

Pershing 1-A

Pershing is a two-stage, solid propellant ballistic missile with selective range capability. Carrying a nuclear warhead, Pershing extends the Army's "Sunday punch" to ranges of 400 miles under almost any weather or terrain condition.

Pershing is capable of providing fire support for the theater as well as general support for the Field Army. Through maneuver of the batteries in a battalion, commanders possess a powerful means of influencing the course of combat and can deliver nuclear fire over a zone of great width and depth, shifting and concentrating fire according to the situation.

The Program was initiated in January 1958 and the Orlando Division of Martin Marietta Aerospace was awarded the prime contract in March of the same year. The first Pershing battalion was activated in June 1962 at Ft. Sill, Oklahoma.

Pershing established a new record for success in the history of the Atlantic Missile Range with its research and development firings. The first Pershing (first stage only) was fired in January 1960 at Cape Kennedy (Canaveral), Florida. In September of that same year, the Army fired both live stages for the first time.

In the hands of troops since 1962 and deployed in Europe in 1964, Pershing has since taken a new and significant deterrent role - Quick Reaction Alert (QRA) - which places it beside other Free World Forces kept ready as a nuclear backup against aggression.

PERSHING MISSILE

Both motor stages were developed and are produced by Thiokol Chemical Corporation. The solid propellant stages are housed in high strength steel casings.

Pershing's inertial guidance system was developed by the Army Inertial Guidance and Control Laboratory in the Army Missile Command's Research and Development Directorate. The guidance system, which is immune to any known countermeasures, controls the missile until cutoff and separation of the second stage.

Topping the Pershing round is its needle-nosed reentry vehicle. The warhead section travels on a ballistic course and reenters the atmosphere at high velocity. The warhead section is covered with an ablative material to allow it to withstand extreme reentry heating.

Fuzing and arming the warhead, a critical part of any weapon system involving nuclear explosives, is done by a system developed by Ford Instrument Company and produced by Sperry Farragut, both divisions of Sperry Rand. Picatinny Arsenal developed the design concept and has supervised the detailed design, development, and testing.

PERSHING 1-A

In order to increase the system's ability to shoot, move, and communicate in its QRA role, the U.S. Army in January 1966 awarded a contract to Martin Marietta Aerospace for development of new ground equipment designated Pershing 1-A. The first Pershing 1-A production contract was awarded to Martin Marietta in November 1967.

Faster erecting launchers and the introduction of solid state electronics contribute to a more rapid rate of fire and even greater reliability.

The biggest outward change was a shift from tracked vehicles to wheels for all ground support equipment, including the improved erector-launcher.

The switch to this new equipment was accomplished through a unique logistics plan known as "SWAP". Battalion-size "packages" of P1-A equipment were formed at Cape Kennedy, Florida, then shipped intact to Pershing units in the field. New equipment was then substituted for the old without affecting the readiness posture of the unit. The first such "SWAP" effort took place in August 1969. SWAP was completed in 1971.

Under the P1-A program, there was no change to the basic 35 foot inertial-guided missile. Each battery has several missiles, each on its own erector-launcher.

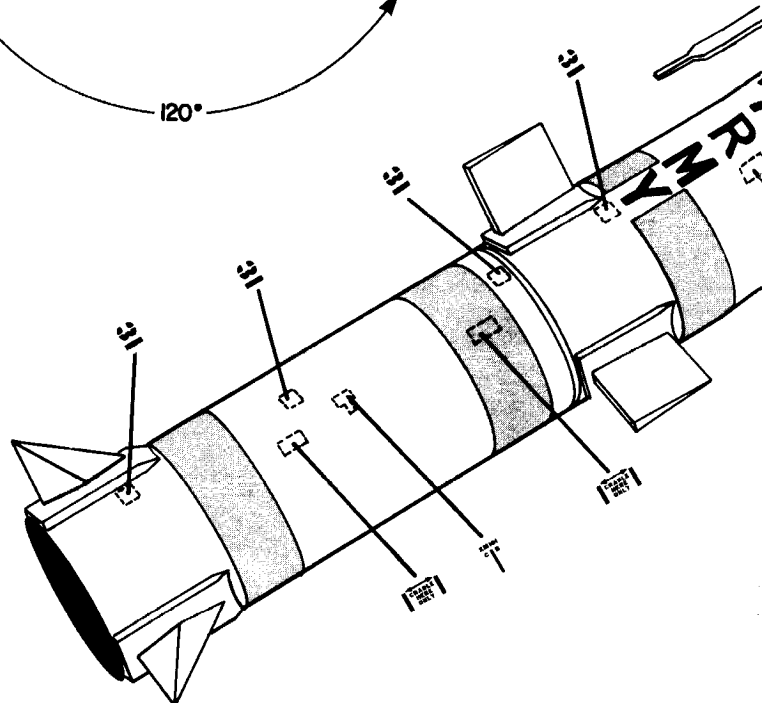
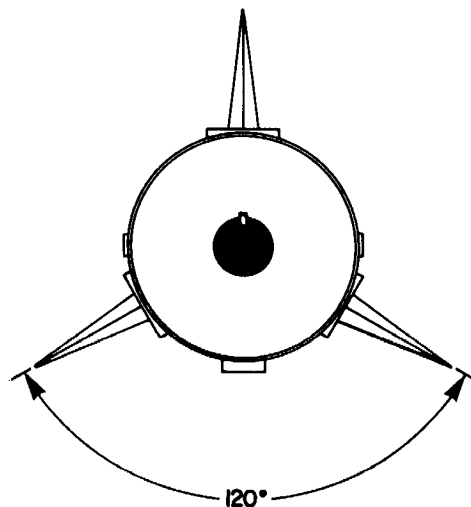
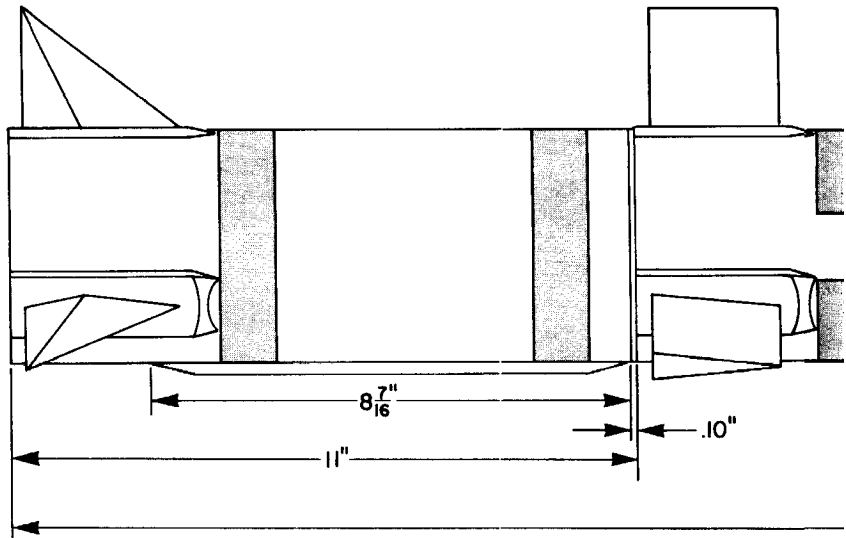
The wheeled ground equipment features an erector-launcher which carries the complete missile on a transporter or semitrailer towed by an M-757 tractor. The M-757 is a modification of the basic M-656 truck developed for the Army by Ford Motor Company.

