 connector on the digital board on the Twiggy drive.
- 7.2.2 Connect the two scope test probes to each side of C12 on the analog board, and the ground leads to the analog ground points at TP 7 and TP 5. (See Fig. 1.)
- 7.2.3 Insert the Alignment Test diskette into the Twiggy drive. Press RETURN.
- 7.2.4 The monitor will read INITIALIZATION and then READING "CAT'S EYE".
- 7.2.5 Observe the cat's eye signal on the scope. The cat's eye percentage must be 80% MINIMUM. If less than 80%, eject the media by pressing "U" to unclamp and re-insert the media. Re-insert a third time, if necessary. If the drive fails to reach 80% a third time, record the percentage and reject the drive.

*** NOTE *** If the large cat's eye signal cannot be set to the 100% scale, rotate the VOLT/DIV control to 2m and adjust the cat's eye to 100%.

7.3 Modulation Test:

- 7.3.1 Press "M" to begin the modulation test.
- 7.3.2 Adjust the oscilloscope settings in the following way:
 - A) Volts/Div: 10 m (both channels)
 - B) Store: out
 - C) adjust both red variable controls for Volts/Div so that the waveform ranges between the dotted lines on the oscilloscope screen labeled 0% and 100%.
 - D) adjust the "position" controls as necessary to place the waveform between the lines labeled 0% and 100%.
- 7.3.3 Place the modulation test stand on top of the rear edge of the froggy as shown in Fig. 1.



TOTAL DEVIATION = DEVIATION A + DEVIATION B

THE TOTAL DEVIATION MUST BE LESS THAN 3,5 SMALL LINES FOR THE TWIGGY TO PASS THE MODULATION TEST.

FIGURE 2. THE EVIDENCE OF MODULATION ON THE OSCILLOSCOPE SCREEN.

- 7.3.4 Observe the waveform on the oscilloscope screen for evidence of excessive modulation. The wave must not deviate from the dotted 0% and 100% lines a total amount more than 3.5 of the small lines printed on the screen. (See Fig. 2.)
- 7.3.5 Remove the test stand. Press "U" to unclamp and remove the diskette. Insert the diskette again to make sure it was properly clamped during the first modulation test. Press "M" to begin the test again. Place the test stand on the froggy. If the drive does not exhibit evidence of modulation in the second test, continue with step # 7.3.6. If it does exhibit modulation, reject the drive.
- 7.3.6 Reset the oscilloscope as described in step # 6.1 above.
- 7.3.7 Remove the test stand.

7.4 Calibration Test:

- 7.4.1 Press Q to begin the calibration test. The program will automatically perform the test and either a PASS or FAIL message will appear on the monitor screen.
- 7.4.2 The diskette will automatically eject from drives that pass. Press the eject switch to remove the diskette from drives that fail.

7.5 Torque Test:

- 7.5.1 Insert the torque screwdriver into the rear of the stepper motor lead-screw and try to turn it. If the screw turns at the 8 in-oz specification of the torque screwdriver, reject the drive. If the screw does not turn, pass the Twiggy drive to final inspection.

*** NOTE *** Press RETURN to begin the alignment test again for another Twiggy.

TWIGGY MANUFACTURING INSTRUCTIONS

1.0 TITLE: QUALITY ASSURANCE - FINAL INSPECTION

1.1 Part No.: 064-0282

1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the final testing of the Twiggy disk drive.

3.0 REFERENCE DOCUMENTS: - Bill of Materials, p/n 653-5150. - Bill of Materials, p/n 653-6110.

<u>4.0 EQUIPMENT REQUIRED:</u>	<u>QTY.</u>
4.1 Apple III	6
4.2 video monitor	1
4.3 switch box	1
4.4 interface card	6
4.5 demux board	6
4.6 controller board	6
4.7 Final QA Inspection Station diskette (See step #6.2 below)	6
4.8 FIV Twiggy Formatted diskette	6
4.9 standard assembly work bench	2
4.10 standard assembly work stool	1
4.11 table mat	1

<u>5.0 MATERIALS REQUIRED:</u>	<u>PART NO.:</u>	<u>QTY.</u>
5.1 Twiggy Assembly	653-6110	1

6.0 PREPARATION PROCEDURE:

*** NOTE *** Section #6.1 is required on initial power on only.
Press RETURN for continual testing of drives.

6.1 Turn the power off to the Apple III. Insert the QA Final Test diskette into the Apple III drive and turn the power on.

