NASA SP-5977 (01)

TECHNOLOGY UTILIZATION

MACHINERY, EQUIPMENT, AND TOOLS

A COMPILATION

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Foreword

The National Aeronautics and Space Administration has established a Technology Utilization Program for the dissemination of information on technological developments which have potential utility outside the aerospace and nuclear communities. By encouraging multiple application of the results of its research and development, NASA earns for the public an increased return on the investment in aerospace and nuclear research and development programs.

Presented in this Compilation are a selection of new hand tools, modifications of existing tools, and techniques developed in the course of NASA research and development projects. The items are presented in two sections: Power Hand Tools and Accessories, and Manual Hand Tools and Accessories.

The latest patent information available at the final preparation of this Compilation indicates that NASA has decided not to apply for patents on the articles described herein. However, potential users of the items described herein should consult the cognizant organization for updated patent information.

We appreciate comment by readers and welcome hearing about the relevance and utility of the information in this Compilation.

Jeffrey T. Hamilton, *Director*
Technology Utilization Office
National Aeronautics and Space Administration

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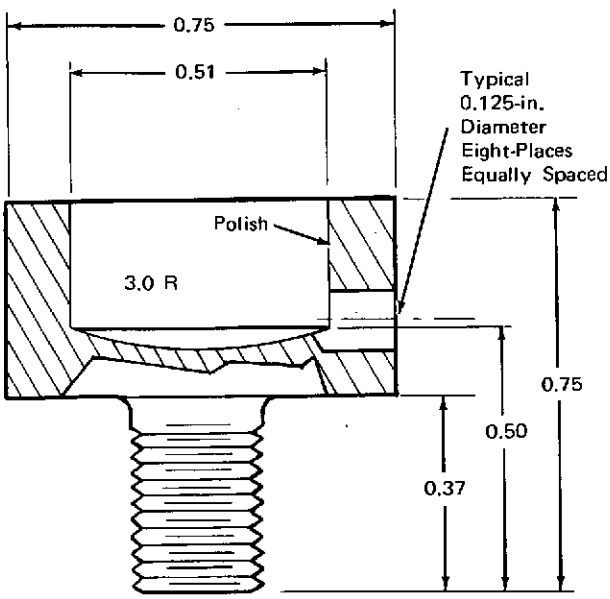
Contents

Section 1. Power Hand Tools and Accessories

TOOL TO DRESS SPOT-WELDER TIPS

A new tool dresses spot-welder tips accurately and rapidly. It has an air-driven hand-held motor and a replaceable abrasive covered cloth for grinding and polishing. The tool dresses the tips more uniformly than previous methods and does not require the tips to be removed from the spot welder.



Note: All dimensions in inches.

Cross Section of Welder Tip Dressing Tool

The figure shows the cross section of a tool designed to dress 1/2-inch (1.26-cm) diameter tips. It consists of a cupped piece of brass with a threaded extension for attaching the tool to an air driven motor. The cup shape forms a three-inch radius (7.6 cm) on the bottom of the welder tip. Eight 1/8-inch (0.32-cm) diameter holes drilled around the perimeter of the cup simplify cleaning the tool with compressed air. The tool and drive head (a right angle drive is preferred) are small enough to allow the dressing of tips without removal from the welder.

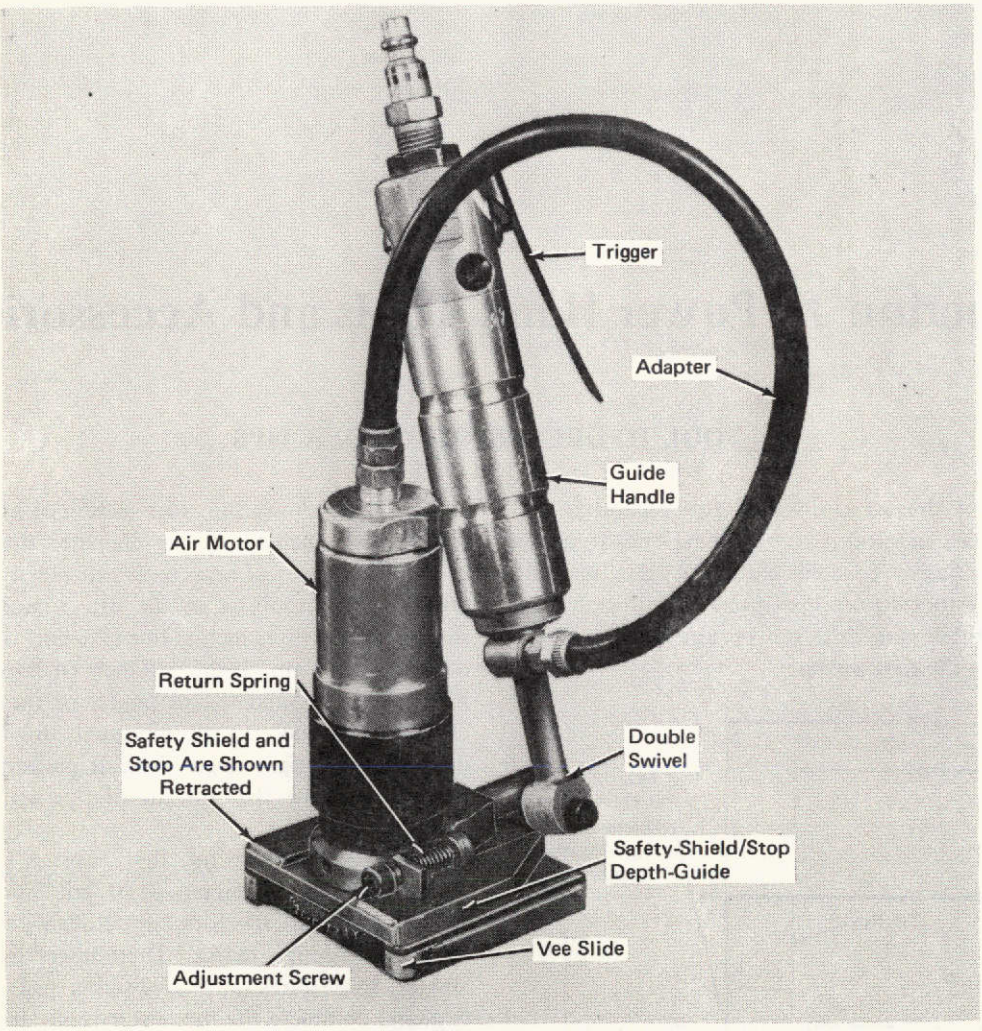
To dress a welder tip, first insert a piece of tight fitting, 1/2-inch diameter #120 grit, abrasive-covered screen cloth into the tool cup. Rough dress the tip to form the proper radius. Then insert a 1/2-inch diameter, loose-abrasive, coated-nylon pad into the tool cup, and complete the dressing by polishing the tip with the nylon pad.

Welder tips dressed with this tool produce welds with improved strength. This tool may be of interest to fabrication industries using spot welding equipment.

Source: W. McMahon of
Rockwell International Corp.
under contract to
Johnson Space Center
(MSC-17412)

No further documentation is available.