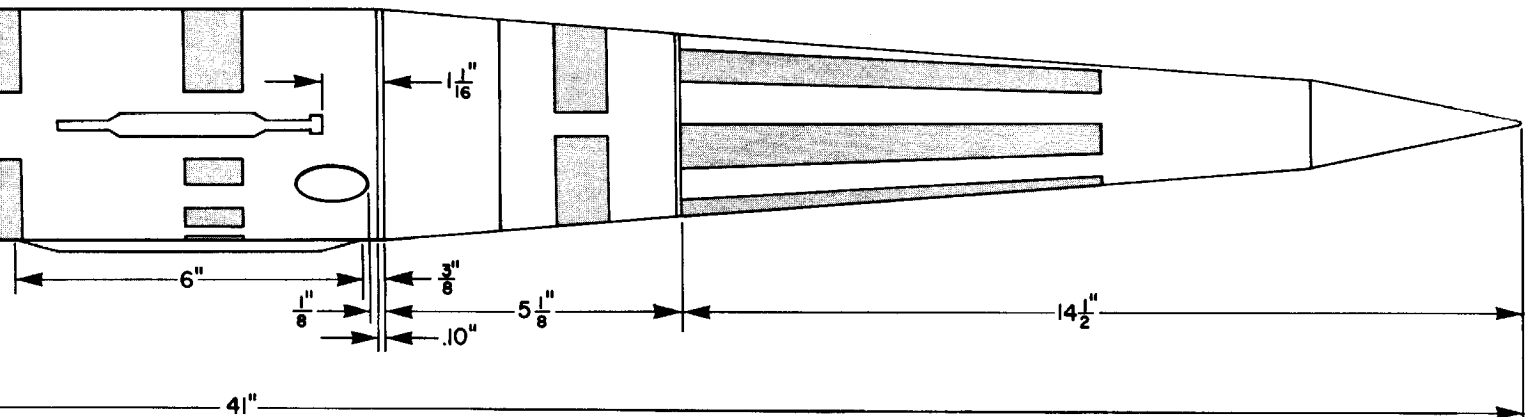
Currently, Pershing is deployed with U.S. and Federal Republic of Germany units in Europe. Changeover from P1 to P1-A for U.S. Army units was completed in 1970 and for FRG units in 1971. The improved system further strengthens the deterrent capability of NATO forces by reducing reaction time and increasing reliability.

Pershing battalions conduct annual service practice firings of the Pershing missile at White Sands Missile Range, New Mexico.

Historical information courtesy of Martin Marietta Aerospace.

NOTE: Read all instructions first. Make sure you have all kit parts, plus the tools and supplies listed. Then start construction, checking off each step as you complete it. Let glue joints dry thoroughly before disturbing.

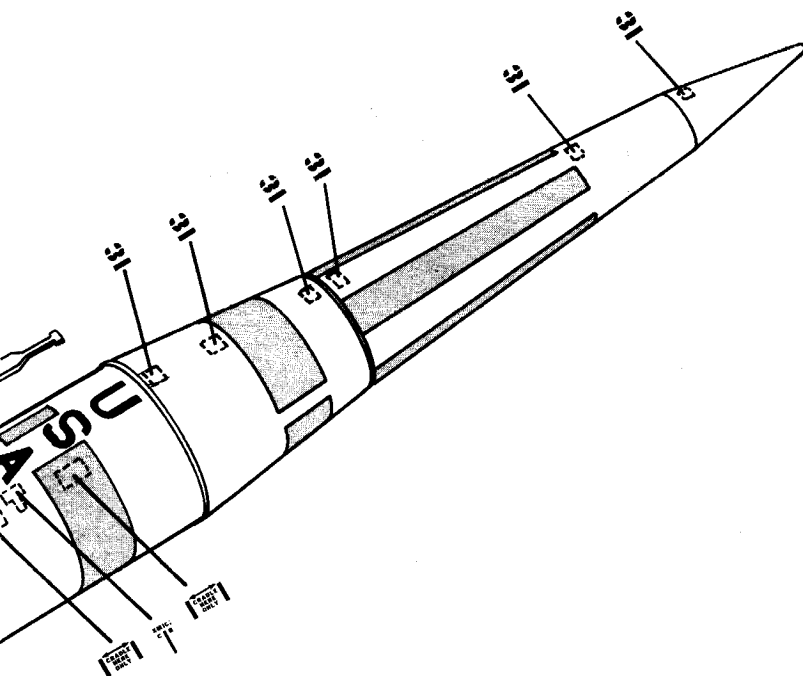





PARTS LIST

In addition to the materials below, you will need: white glue; liquid plastic cement, a small bottle of contact cement; model knife or single edge razor blade; pencil; ruler; sandpaper; paint; masking tape; and metal straight edge.

(A)	1	Body Tube BT-101LA (21.4 inches long)	030445
(B)	1	Body Tube BT-50L (12.7 inches long)	030366
(C)	1	Engine Hook Retainer BT-52AG (2.1 inches long)	030378
(D)	1	Engine Block AR-2050	030164
(E)	1	Engine Hook EH-2	035025
(F)	1	Pershing Ring Set TA-68	030051
(G)	1	Cable Cover Stock (Balsa—3/16" X 11/16" X 15")	075028
(H)	1	Pershing Top Cone	071040
(I)	1	Pershing Base Cone	071041
(J)	3	Plastic Fin and Pad Sheet PF-68	032468
(K)	1	Decal Sheet (B) KD-68B	037068
(L)	1	Decal Sheet (A) KD-68A	037066
(M)	1	Pattern Sheet SP-68	083148
(N)	1	Cone Pattern Sheet	083149
(O)	1	Launch Lug LL-3B	038187
(P)	2	Parachute PK-24A	085568
(Q)	2	Shroud Line SLT-144	038241
(R)	2	Set of 6 Tape Discs TD-3F	038406
(S)	2	Shock Cord SC-2	085736
(T)	1	Engine Casing EC-6	035012
(U)	1	Clay Balance Weight	085265

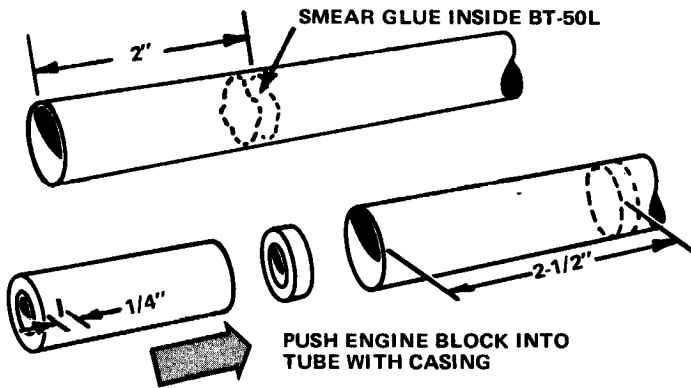


NOTE: Wash all plastic parts and rinse thoroughly before beginning construction.

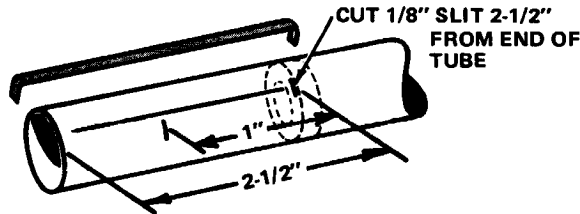
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CHECKER			
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PROJECT	CODE IDENT	SIZE	
TEST REP	NO.		
SCALE			SHEET 1 of 2

ASSEMBLY INSTRUCTIONS

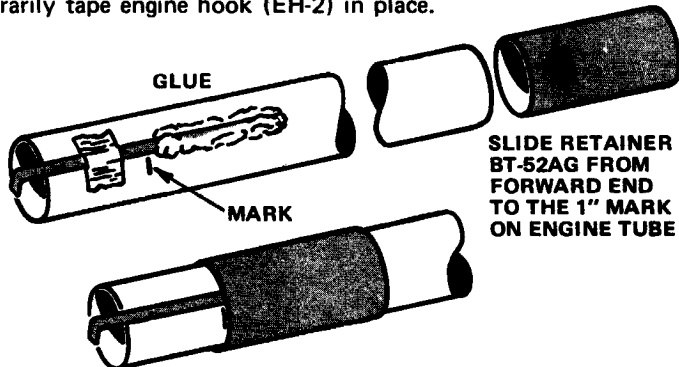
Read all instructions carefully before beginning work on your Pershing 1-A. Then begin construction. Check off each step as you complete it.



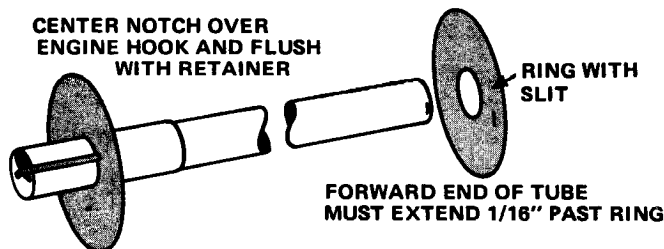
- 1** Mark engine casing (EC-6) 1/4" from one end. Use your finger or a stick to smear a band of glue inside engine mount/stuffer tube (BT-50L) about 2" from one end. Insert engine block (AR-2050) into end with glue. Use casing (EC-6) to push engine block into place (with the casing mark even with end of tube) with one smooth movement. Remove casing immediately.