6.2 Refer to the Revision Level Sheet for a list of the latest version of the test diskettes.

7.0 Final Test Inspection:

7.1 Visual Inspection:

- 7.1.1 Make sure the froggy pads are not cocked, loose, or damaged.
- 7.1.2 Make sure there is Torque Seal on the speed pot.
- 7.1.3 Make sure the plastic keys are installed on the J1 connector on the digital board.
- 7.1.4 Inspect the head cables and wiring harnesses for insulation damage, proper routing, looping, and tie-wrapping.
- 7.1.5 Make sure the chassis number, serial number, and revision level number on the assembly and the boards are correct and legible. Verify the numbers on the attached tag.
- 7.1.6 Check the load pads on the alien and the serpent for damage or looseness, before and after the test.

7.2 Speed and Data Handling Test:

- 7.2.1 Connect the interface cable from the demux board to the J1 connector on the digital board of the Twiggy drive.
- 7.2.2 Press RETURN to begin the program. Insert the Speed Test diskette into the Twiggy. The program will test the drive for eight speed classes.
- 7.2.3 A PASS or FAIL message will appear on the screen. If the drive FAILS, press the eject switch to remove the diskette and reject the drive.
- 7.2.4 If the drive PASSES, the program will automatically continue to the data handling test. The program will test the drive for 2000 transfers.
- 7.2.5 If ONE ERROR OR LESS occurs, a PASS message will appear on the screen. Record the PASS result and carefully place the Twiggy into the carrier bin so that the head cables are on top to avoid damage.
- 7.2.6 If MORE THAN ONE ERROR occurs, a FAIL message will appear on the screen and the Twiggy must be rejected.
- 7.2.7 Press RETURN to test another Twiggy.

TWIGGY MANUFACTURING INSTRUCTIONS

1.0 TITLE: TWIGGY - MEDIA SCANNING

- 1.1 Part No.: 064-0282
- 1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the testing and formatting of diskettes for the data handling test for the Twiggy drive.

3.0 REFERENCE DOCUMENTS: None.

4 EQUIPMENT REQUIRED:

	<u>QTY.</u>
4.1 standard assembly work bench	1
4.2 standard assembly work stool	1
4.3 table mat	1
4.4 Apple III	1/Twiggy drive
4.5 intelligent controller board	1/Twiggy drive
4.6 demux board	1/Twiggy drive
4.7 controller cable	1/Twiggy drive
4.8 demux cable	1/Twiggy drive
4.9 video monitor	min. 1
4.10 certified Twiggy drive (zero data handling errors, azimuth angle less than 6 minutes)	1/Twiggy drive
4.11 Twiggy Media Scanner diskette (See step #6.3 below)	1/Twiggy drive
4.12 video cable	1/Twiggy drive
4.13 black felt pen	A/R
4.14 large bins (Akro #30-240)	3

5.0 MATERIALS REQUIRED:

	<u>QTY.</u>
5.1 diskette envelopes	A/R

6 PREPARATION PROCEDURE:

- 6.1 Connect the Apple III to the video monitor with the video cable.
- 6.2 Insert the Disk Scanner Program into the Apple III and turn the power on.

- 6.3 Refer to the Revision Level Sheet for a list of the latest version of the test diskettes.

7.0 MEDIA SCANNING PROCEDURE:

- 7.1 Remove a diskette from the bin labeled "TO BE SCANNED" and count the number of black X's on the diskette label. If there are 10 or more X's, place the diskette into the bin labeled "FAILED." If there are less than 10 X's, insert the diskette into the certified Twiggy drive after the Apple III is booted up. The program will automatically test the diskette.
- 7.2 If the diskette passes the test, the Twiggy will eject it and a PASS message will appear on the screen. Remove the diskette and carefully write a black X on the diskette label. Put the diskette into an envelope and place the diskette into the bin labeled PASSED.
- 7.3 If the diskette fails the test, the Twiggy will eject the diskette. Put the diskette into an envelope and place it in the bin labeled "FAILED."