PORTABLE PNEUMATIC SAW WITH SAFETY STOP DEPTH GUIDE AND ADJUSTABLE HANDLE



Portable Pneumatic Saw With Safety Stop Depth Guide and Adjustable Handle

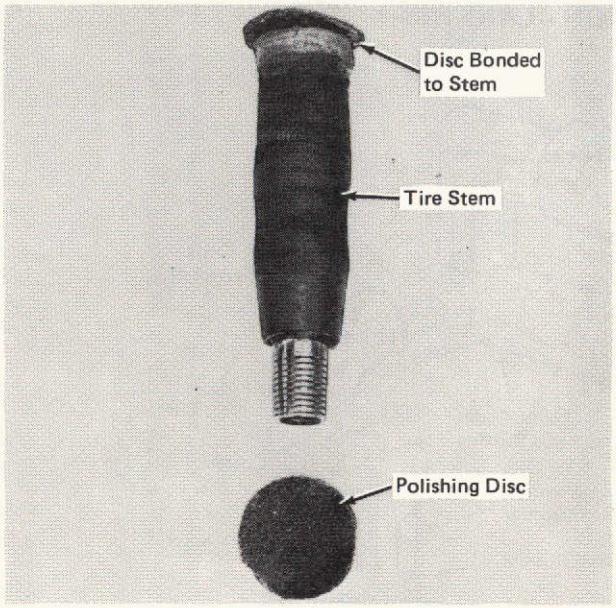
This portable, pneumatic, metal-cutting saw has a compact sliding guard, a depth stop and an adjustable swivel handle. The adjustable handle allows cutting at any angle, and the spring-loaded safety shield acts as an adjustable cutter-guide. The saw assembly (see figure) is composed of a guide handle (the air motor trigger end), an inlet adapter, and an air motor with a spring loaded stop and shield assembly.

Prior to using the saw, the adjustment screw is set to the desired cutting depth, the handle position set, and the double swivel tightened. The cut is made by pushing the guide edge of the safety-shield/stop depth-guide against the part to be cut until the operating saw blade cuts through the part. By guiding the tool against the part, a straight cut can be made with no danger of the blade damaging assembly surfaces or being a hazard to the operator. When the saw is removed from the cut, the return spring snaps the safety shield back over the cutter.

Source: W. H. Kistler of
Rockwell International Corp.
under contract to
Johnson Space Center
(MSC-17610)

No further documentation is available.

ECONOMICAL SPINDLE FOR POLISHING DISCS



Spindle

An economical spindle has been devised for polishing and deburring with a hand motor. Standard automotive tire-valve stems are bonded to small abrasive discs and chucked into the motor. The valve stems may be obtained cheaply by using the stems from discard tires. In use, the pliable rubber shank of the valve stem prevents scratching the workpiece.

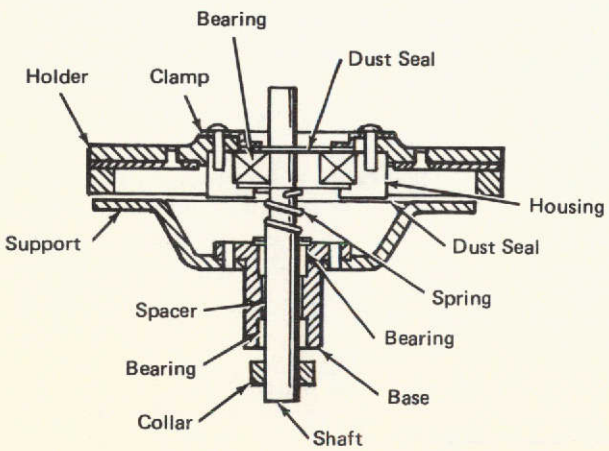
Source: W. L. Wright of
Rockwell International Corp.
under contract to
Johnson Space Center
(MSC-17608)

No further documentation is available.

ULTRA-HIGH VACUUM FLANGE REFACING TOOL

A portable honing device may be used to reface the sealing surfaces on ultra-high vacuum flanges. The tool is powered by a variable-speed electric drill and can hone the sealing surfaces to a 32 rms finish. The portability of this device eliminates either honing the flange by hand or taking the flange to a machine shop to achieve a machined finish. Taking the flange to a machine shop, in some cases, requires removing the flange from the equipment or pipe and rewelding it after the refacing operation is completed.

Prior to using this refacing tool, a coolant should be applied to the stone to eliminate the need to periodically dress the flange during refacing. To use the refacing tool (see figure), the support of the tool is inserted into the throat of the flange to be refaced and the spring compressed. At no point should the outside diameter of the stone move inside the inside diameter of the seal; the sealing surface should be partially uncovered on one side. Next, the shank of the refacing tool is placed in the chuck of a variable-speed drill. With the stone pressed against the sealed surface, the drill is started slowly and then the speed increased. The drill should be run for short periods of time (10-15 seconds) and the finish checked and redressed as required until the desired finish is achieved.



Ultra-High Vacuum Flange Refacing Tool

Source: R. L. Acres of
Service Technology Corp.
under contract to
Johnson Space Center
(MSC-13504)

Circle 1 on Reader Service Card.

TOOL TO CUT VENT HOLES IN MULTILAYER MYLAR INSULATION BLANKETS

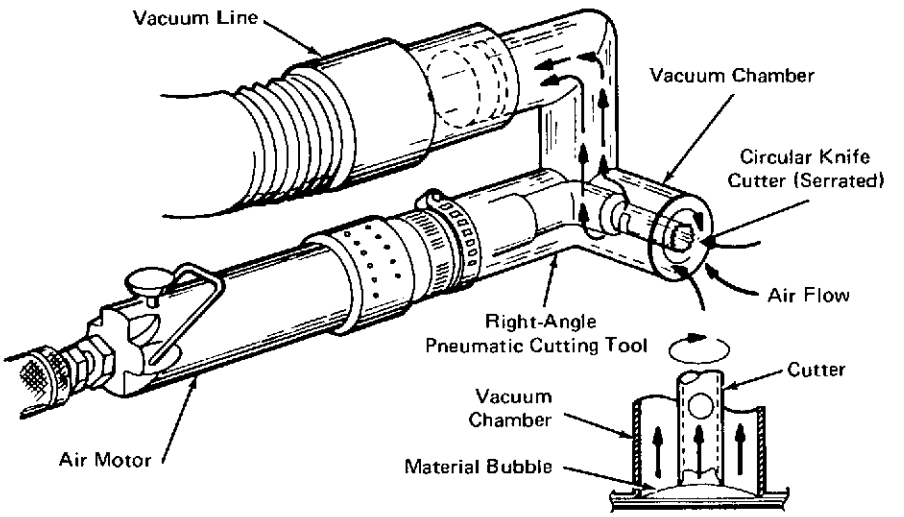


Figure 1. Vacuum Lift Attachment for Use With Right-Angle Pneumatic Hand-Drill

A unique attachment for a standard pneumatic hand-drill provides a safe and efficient means for cutting vent holes in installed multilayer mylar insulation blankets. Using conventional hole cutting techniques on installed blankets exposes the underlying surfaces to potential damage from the cutting tool. The special attachment for a pneumatic hand-drill (see Figure 1) uses a vacuum head to lift a thin, flexible film (or series of films) against a rotating, circular knife cutter in order to cut holes in the film. The cutter is slightly recessed so that the serrated knife cannot contact any of the underlying surfaces.