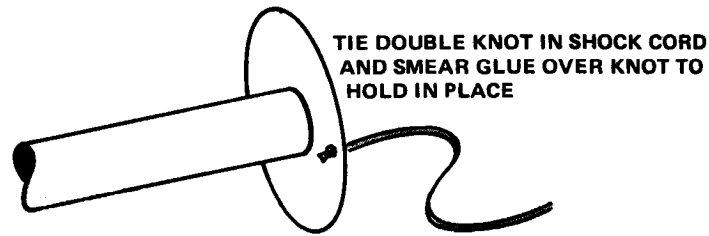
- 2** Cut a 1/8" slit in stuffer tube 2-1/2" from engine block end. The slit will be even with the edge of the engine block. Mark stuffer tube 1" from engine block end. Temporarily tape engine hook (EH-2) in place.



- 3** Apply a heavy line of glue on the engine hook from the 1" mark to the engine block end. Slip engine hook retainer (BT-52AG) onto forward end of stuffer tube and slide it back over engine hook to the 1" mark. Wipe away any excess glue and remove tape from engine hook.

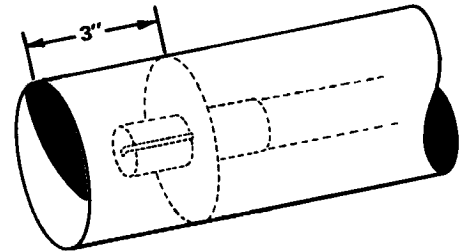


- 4** Remove centering rings from ring set (TA-68) and place on stuffer tube as shown. Glue securely in place and allow to dry. Apply a second layer of glue to joints for strength.

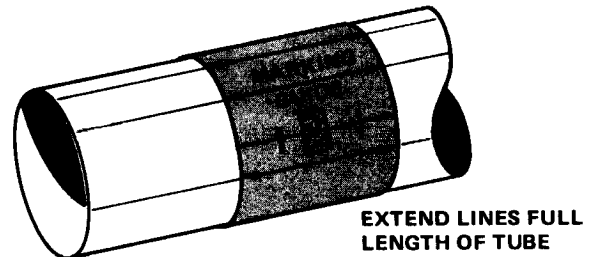


- 5** Tie a secure double knot at end of one of the shock cords (SC-2). Slip unknotted end through slit in forward centering ring and pull knot against ring. Apply a liberal coating of glue over the knot to hold it in place.

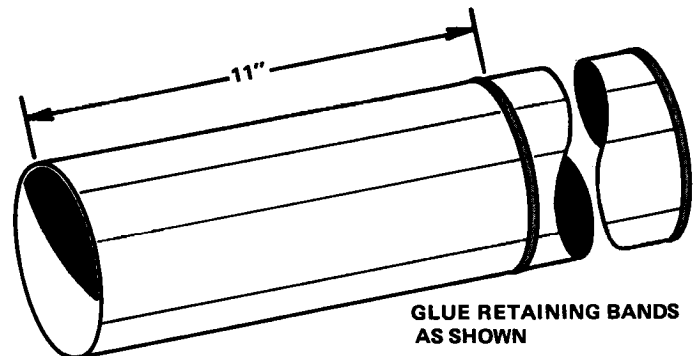
SLIDE ENGINE MOUNT 3" INTO BODY TUBE AND APPLY GLUE TO RING/TUBE JOINTS



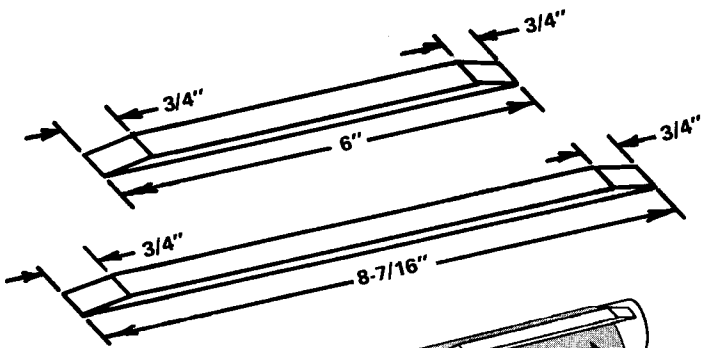
- 6** Mark the inside of the main body tube (BT-101LA) 3" from one end. Place engine mount/stuffer tube assembly inside main body tube with engine hook at the marked end of main body tube. Slide assembly until the rear centering ring is even with the 3" mark. Apply glue to ring/tube joints at both ends. After these joints are fully dry, apply a second coat of glue to ring/tube joints. These joints must be sealed properly to minimize loss of ejection gases.



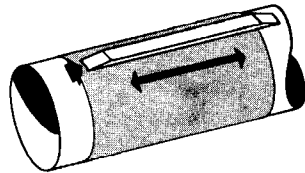
- 7** Cut marking guide from pattern sheet (SP-68) and wrap around main body. Tape ends of marking guide together with alignment marks matched. Mark main body at each arrow point (use a pencil because ink will bleed through paint) and connect each set of marks with straight lines. Extend all seven lines for the full length of the body and mark each as to its purpose (cable cover center, fin/pad center, etc.). Mark the body 11" from the engine end and (using edge of marking guide) draw a line around the body at this point.



- 8** Cut retaining bands from pattern sheet and glue around body. Glue one with its top edge even with the 11" line and glue other with its top edge even with the front end of the body.

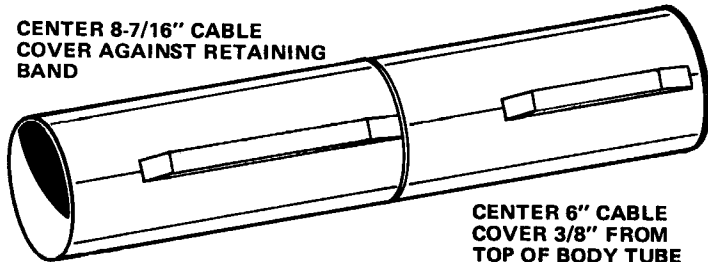


SAND LIGHT CURVATURE INTO CABLE COVERS



9 Cut cable cover stock into two lengths, one piece 6" long and the other 8-7/16" long. Taper ends as shown. Wrap a large piece of sandpaper around body and sand a slight curvature into bottom of cable covers.

CENTER 8-7/16" CABLE COVER AGAINST RETAINING BAND

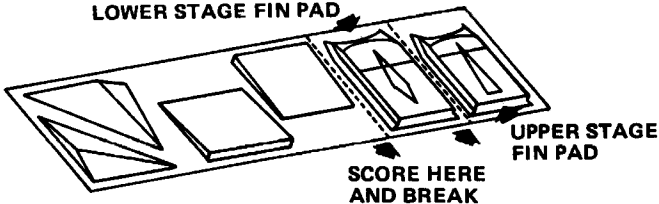


CENTER 6" CABLE COVER 3/8" FROM TOP OF BODY TUBE

10 Glue 8-7/16" long cable cover in place with its upper end against lower retaining band. Glue 6" long cable cover in place with its upper end 3/8" below edge of body. Be sure cable covers are centered on their guide line.

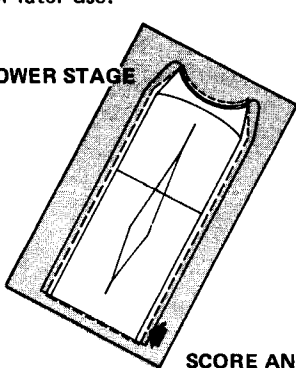
NOTE: To insure strong joints when cementing later, wash all plastic parts thoroughly with soap and water. Rinse well and dry completely.

LOWER STAGE FIN PAD

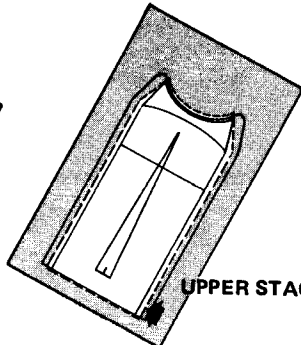


11 Remove the six fin pads from the molded plastic sheets (PF-68) by scoring (cutting partially through the plastic) and gently bending back and forth to break on the score lines. Be sure to leave a wide flange around the fin pads for later use.