TWIGGY MANUFACTURING INSTRUCTIONS

1.0 TITLE: TWIGGY - FROGGY ASSEMBLY

1.1 Part No.: 064-0283

1.2 Latest Revision: Sept. 1983

2.0 PURPOSE: This procedure describes the assembly of the froggy for the Twiggy drive.

3.0 REFERENCE DOCUMENTS: - Bill of Materials, p/n 653-5130.

4.0 EQUIPMENT REQUIRED:

QTY.

4.1	standard assembly work bench	1
4.2	standard assembly work stool	1
4.3	table mat	1
4.4	small bin	1
4.5	medium bin	1
4.6	large bin	1
4.7	pliers	1
4.8	phillips screwdriver	1
4.9	e-ring stand	1
4.10	e-ring applicator	1
4.11	froggy assembly fixture	1

5.0 MATERIALS REQUIRED:

PART NO.:

QTY.

5.1	froggy	815-5011	1
5.2	screw, 4-40 X 3/8	400-1406	1
5.3	hex nut, #4	835-0114	1
5.4	washer	860-0030	1
5.5	froggy roller	800-0090	1
5.6	roller pin	800-0089	1
5.7	frog leg pin	800-0088	1
5.8	loctite	907-0019	1
5.9	foam	805-0017	2
5.10	frog leg	815-5000	1
5.11	frog spring	805-0081	1
5.12	e-clips	860-0029	2