The vent hole is cut by applying the vacuum while holding the operating cutter head lightly against the blanket. As each layer of insulation is cut, a vacuum is drawn through the opening. The subsequent layers of the blanket lift onto the cutter. When all the layers have been cut, the vacuum is released and the tool removed. Figure 1 shows the attachment used with a right-angle pneumatic cutting tool, and Figure 2 shows the attachment used with a straight cutting tool.

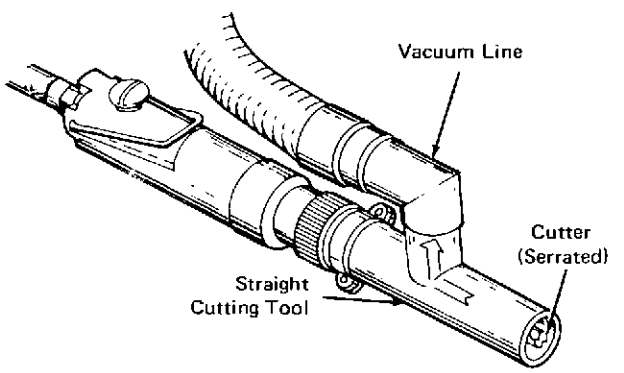


Figure 2. Vacuum Lift Attachment for Use With Straight Pneumatic Cutting Tool

Source: R. A. Farmer and H. L. Stein of
Rockwell International Corp.
under contract to
Johnson Space Center
(MSC-15337)

No further documentation is available.

Section 2. Manual Hand Tools and Accessories

QUICK LOCK, SPLIT HEX-WRENCH WITH RATCHET ACTION

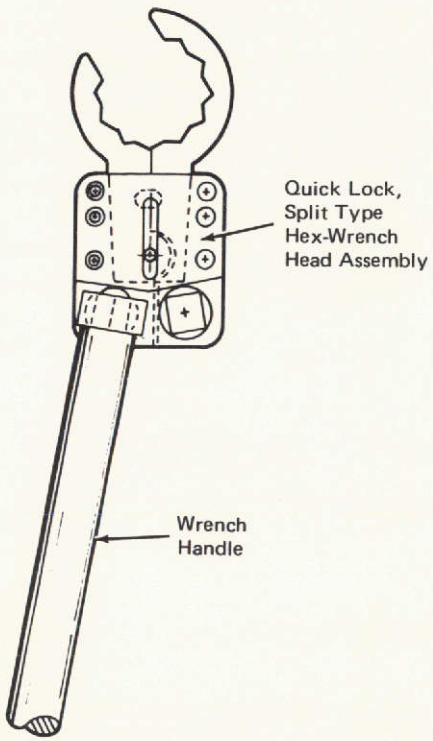


Figure 1. Quick Lock, Split Hex-Wrench With Ratchet Action

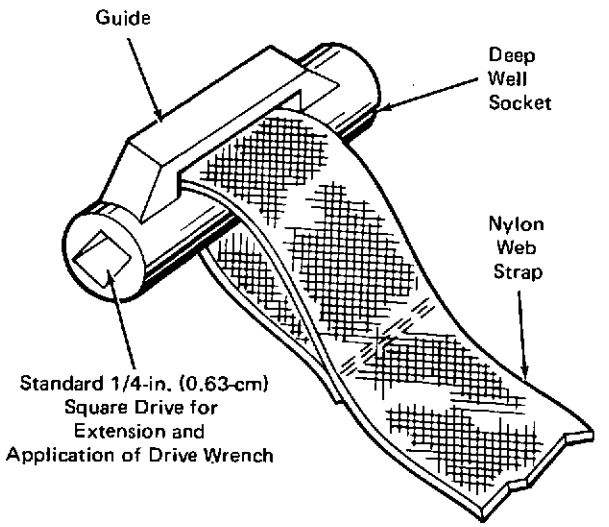
Figure 2. Quick Lock, Split Type Hex-Wrench Head Assembly

A special tool has been designed to provide the application of high torque to nuts where restricted access precludes the use of standard ratchet wrenches. The quick lock, split hex-wrench (see Figure 1) uses a spring-loaded wedging action split jaw (see Figure 2) which allows quick opening or locking by pushing or pulling on the wrench handle. This quick open/lock design permits release and relocking of the wrench to the next set of hex points to give a ratcheting action for torquing in restricted access areas. The tool head shown in Figure 2 can be used for torquing nuts up to 270 joules (200 ft-lbs).

Source: J. A. Stein, R. L. Gilbert, and P. V. Sauer, Jr. of Rockwell International Corp. under contract to Johnson Space Center (MSC-19025)

Circle 2 on Reader Service Card.

STRAP WRENCH FOR MATING AND DEMATING ELECTRICAL CONNECTORS



Strap Wrench for Mating and Demating Electrical Connector

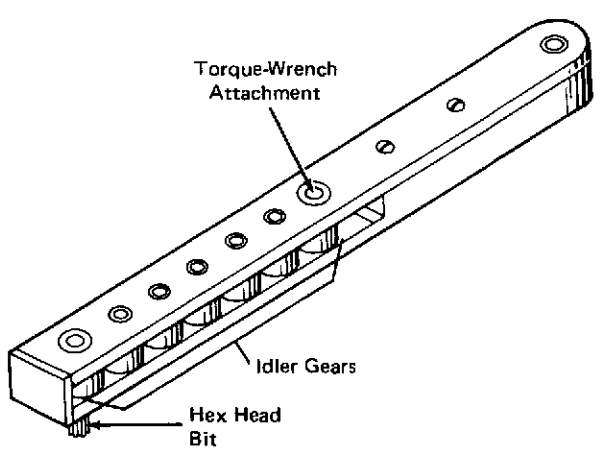
During checkout and test of the Apollo spacecraft ground support equipment (GSE) cables to the spectrometers had to be mated and demated several times during the test sequence. Since there was inadequate hand access to grasp the connectors, the only way to mate and demate the connectors was with pliers and a length of web strap around the connector. This method was very cumbersome and time consuming and created a potential for damaging connectors.

To provide a more efficient and safer method of mating and demating the inaccessible connectors, a special strap wrench (see figure) was made. This strap wrench is composed of a guide welded to a standard 1/4-in. (0.63-cm) square drive deep-socket and a 10-ft. (30.5-m) long 3/4-in. (1.89-cm) nylon-web strap.

Source: T. L. Powell of
Rockwell International Corp.
under contract to
Kennedy Space Center
(KSC-10785)

No further documentation is available.

TORQUE-WRENCH ADAPTER



Torque-Wrench Adapter

A special torque-wrench adapter has been developed for torquing recessed nuts. The adapter (see figure) permits the torquing of bolts in a confined area by using a series of idler gears to transfer the torque from the torque wrench to the actual bolt location. This type of adapter must be calibrated, and a table of values must be prepared to show the relationship between the wrench torque reading and the actual torque applied to the nut.

Source: A. M. Accetta of
Rockwell International Corp.
under contract to
Johnson Space Center
(MSC-15247)

No further documentation is available.