LOWER STAGE

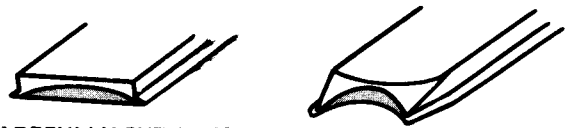


UPPER STAGE



SCORE AND BREAK AS INDICATED LEAVING 1/16" FLANGE ON SIDES ONLY

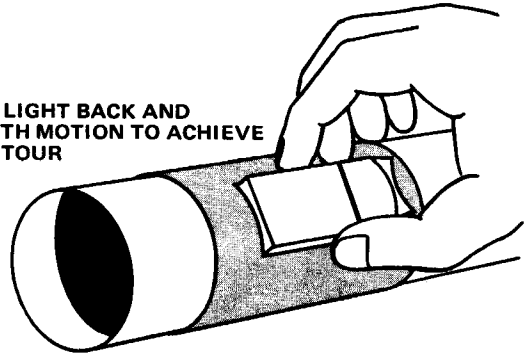
12 Trim the fin pads as shown using the score and break method. Work carefully. Leave 1/16" wide flanges on sides for gluing. Use a metal straight edge to make straight score lines.



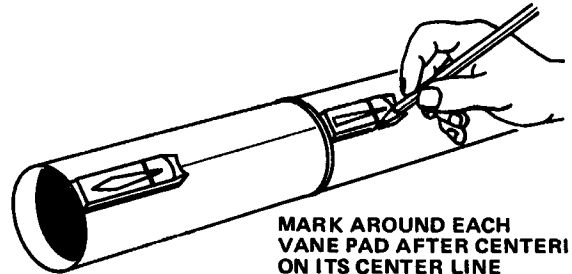
CAREFULLY CUT AWAY AREAS INDICATED BY SHADING

13 Use model knife or single edge razor blade to carefully cut away indicated areas on all fin pads.

USE LIGHT BACK AND FORTH MOTION TO ACHIEVE CONTOUR



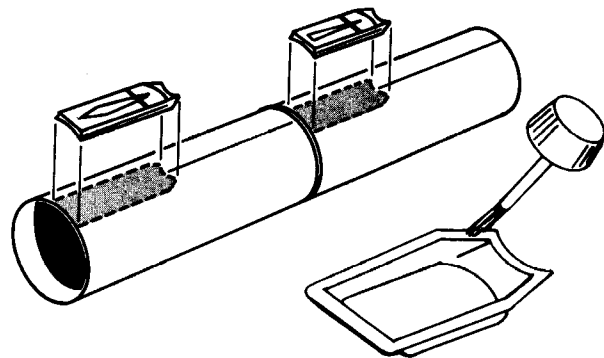
14 Wrap a sheet of sandpaper around body and sand bases of fin pads to match contour of body tube.



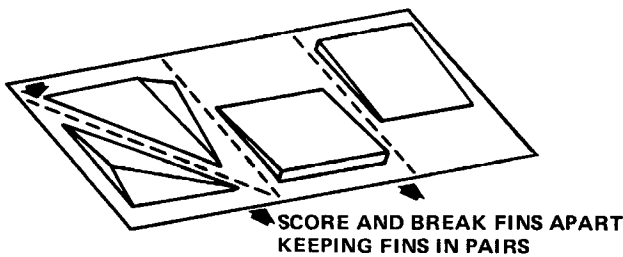
MARK AROUND EACH VANE PAD AFTER CENTERING ON ITS CENTER LINE

15 Place each fin pad in its proper place on the body and mark around it with a pencil. This will aid in proper placement when cementing in place. Be sure to center pads on their guide lines. The longer pads with diamond shaped fin outlines go at the rear of the body. The short pads with triangular fin outlines go against forward edge of rear retaining band.

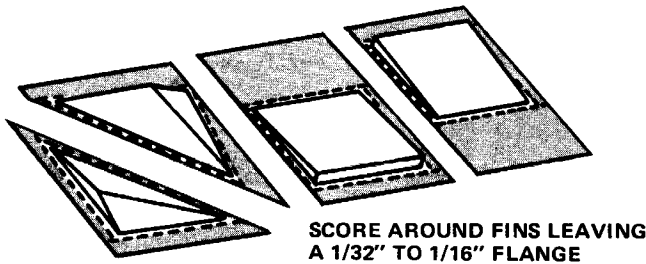
APPLY THIN LAYER OF CONTACT CEMENT TO BOTTOM OF FLANGES AND PLACE INSIDE OUTLINES



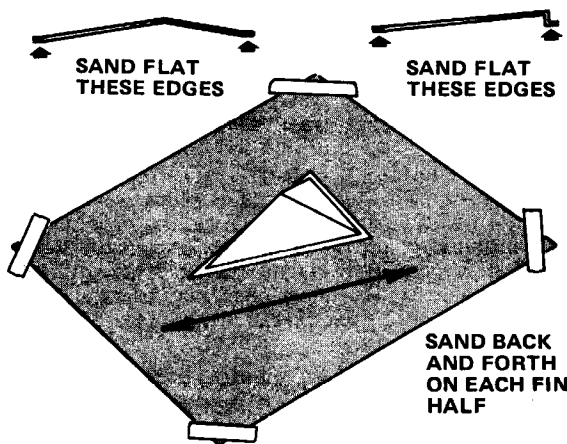
16 Working with only one pad at a time, carefully apply a thin layer of contact cement to all surfaces of fin pad which contact the body. Place pad in position on body while cement is still wet. Place it properly the first time to avoid smearing cement around. Use same method to cement remaining fin pads in place. If you have smeared cement on unwanted areas, use a pencil eraser to rub it off after it dries.



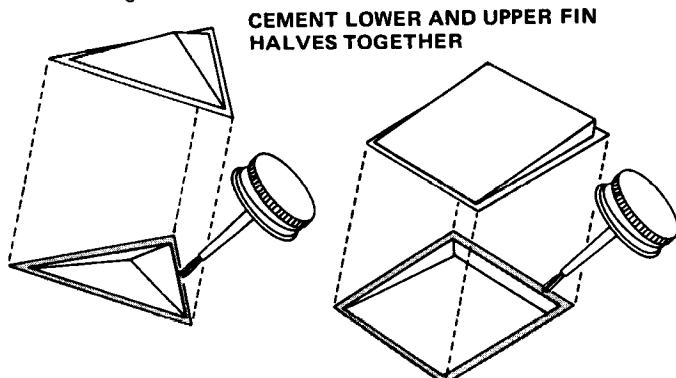
17 Use score and break method to separate the four fin halves on each plastic sheet. Keep fin halves in matched pairs. Each sheet contains parts for a complete upper and lower stage fin.



18 Use metal straight edge as a guide and trim fin halves (using score and break method), leaving a flange 1/32" to 1/16" wide around each fin half. Work carefully.

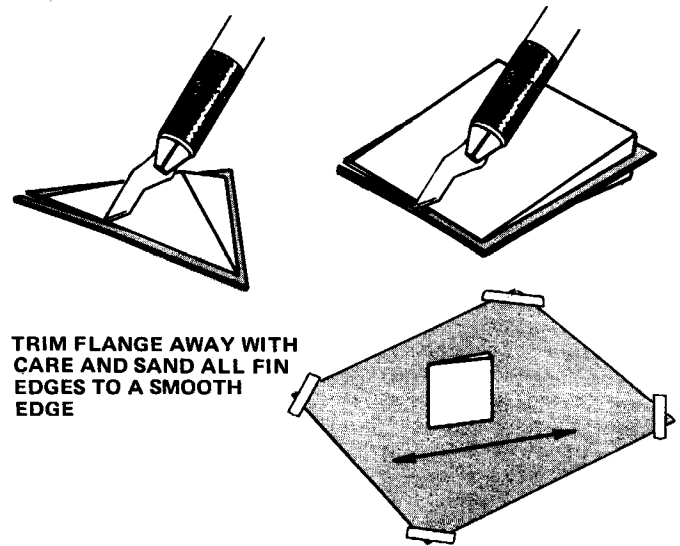


19 Tape a 8-1/2" X 11" sheet of 100 grit sandpaper to a flat work surface. Sand back of each fin half until the flange portion is about half of its original thickness. This will give a smooth fit between fin halves and a strong, neat joint when cemented together.