6.0 PREPARATION PROCEDURE: None

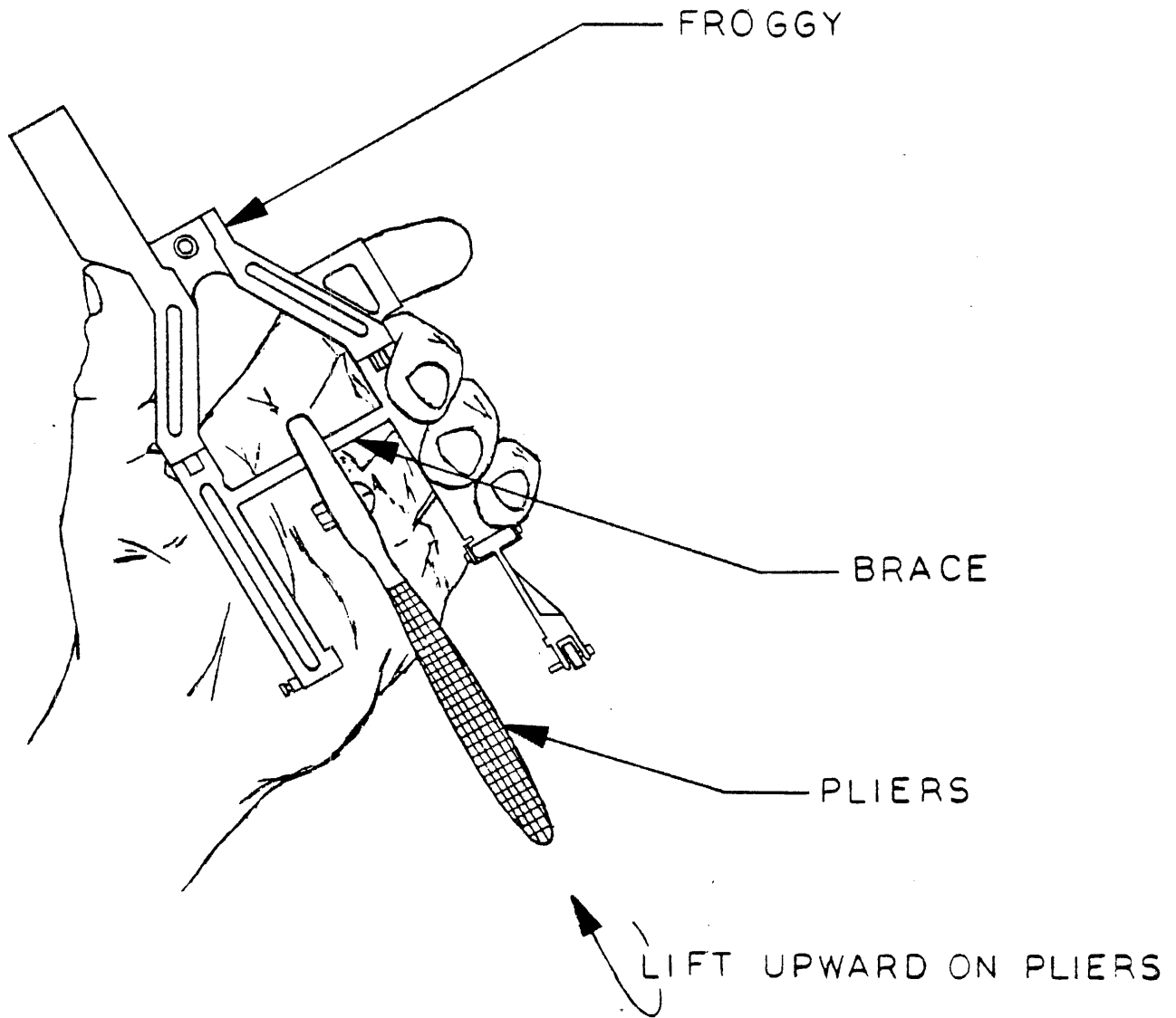


FIGURE 1. THE REMOVAL OF THE BRACE FROM THE FROGGY

7.0 ASSEMBLY PROCEDURE:

7.1 Brace Removal:

- 7.1.1 Hold the froggy and pliers as shown in Fig. 1.
- 7.1.2 Twist the brace with the pliers to break it off, while simultaneously supporting the top section of the froggy. Use the pliers to remove any remaining pieces of the brace.

*** NOTE *** Do not damage or crack the froggy in any other place, especially around the spindle hole. If the froggy is cracked, reject it.