SPECIAL TOOL FOR GYRO BASE LEVELING

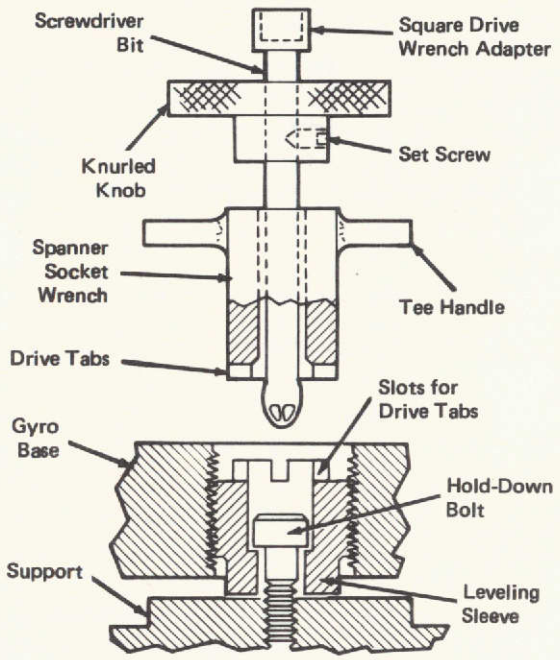


Figure 1. Leveling Adjustment for Gyro Base

A unique tool has been developed for use in performing gyro base leveling adjustments. The special tool (see Figures 1 and 2) consists of a screwdriver bit adapted for hand and wrench turning and mounted concentrically within a spanner socket wrench that is adapted for turning by hand. Previously, two separate tools had to be used to make the leveling adjustments, and since the leveling sleeve was not held in position while tightening the hold-down bolt, the adjustment became a trial and error procedure to get the sleeve properly set when the hold-down bolt was to specification. The new tool sets the leveling adjustment and holds the leveling sleeve in position while torquing the hold-down bolt.

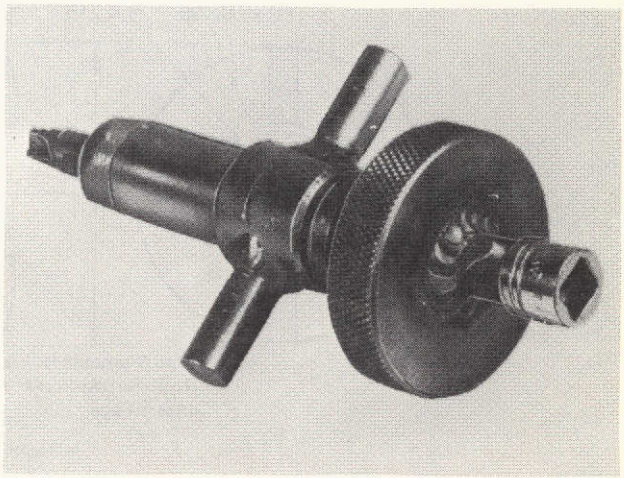


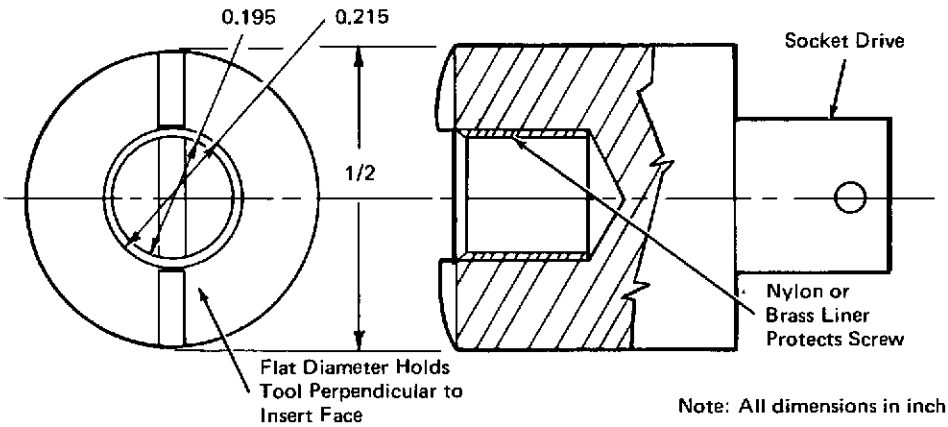
Figure 2. Special Tool for Gyro Base Leveling Adjustment

To make a gyro base leveling adjustment, the tool is engaged by holding the "T" handle so that the initial setting of the leveling sleeve can be retained while using the screwdriver to loosen the hold-down bolt. The sleeve is then reset, as required, with the spanner wrench which is then used to hold the new setting while the screwdriver is used to tighten the bolt.

Source: F. P. Tiller and L. M. Herm of
Rockwell International Corp.
under contract to
Johnson Space Center
(MSC-17144)

No further documentation is available.

SPECIAL ASSEMBLY TOOL FOR TORQUING SCREWS INTO HONEYCOMB PANEL



Holding Tool

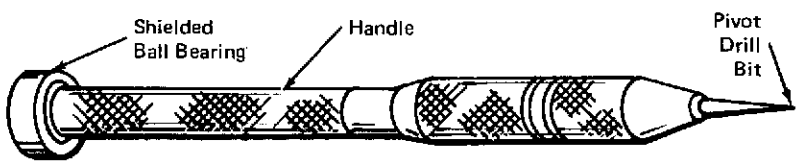
No holding tool was available for "snap-in" inserts when tightening screws in honeycomb panel. Insert rotation, could cause face sheet and thread damage whenever screws were projected through the inserts for secondary attachments. A recessed driver served as a holding tool, but it was easily misaligned and could cause damage to the projecting screw thread.

A novel tool resembling a common socket wrench (see figure) prevents damage to the inserts, screw threads, or panels. The driver has a lining of soft material to protect the projecting shaft and two lips on the bearing surface to engage the slats on the insert.

Source: J. A. Klein of
Rockwell International Corp.
under contract to
Johnson Space Center
(MSC-17413)

No further documentation is available.