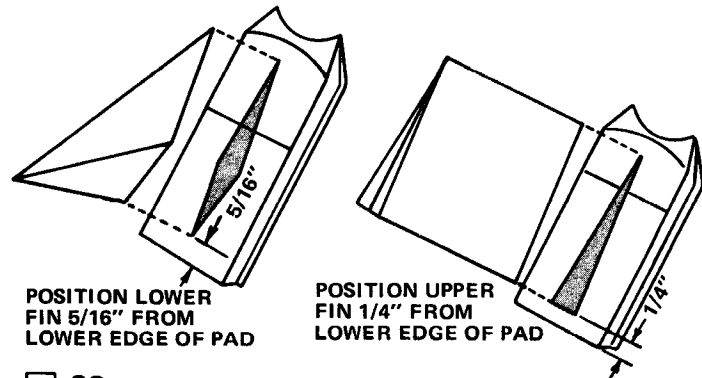
20 Be sure fin halves are arranged into matched sets. Work with only one set of fin halves at a time. Apply liquid plastic cement to flange surfaces on both fin halves and press

firmly together. Check alignment of fin halves by sighting down edges in at least two directions. After cement begins to set, you may set the completed fin unit aside and repeat the assembly process with remaining fins, one set at a time. When all fins are completed, allow them to dry at least overnight before trimming in the next step.



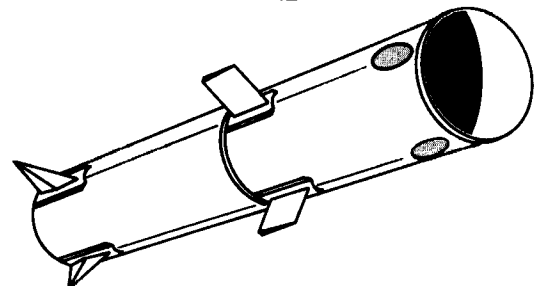
21 Use model knife or single edge razor blade to trim away most of the flange around each fin. Use sandpaper to trim to final size. Use fine sandpaper for final sanding on fin edges.

BODY OMITTED FOR CLARITY

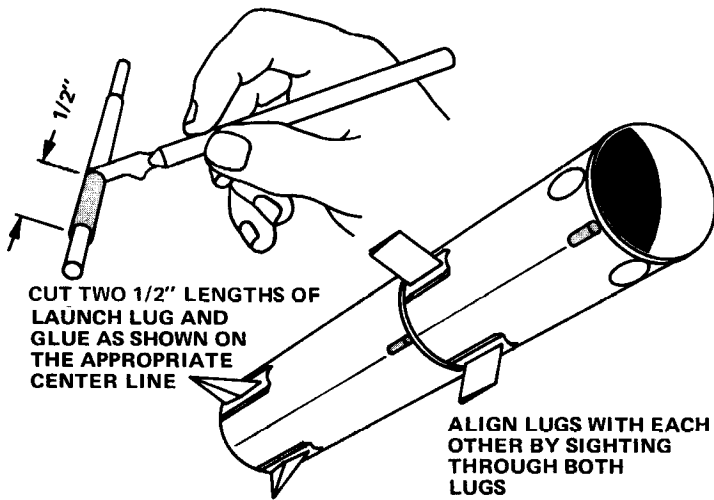


22 Use liquid plastic cement to cement fins to fin pads. Match bases of fins with fin outlines on fin pads. Lower stage fins are triangular with a diamond shaped base; upper stage fins are rectangular with a triangular shaped base.

**CENTER THREE THRUST REVERSAL PORT COVERS FROM
DECAL (A), 1/8" FROM FORWARD END OF BODY TUBE AND
ON EACH FIN PAD CENTER LINE**



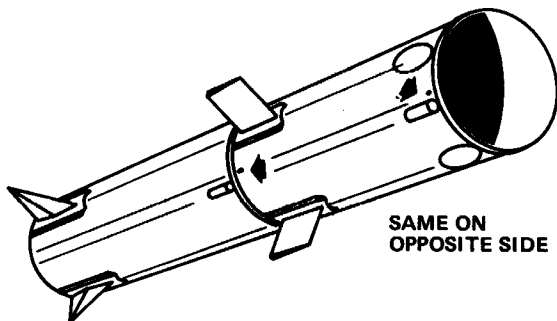
23 Place the three thrust reversal port covers (from water-transfer decal sheet (A)) on fin pad center lines 1/8" from forward end of body. Place them with their longest dimension running lengthwise on body.



CUT TWO 1/2" LENGTHS OF LAUNCH LUG AND GLUE AS SHOWN ON THE APPROPRIATE CENTER LINE

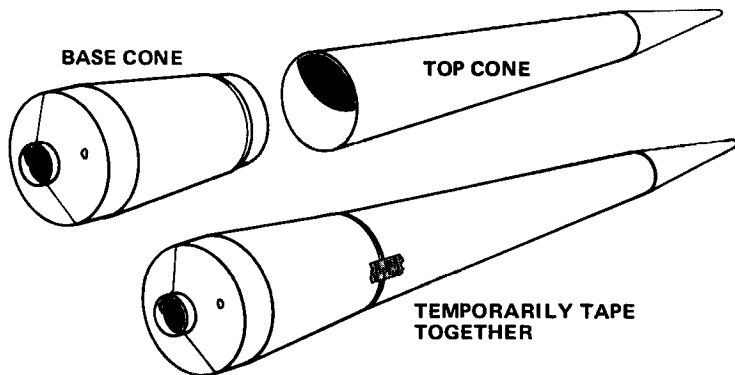
ALIGN LUGS WITH EACH OTHER BY SIGHTING THROUGH BOTH LUGS

24 Using a dowel or stick for internal support, cut two 1/2" lengths of launch lug from the LL-3B and glue to body. Place launch lugs on launch lug center line and against retaining bands as shown.



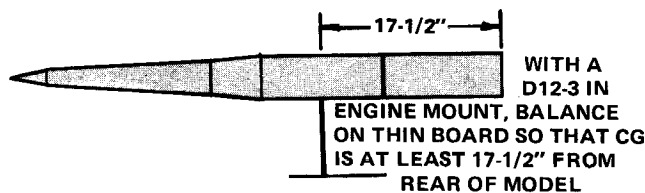
SAME ON OPPOSITE SIDE

25 Use straight pin to put four small pinholes on the two charge retainer center lines, one on each line just below upper retaining band and one on each line just above lower retaining band. These holes are for later use in positioning decals.



26 Check fit of top cone (part number 71040) on base cone (part number 71041). If necessary, sand slightly for proper fit. Temporarily assemble nose cone, taping pieces together.

FINS OMITTED FOR CLARITY



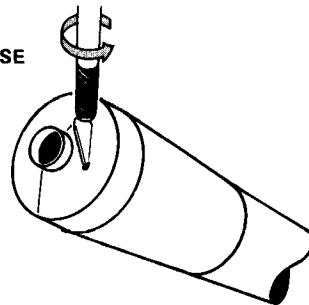
WITH A D12-3 IN

ENGINE MOUNT, BALANCE ON THIN BOARD SO THAT CG IS AT LEAST 17-1/2" FROM REAR OF MODEL

27 Slip an unused D12-3 into engine mount and slip nose cone into body. Check model's balance point as shown. If it does not balance at least 17-1/2" from rear of model, add weight inside top cone until it does. Modeling clay pressed

firmly into the tip of the top cone makes a good balance weight. Secure weight firmly in place with a layer of glue (Epoxy is best.).

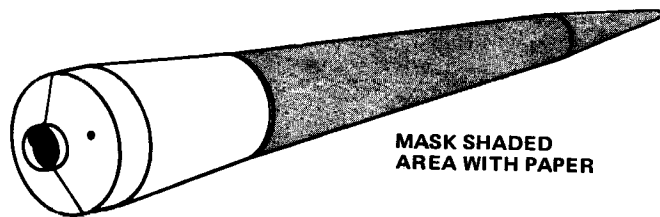
SPIN KNIFE TO DRILL HOLE IN NOSE CONE AT DIMPLE



28 Use liquid plastic cement to cement top cone and base cone together. Use model knife to cut small hole (about 1/4" in diameter) in bottom of nose cone as shown.