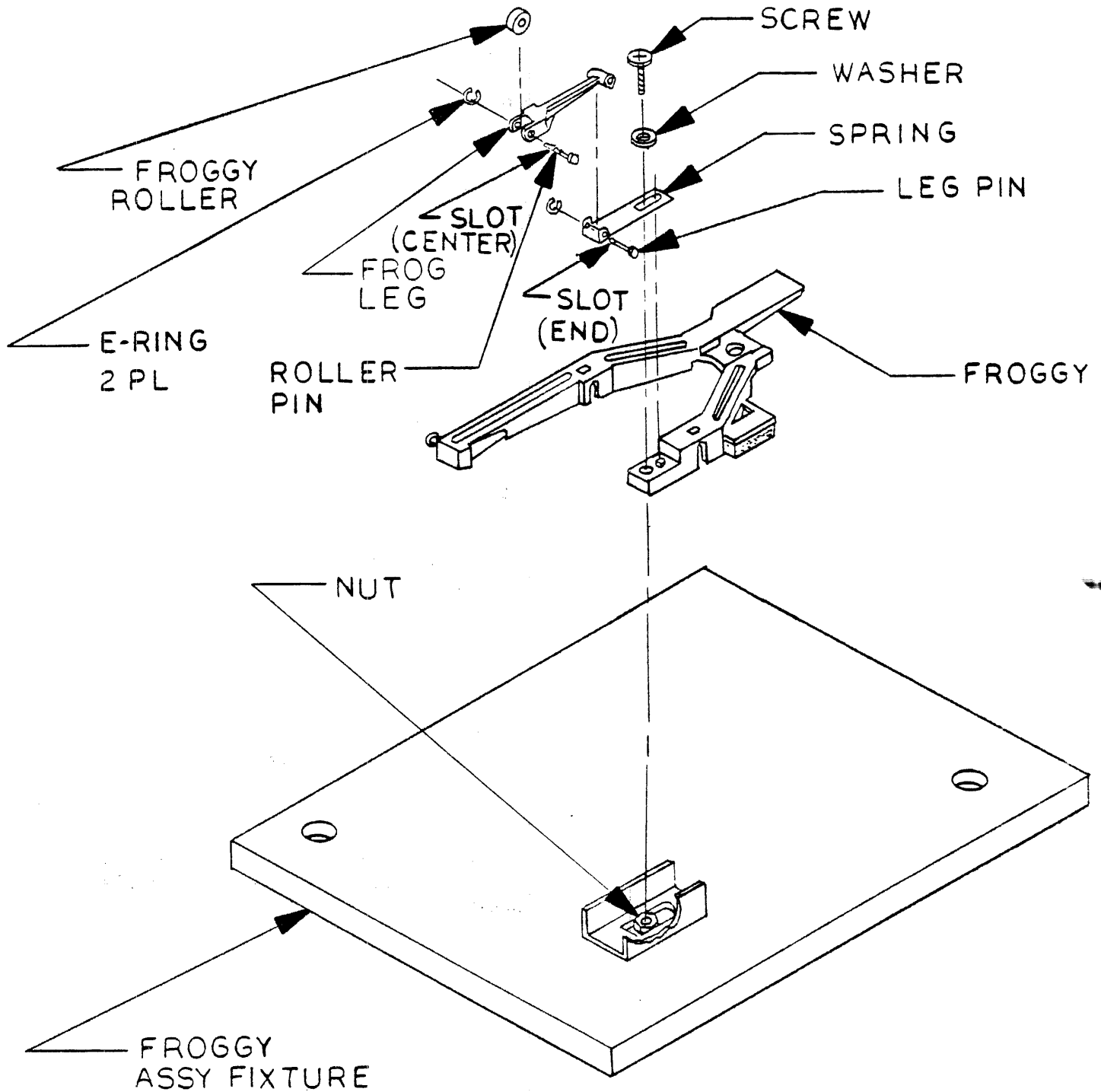


FIGURE 2. THE INSTALLATION OF THE FOG LEG & LEG PIN, FROGGY ASSY FIXTURE & INSTALLATION OF FROG LEG ONTO THE FROG.

7.2 Frog Leg Assembly:

- 7.2.1 Assemble the frog leg as shown in Fig. 2.
- 7.2.2 Place the frog leg on the spring. (See Fig. 2.) Insert a leg pin (it has a slot in the end) into the holes in the spring and the frog leg.
- 7.2.3 Insert an e-ring from the e-ring stand into the e-ring applicator. (See Fig. 3.)
- 7.2.4 Using the e-ring applicator, insert the e-ring into the slot in the end of the leg pin holding the frog leg onto the spring. (See Fig. 2.)
- 7.2.5 Place a froggy roller onto the frog leg as shown in Fig. 2. Insert a roller pin (it has a slot in the center) through the holes in the frog leg and the froggy roller.
- 7.2.6 Using the e-ring applicator, insert an e-ring into the slot in the roller pin holding the froggy roller onto the frog leg. (See Fig. 2.)
- 7.2.7 Make sure the frog leg moves freely on the leg pin. Make sure the froggy roller spins freely on the roller pin. If not, reject the frog leg.

7.3 Froggy Assembly:

- 7.3.1 Insert the nut into the nut retaining hole on the froggy assembly fixture. (See Fig. 2.) Insert the froggy onto the fixture. (See Fig. 2.)
- 7.3.2 Insert the assembled frog leg onto the froggy as shown in Fig. 2. (Be sure the spring faces up as shown in Fig. 2.) Insert the washer on top of the spring over the hole in the froggy so that the smooth side of the washer faces up.