MAKING PIN VISES MORE SERVICEABLE



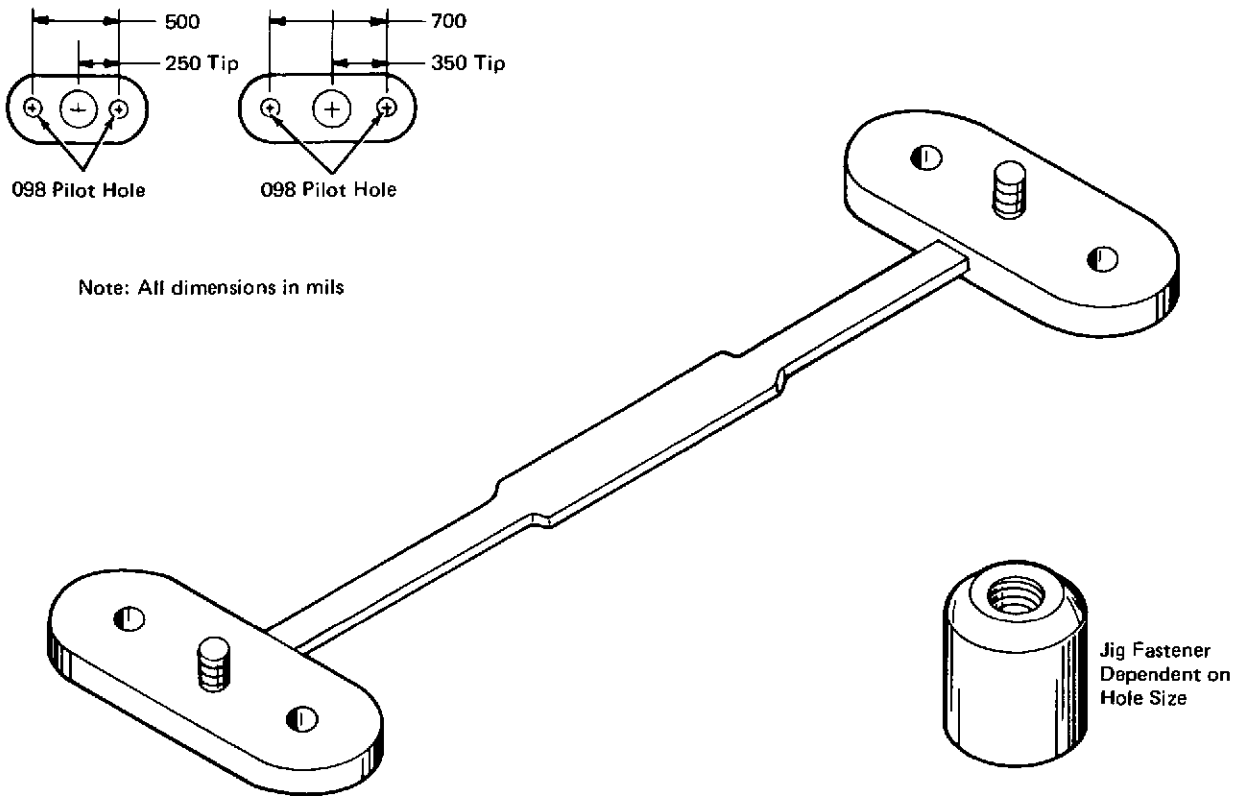
Modified Pin Vise

Original pin vises can be easily modified to improve their operation for hand drilling small orifices by adding a small-diameter, shielded ball bearing to the end of the vise handle. The end of the conventional pin-vise handle as supplied by the manufacturer, creates friction against the skin of the palm, causing the skin to blister when extensive drilling is required. A shielded ball bearing pressed into the handle of the pin vise (see figure) provides a bearing surface that rests on the palm of the hand and turns very easily giving the operator a sensitive feeling of the cutting action.

Source: H. B. Miller
Langley Research Center
(LAR-90275)

No further documentation is available.

UNIVERSAL NUT-PLATE JIG



Universal Nut-Plate Jig

A new hand-held jig has been designed for use with varying sizes of nut plates. Whereas standard jigs have a single, stationary pilot which can accommodate only one size of nut plate, this new jig uses replaceable pilots allowing the same tool to be used to align the drilling of rivet holes for different sizes of nut plates. The universal nut-plate jig has an additional pilot hole which is spaced to provide drilling capability for single wing-nut plates.

Source: S. J. Thomas of
Rockwell International Corp.
under contract to
Johnson Space Center
(MSC-90675)

No further documentation is available.

THREADED FITTING ASSEMBLY TOOL

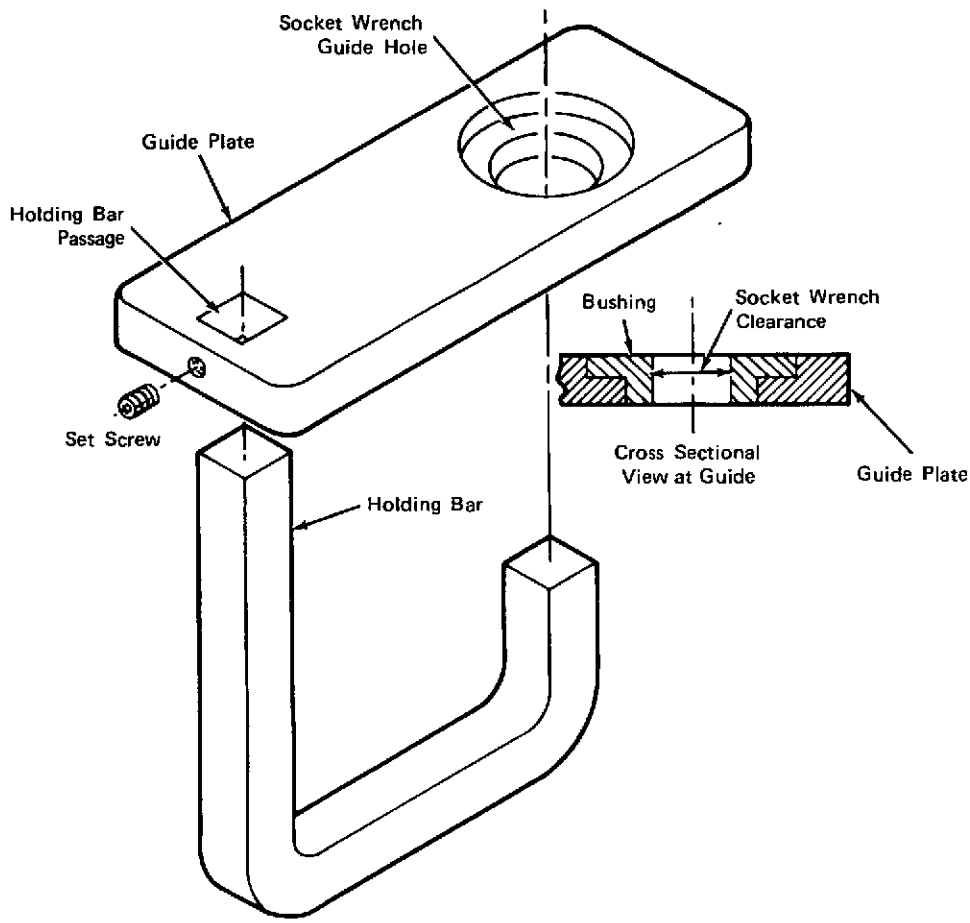


Figure 1. Threaded Fitting Assembly Tool

A special tool and technique are used for the measured assembly of threaded fittings having hexagonal wrenching surfaces. The tool uses standard sockets and drive handles and is particularly useful in confined areas where normal assembly methods cannot be used.

The tool (see Figure 1) is composed of a holding bar (square drive to attach a restraining socket) and a guide plate. To use this tool, the restraining socket is installed on the holding bar and one end of the threaded fastener (see Figure 2). The guide bar is then positioned on the holding bar and the other end of the fastener.