29 Check model completely. Reinforce glue joints where necessary, and do any needed touch up sanding.

30 Remove both charge retainers from ring set (TA-68). Now give entire model and charge retainers two light spray coats of flat white. After allowing to dry thoroughly, give nose cone an additional coat of flat white. If you are not satisfied with its appearance, give it additional coats. Allow to dry thoroughly between coats and before any further assembly.

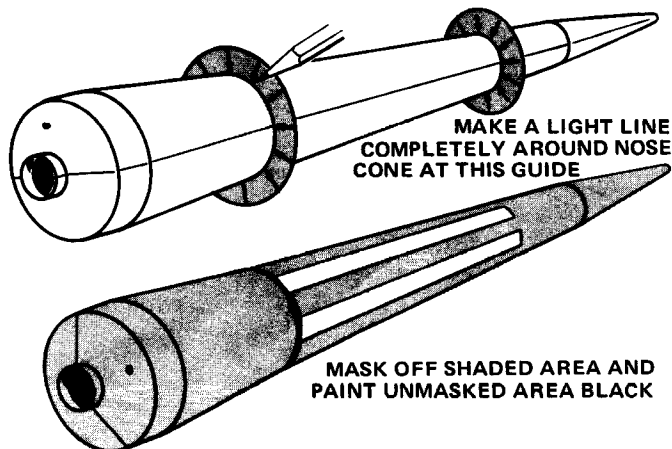


MASK SHADED AREA WITH PAPER

31 Give main body and charge retainers at least two light spray coats of flat artillery olive. Work for a uniform color, but do not weigh your bird down with too much paint. Use masking tape and paper to mask off entire top cone section of nose cone and give base cone at least two light spray coats of flat artillery olive. After allowing to dry thoroughly, remove masking material.

NOTE: If you wish to simulate an operational Pershing, paint entire model flat artillery olive and use only the white water-transfer decals. The more elaborate paint scheme outlined here was used on Pershing test missiles during development of the Pershing system.

MARK NOSE CONE AT EACH ARROW POINT



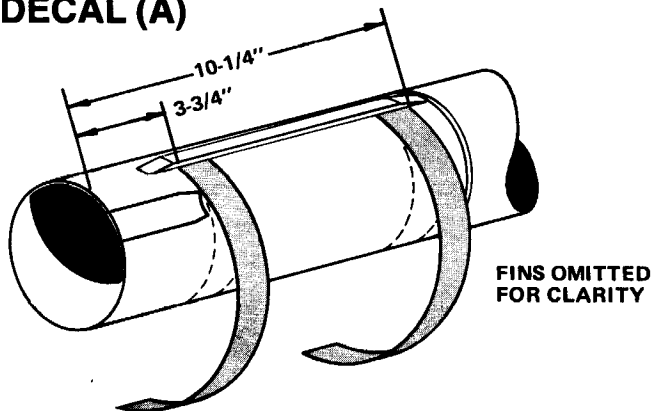
MAKE A LIGHT LINE COMPLETELY AROUND NOSE CONE AT THIS GUIDE

MASK OFF SHADED AREA AND PAINT UNMASKED AREA BLACK

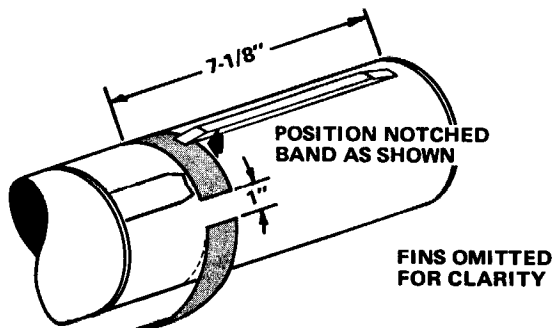
32 Cut nose cone marking guides from pattern sheet (SP-68) and place over nose cone as shown with one of the arrows on each guide lined up with one of the mold parting

lines on the nose cone. (If you look carefully, you will find two slight lines running lengthwise on the nose cone.) Use pencil to make a light mark at each of the arrow points on both marking guides. Use a straight edge to connect matching marks with a light pencil line. Mask off base cone and indicated areas of nose cone. Give masked cone at least two light spray coats of flat black. After allowing to dry thoroughly, remove masking material.

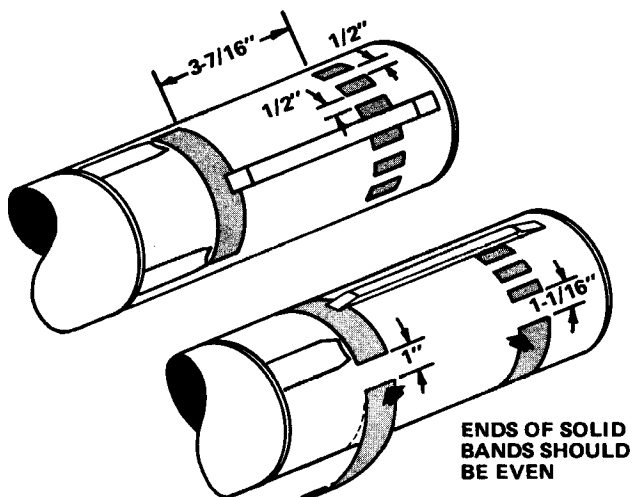
APPLICATION OF WATER-TRANSFER DECAL (A)



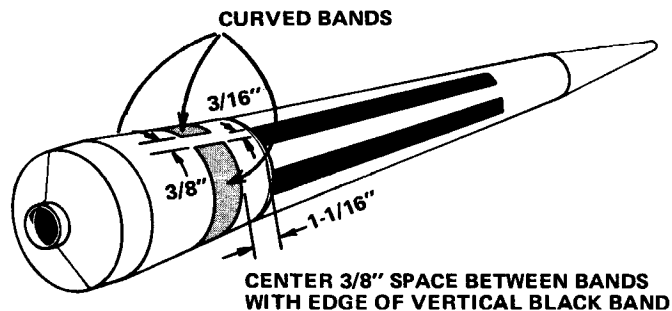
33 Remove two longest bands from the orange decal sheet (A) and apply to lower stage body. Move decal into exact position and carefully blot away excess water with a soft cloth.



34 Remove 1" X 5.2" band with notch in one edge and apply to body upper stage. Center notch over lower end of cable cover. Apply a 1" X 5.2" band at same level with one inch between ends of bands.

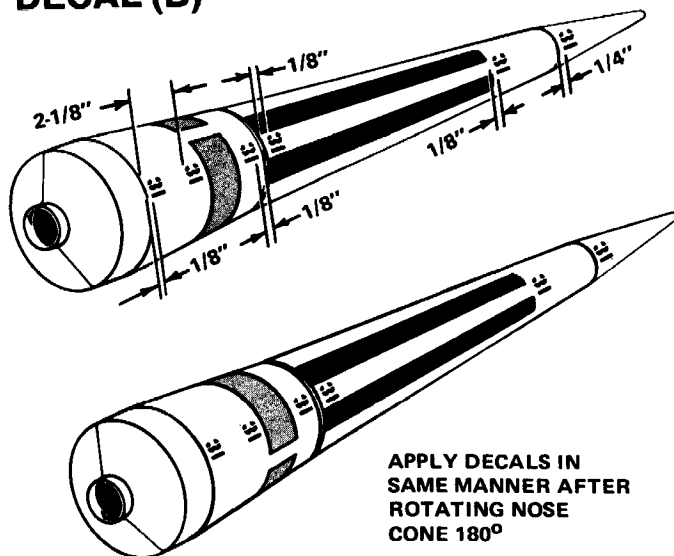


35 Apply the six 0.4" X 1" strips as shown. Apply remaining 1" X 5.2" band at same level with 1-1/16" between ends of bands. Blot away excess water when decal is in position.

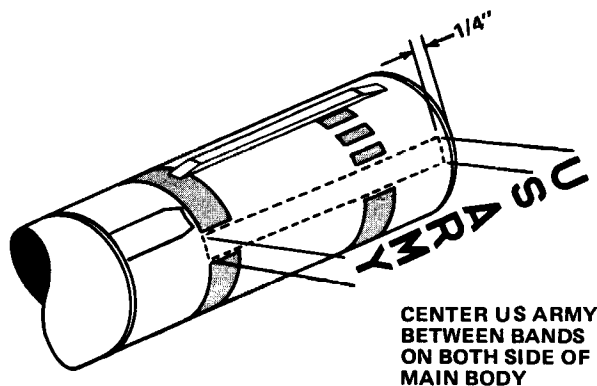


36 Apply the three curved bands to nose cone as shown. There should be a 3/8" space between ends of bands and this space should be centered on edges of vertical black and white stripes. Smooth out all wrinkles and air bubbles and allow decals to dry.