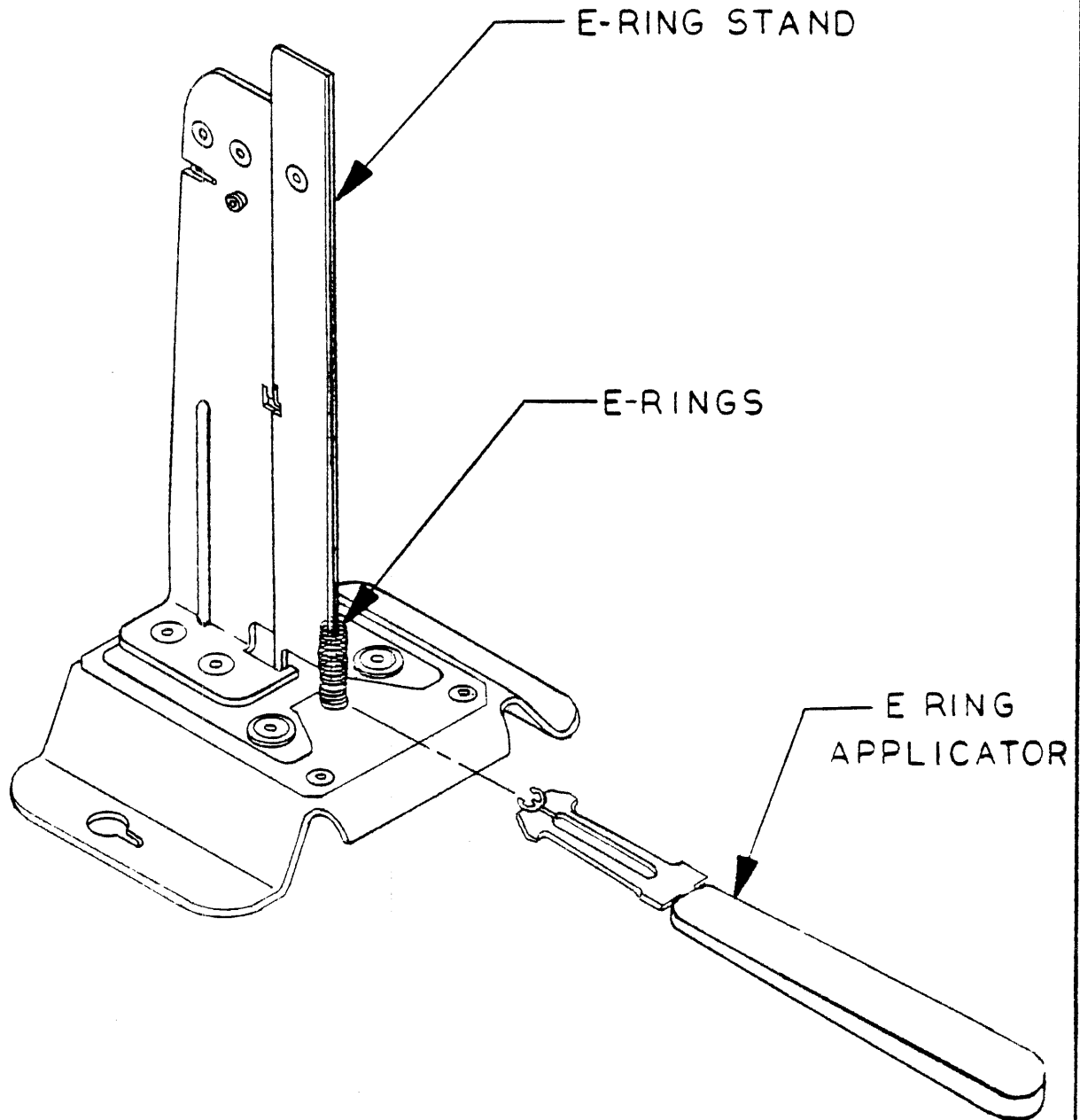


FIGURE 3. THE E RING STAND & THE E-RING APPLICATOR.