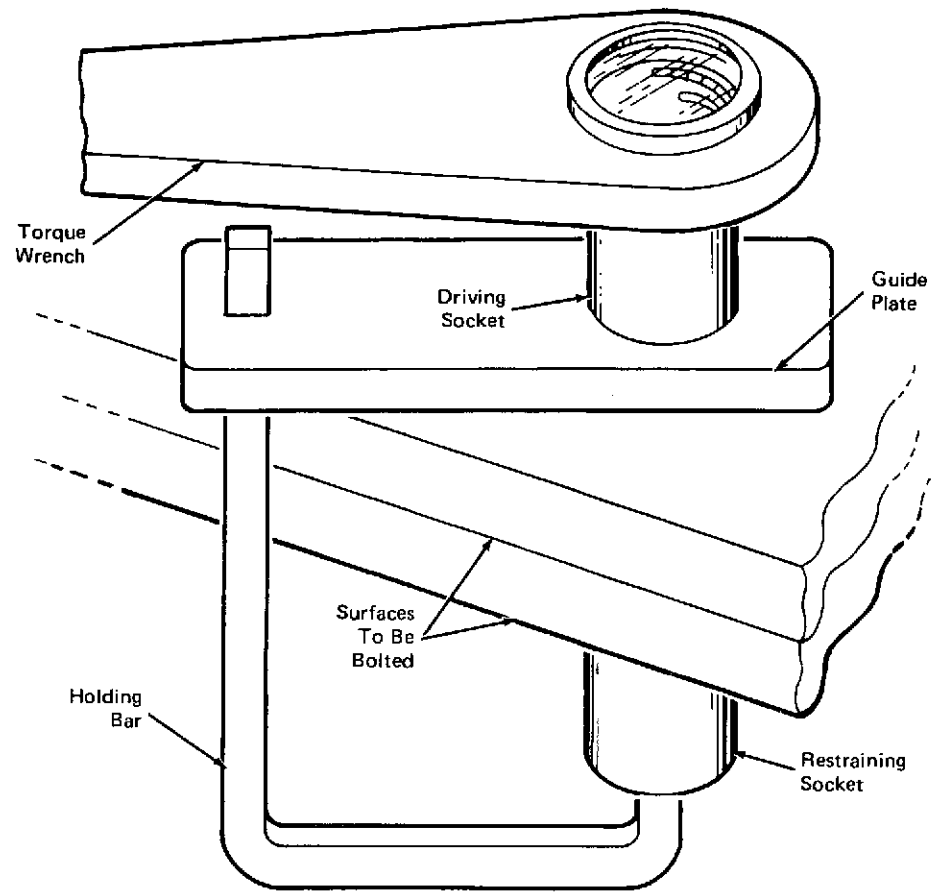


Figure 2. Using Threaded Fitting Assembly Tool to Torque Bolt

A torque wrench or other driving wrench with the appropriate socket is positioned on the fastener which is centered in the guide plate guide hole. Turning the driving wrench will cause the restraining socket and holding bar to rotate until the bar contacts the surface of the assembly being bolted. Further turning of the driving wrench will tighten the nut and bolt.

Source: L. W. Rabb and R. T. Ferry of
The Boeing Company
under contract to
Kennedy Space Center
(KSC-10464)

Circle 3 on Reader Service Card.

CONCEPT FOR REMOVAL TOOL FOR DEBRAZING COUPLINGS

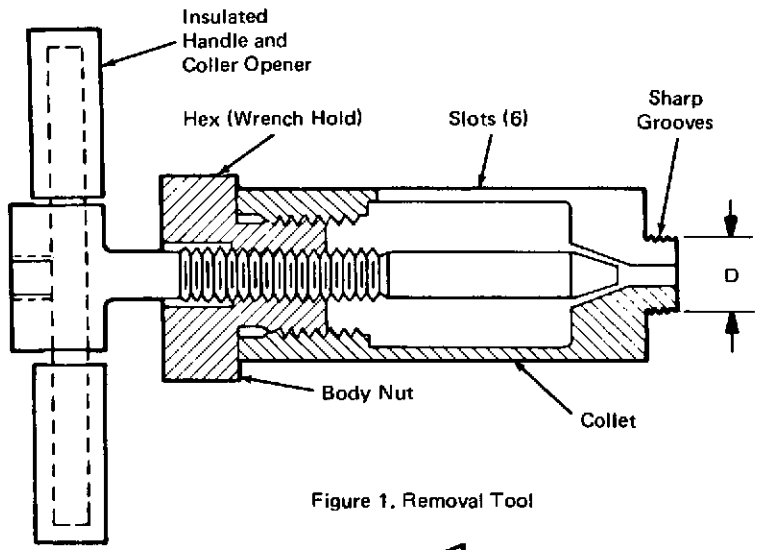


Figure 1. Removal Tool

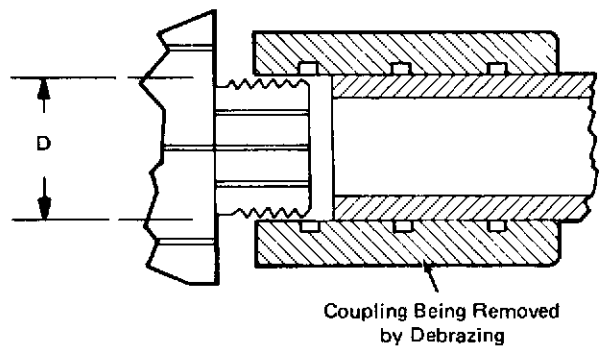


Figure 2. Enlarged View of Coupling Removal

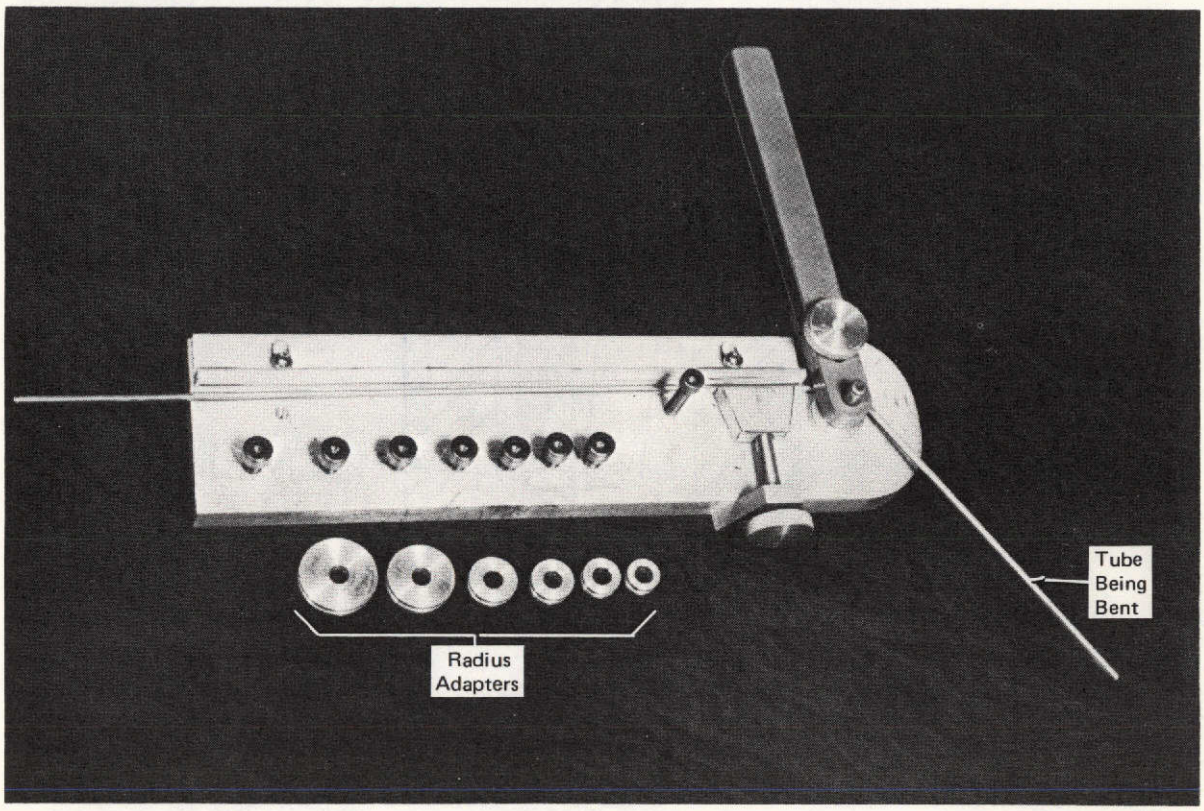
A concept for a new manufacturing aid provides an improved holding and removing tool when debrazing couplings. A short, internal, expanding grip will open the coupling and an insulated handle permits easier handling of the hot part. This concept uses interchangeable collet grips to allow use on various sizes of tubing.