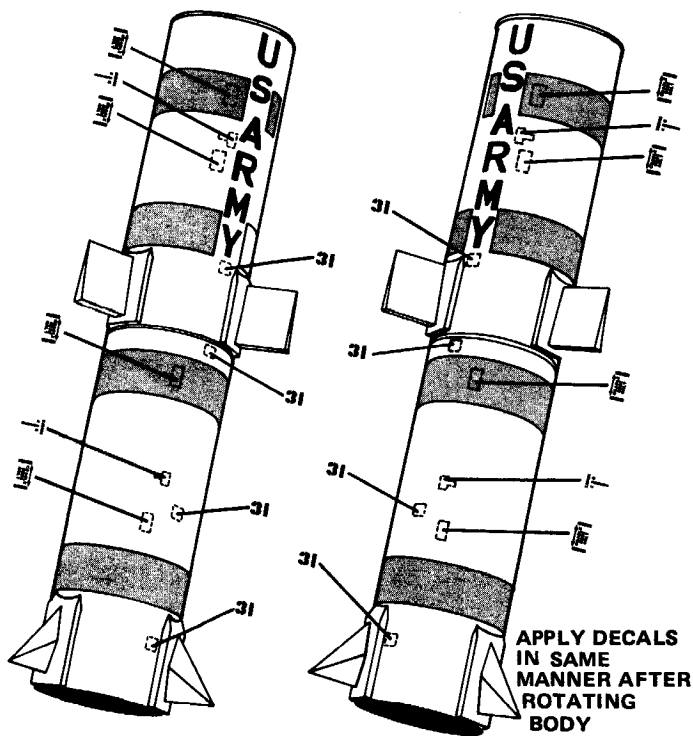
APPLICATION OF WATER-TRANSFER DECAL (B)



37 Apply twelve red 31's to nose cone as shown. Place six on each side. There should be three black stripes and two white stripes separating 31's applied in vertically striped area.

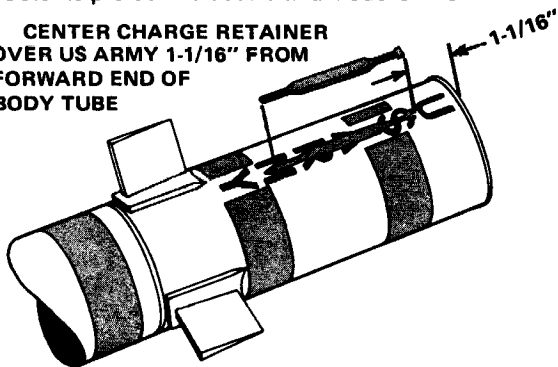


38 Apply "US ARMY" decals to body. Center decal on imaginary line between pin holes from step 25 and between self-adhesive bands.



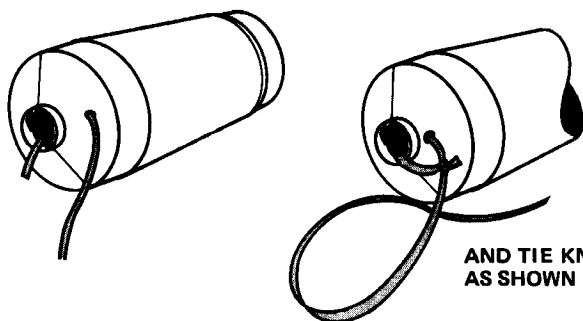
- 39** Apply red 31's and white decals in their locations as shown on the drawing above. Rotate body 180° and repeat application of decals as indicated. When all decals are completely dry, we recommend that the completed model be sprayed with Testor's "Dull-Cote" to protect the decals and model's finish.

CENTER CHARGE RETAINER
OVER US ARMY 1-1/16" FROM
FORWARD END OF
BODY TUBE



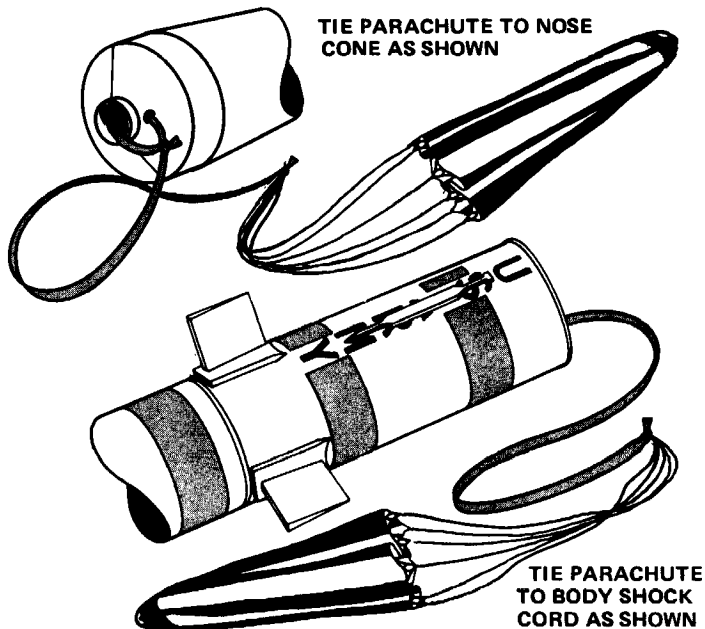
- 40** Use contact cement to attach both charge retainers to body. Be very careful not to smear cement on unwanted areas of body.

SLIP SHOCK CORD THROUGH
NOSE CONE AS SHOWN



AND TIE KNOT
AS SHOWN

- 41** Tie one end of remaining shock cord (SC-2) to nose cone.



TIE PARACHUTE TO NOSE
CONE AS SHOWN

TIE PARACHUTE
TO BODY SHOCK
CORD AS SHOWN

- 42** Assemble the two parachutes (PK-24A's) by directions on parachutes and tie one parachute to each shock cord (nose cone and body).

COUNTDOWN CHECKLIST

- 12** Pack 12 to 14 squares of loosely crumpled Estes RP-1A recovery wadding into main body tube. The wadding should fill the bottom of the parachute compartment for at least two inches.
- 11** Loosely fold the main parachute and lay it on top of the wadding, with its shroud lines and shock cord on top of it. Fold and pack the parachute for the nose cone on top of the main 'chute. Slide the nose cone into place.

NOTE: DO NOT pack parachutes until you are actually ready to launch. For maximum parachute reliability, lightly dust the parachutes with ordinary talcum powder before each flight, especially in cold weather.

- 10** Install an igniter in a D12-3 engine as directed in the engine instructions. Insert engine into the engine mount. Make sure the engine hook latches securely over the end of the engine.
- 9** Disarm the launch panel.
- 8** Lower the rocket into position on the launch rod (a 3/16" diameter launch rod is recommended). Clean the micro-clips and attach one to each lead of the igniter. The clips must not touch each other, and the igniter leads must not cross.
- 7** Clear the launch area, alert recovery crew and trackers.
- 6** Check for low flying aircraft and unauthorized persons in recovery area.
- 5** Arm the launch panel.
- 4** **3** **2** **1** **LAUNCH**

MISFIRE PROCEDURE

Occasionally the igniter will heat and burn in two without igniting the engine. This is almost always caused by a failure to install it correctly. Disarm the launch panel, remove the model, clean the igniter residue from the nozzle, and install a new igniter. Follow the launching procedure again.