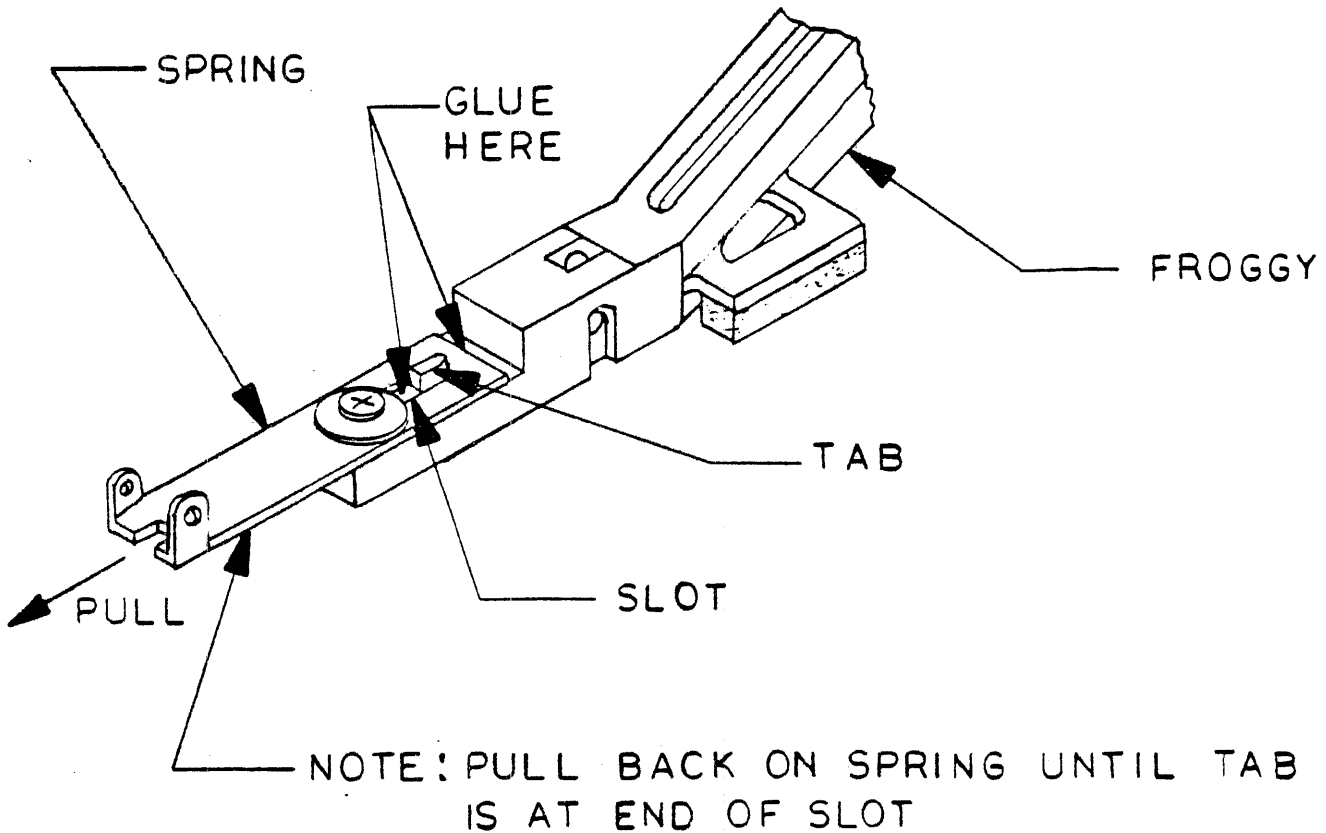
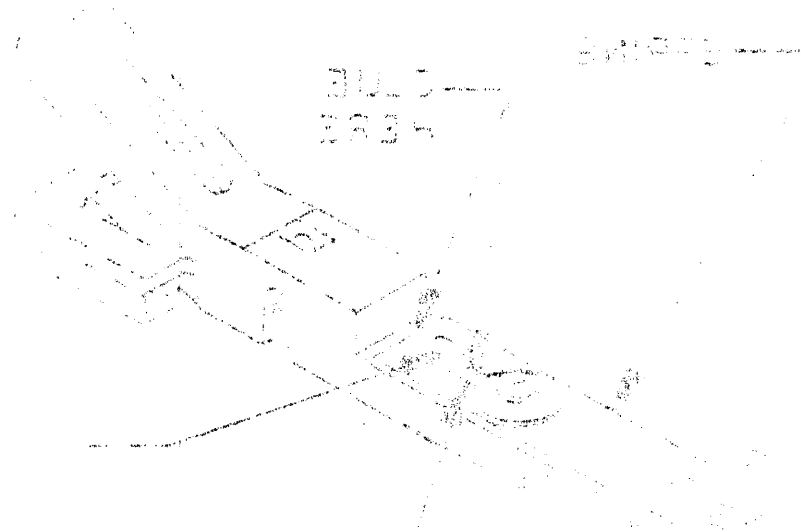


FIGURE 4. THE PLACEMENT OF THE SPRING ON THE FROGGY & APPLICATION OF GLUE TO THE FROGGY

- 7.3.3 Insert the screw (4-40 X 3/8 in.) into the holes in the washer, spring, and froggy. Pull the spring away from the froggy so that the tab in the froggy is located at the front edge of the slot in the spring. (See Fig. 4.) While holding the spring there, tighten the screw.
- 7.3.4 Carefully apply glue along the front edge of the spring, and between the washer and the notch. (See Fig. 4.)