At present, pliers are used to pull, and screwdrivers are used to push the hot union for removal. A slower technique, machining the coupling off, is used when practical. The proposed tool (see figures) has short internal collet grips of various sizes for a positive grip, wrenching flats, and an insulated handle for safety and speed.

Source: J. F. LaRue of
Rockwell International Corp.
under contract to
Johnson Space Center
(MSC-17909)

No further documentation is available.

MINIATURE TUBE-BENDING TOOL



Miniature Tube-Bending Tool

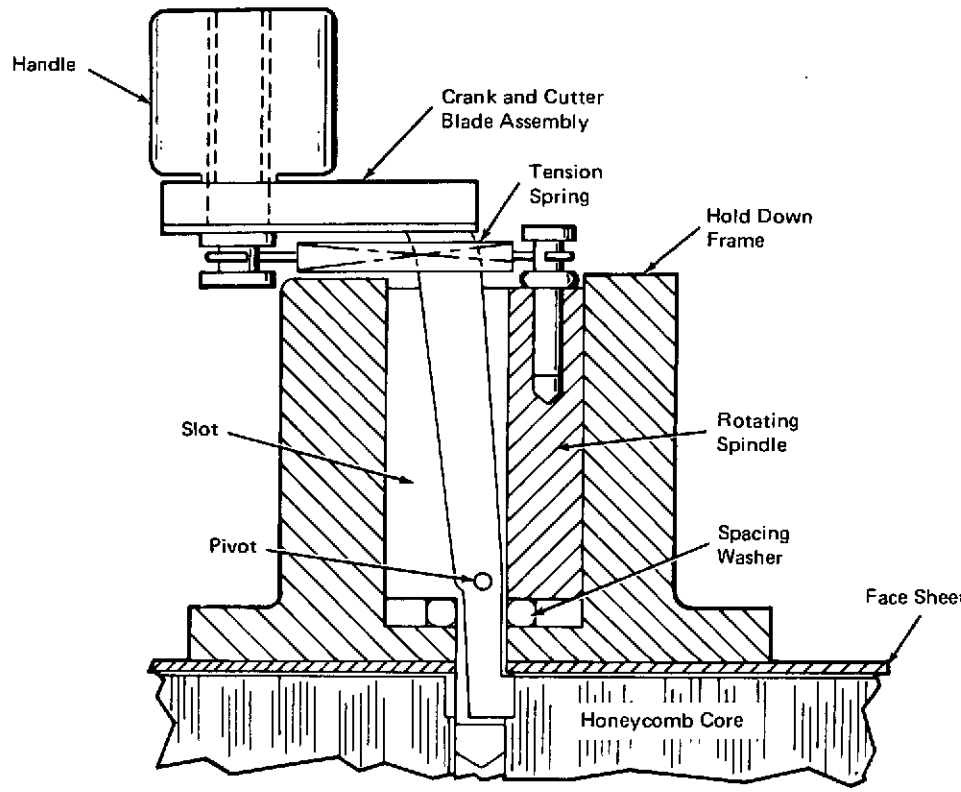
A hand-operated miniature, precision tool bends small diameter tubes used in aerodynamic wind-tunnel model making. It accommodates tube diameters from 0.051 to 0.317 cm (0.020 to 0.125 in.) and forms radii from 0.48 to 2.54 cm (3/16 to 1 in.). Completely self-contained, the device (see figure) provides storage space for the handle and radius adapters in a single, compact unit.

This tool may be useful for precision model making and for laboratory applications.

Source: L. W. Barnett and B. R. Dunn
Rockwell International Corp.
under contract to
Johnson Space Center
(MSC-17581)

No further documentation is available.

UNDERCUT TOOL FOR INSTALLING BLIND RIVETS IN HONEYCOMB PANEL FACE SHEETS: A CONCEPT



Undercutting Tool

Proper installation of a blind fastener in a honeycomb panel facing sheet requires that the honeycomb core be undercut to allow proper setting of the expanded tool. Attempts were made to undercut the honeycomb by angling and rotating the drill used for drilling the face sheet. This procedure was unsatisfactory since the undercut could not be controlled and the face panel was easily damaged by the angled drill. For lack of a suitable undercutting technique, more expensive potted inserts have been used in place of blind-rivet fasteners.