MATCH LINES

LAUNCH LUG CENTER

CHARGE RETAINER CENTER

FIN / PAD CENTER

CABLE COVER CENTER

FIN / PAD CENTER

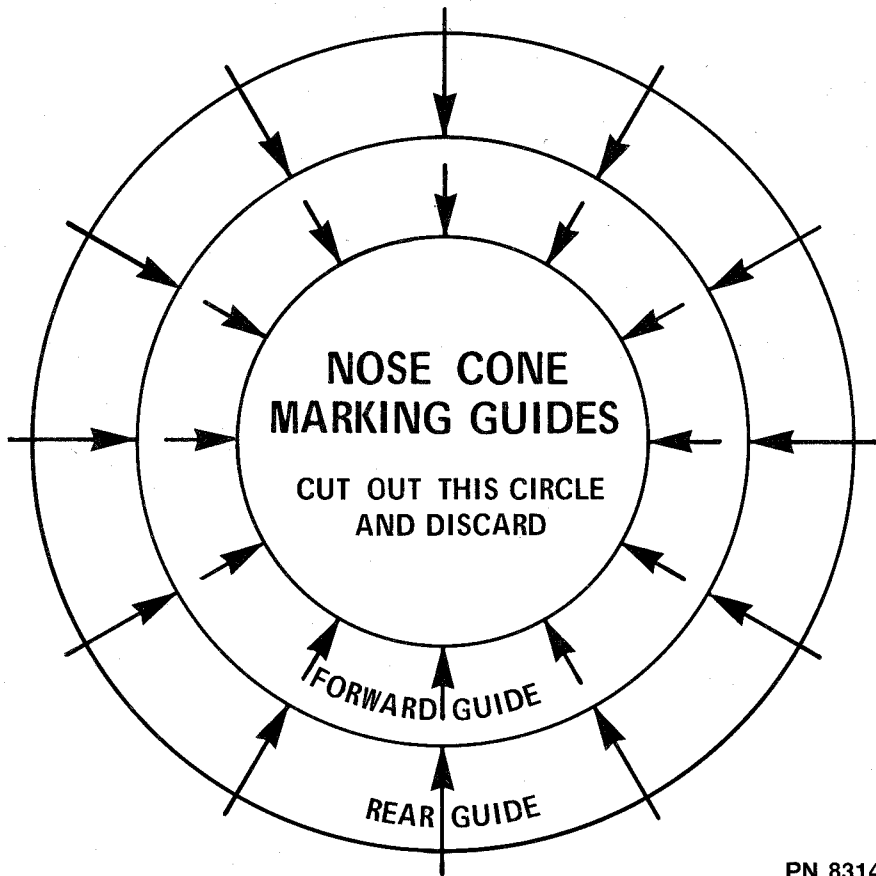
CHARGE RETAINER CENTER

FIN / PAD CENTER

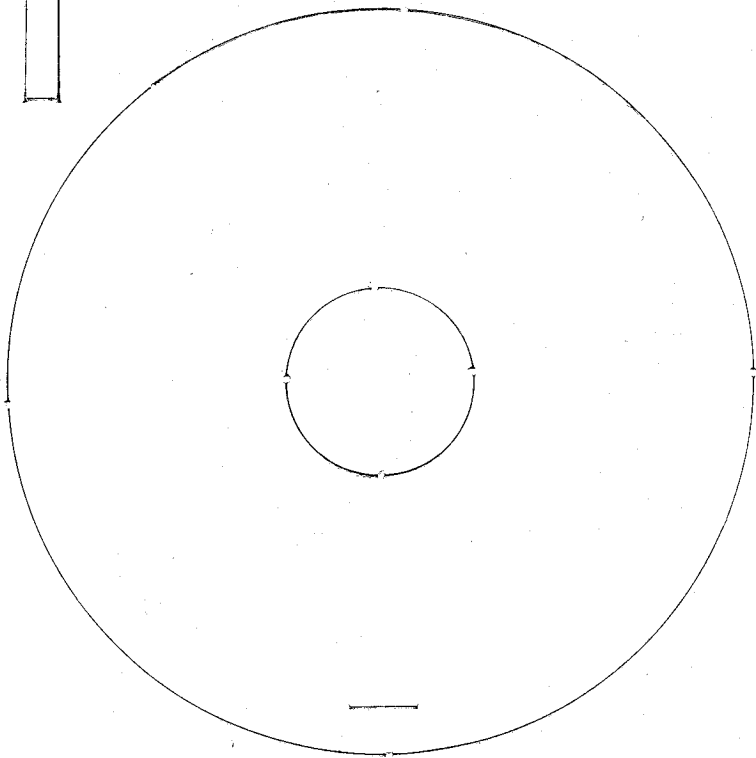
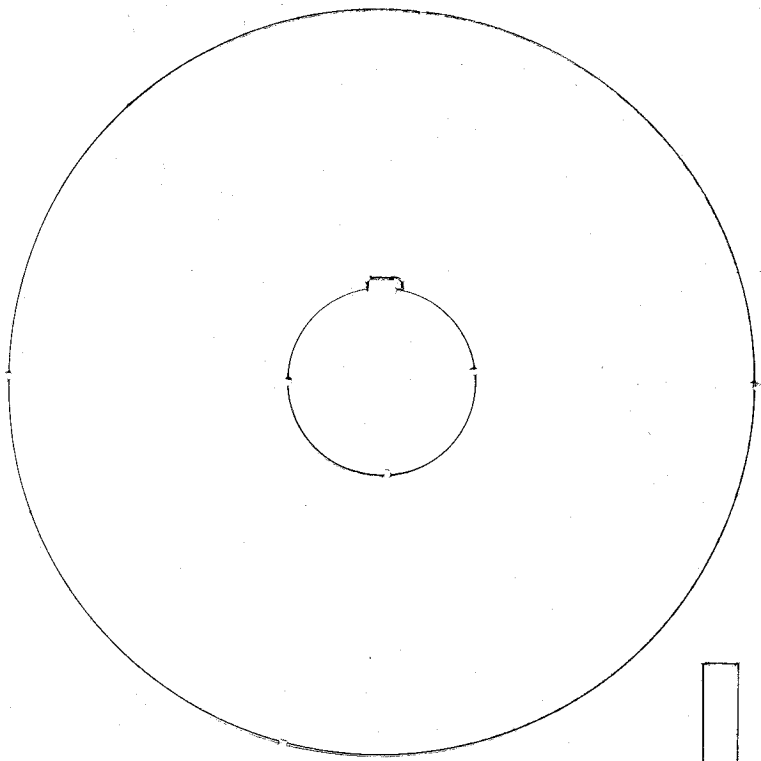
MATCH LINES

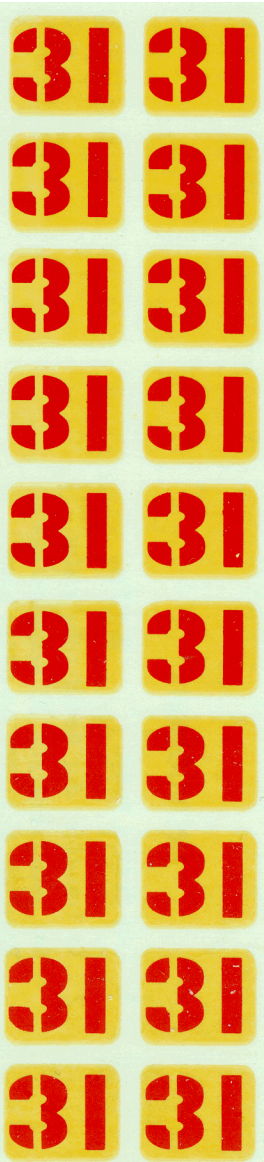
PERSHING MARKING
GUIDE

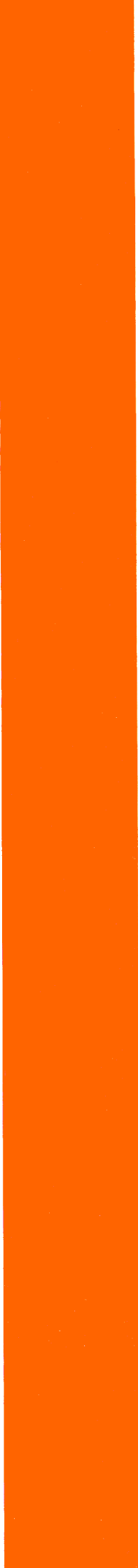
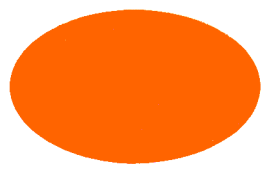
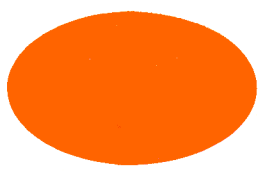
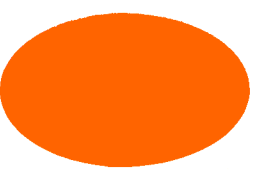
RETAINING BANDS



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