NO MORE THIS ITEM
NO MORE TA 2

TURNED ALI 2 47
NO MORE 4 11 17
NO MORE

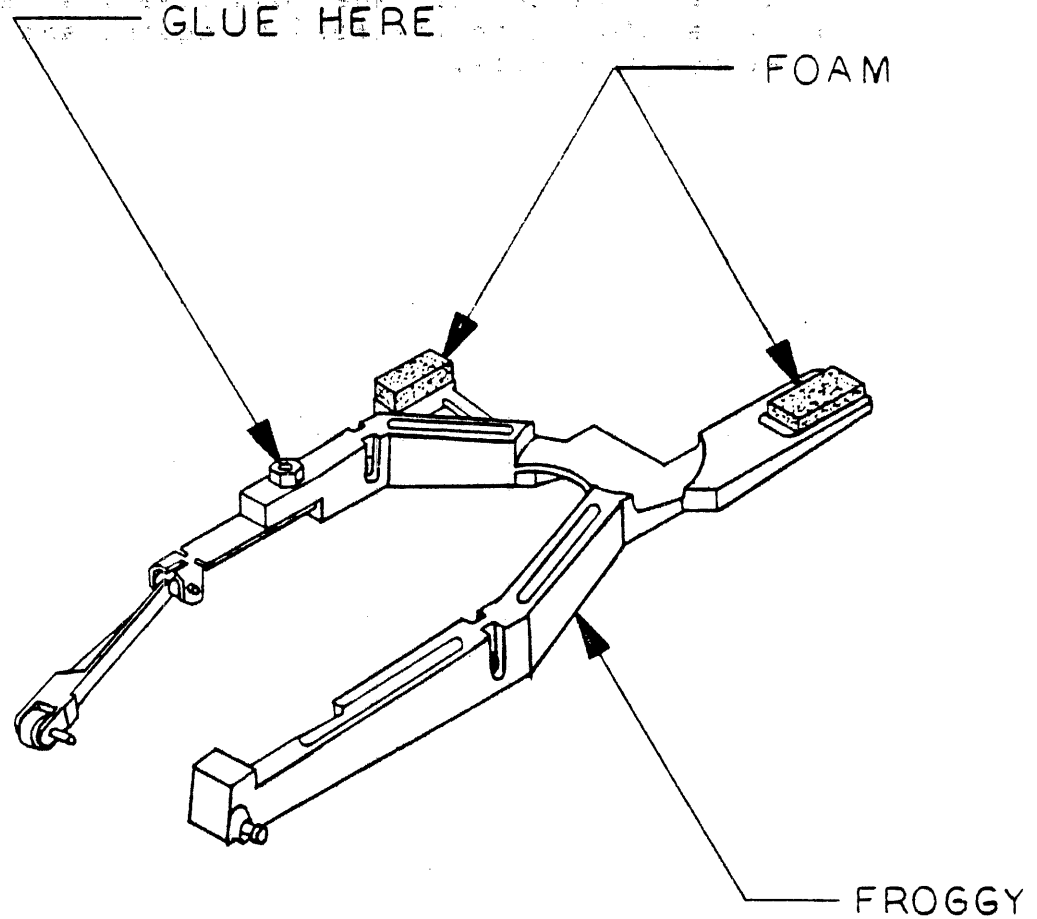


FIGURE 5. THE INSTALLATION OF THE FOAM ON THE FROGGY

- 7.3.5 Carefully apply glue to the bottom of the screw where it contacts the nut. (See Fig. 5.) Remove any excess glue with a paper towel.
- 7.3.6 Install foam on the bottom-side of the froggy as shown in Fig. 5. Apply the adhesive side of the foam evenly on the froggy surface so that the foam lies flat and without wrinkles. Make sure the foam is square and flush with the edges of the froggy.