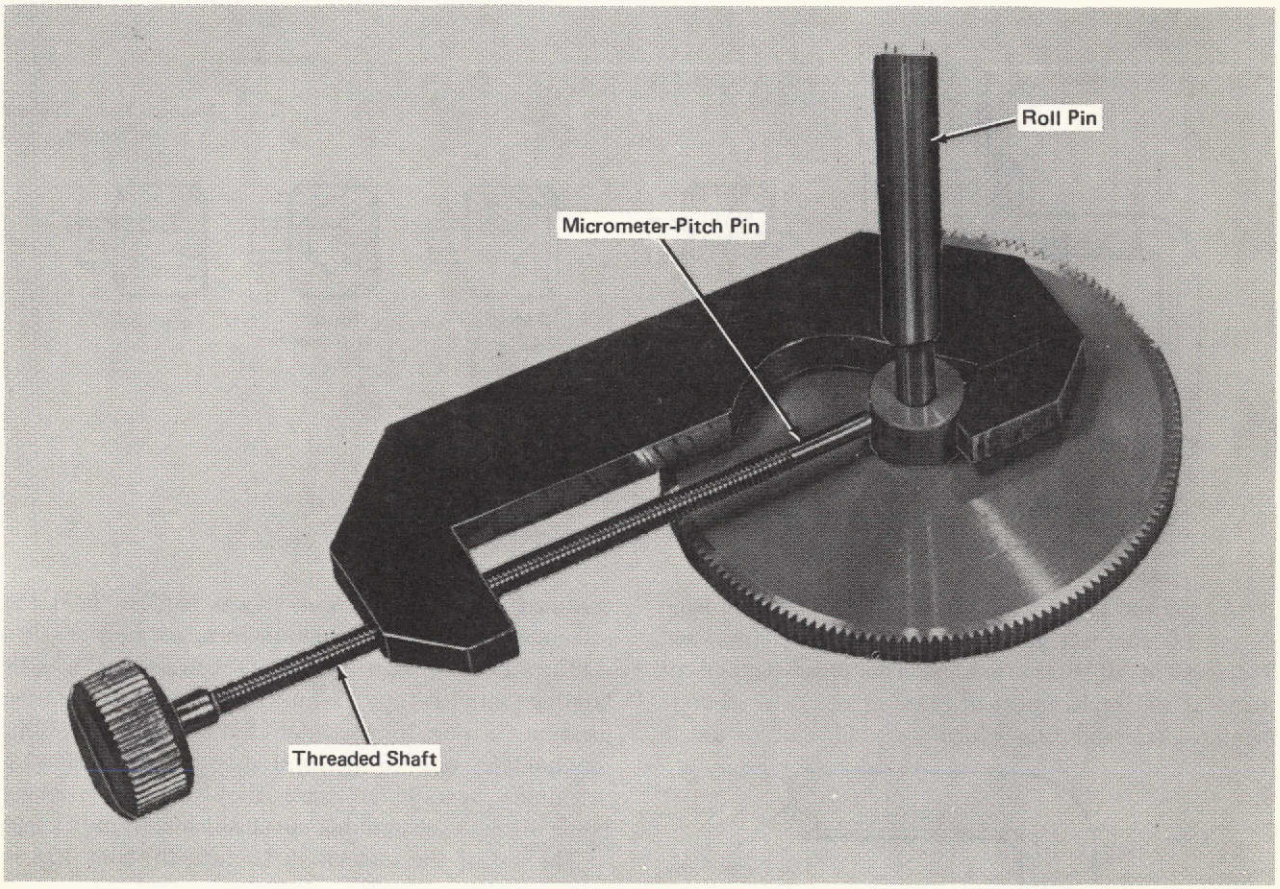
The undercutting problem can be solved by a special hand operated undercutting tool (see figure) with a safety feature to avoid damaging the face sheet. The tool provides a means of safely extending and retracting a cutter below the facing sheets. By using various stop washers, sheets of various thickness can be exactly undercut.

To use the undercutting tool, the slotted, pilot extension of the rotating spindle is inserted into the blind hole which has been drilled through the facing sheet. The tension spring keeps the cutter blade retracted. The tool is positioned and held down by using one hand on the hold down frame. The appropriate spacing washer, selected for the panel thickness being undercut, establishes the cutter gap. While holding the tool in position with one hand, the other hand is used to force down and simultaneously rotate the handle. The downward force extends the cutter so that the rotation will undercut the fact sheet. As soon as the cut is completed, the handle is released and the spring automatically retracts the cutter blade so that the tool can be safely retracted.

Source: G. A. Kline of
Rockwell International Corp.
under contract to
Johnson Space Center
(MSC-15564)

No further documentation is available.

ROLL-PIN INSERTION TOOL



Insertion Tool Used to Place a Roll Pin in a Gear

Roll pins can be inserted into delicate precision parts without damage by using supported screw thread pressure rather than unsupported shock pressure as with a punch and hammer. The roll-pin insertion tool (see figure) uses a micrometer-pitch thread which facilitates maintenance of insertion depth and allows more delicate operator feel. A threaded shaft pushes the pin into the opening while the workpiece is held in the jaw opposite the shaft; depth is measured by the number of turns. The basic device can also be used for removing press-fit pins.

Source: D. W. Roehs and
L. W. Barnett of
Rockwell International Corp.
under contract to
Johnson Space Center
(MSC-17385)

No further documentation is available.

TUBE-END PREPARATION KIT FOR BRAZE UNION REMOVAL AND REPLACEMENT

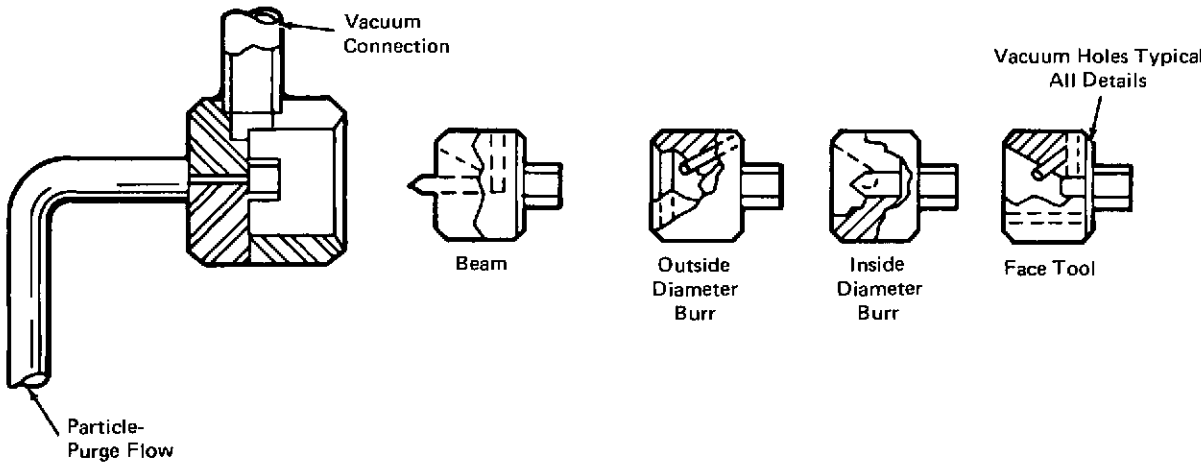
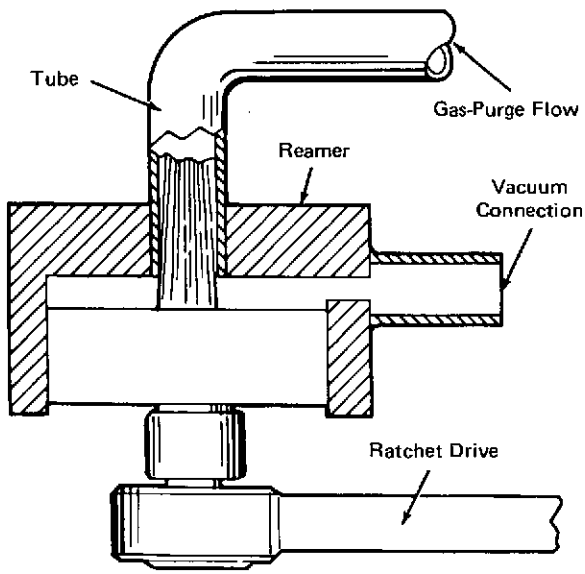


Figure 1. Tube-End Preparation Kit

A tube-end preparation kit was developed to provide a set of compact tools to allow easy removal and replacement of braze unions. The prior method of removal and replacement of braze unions used separate hand-reamers and files which were difficult to use in confined areas. In addition, it was hard to hold the tolerances required for induction-braze assembly.



Caution: Maintain Particle Purge-Gas Flow During Installation and Removal of Tool.

Figure 2. Kit Used to Ream Inside Diameter of a Tube

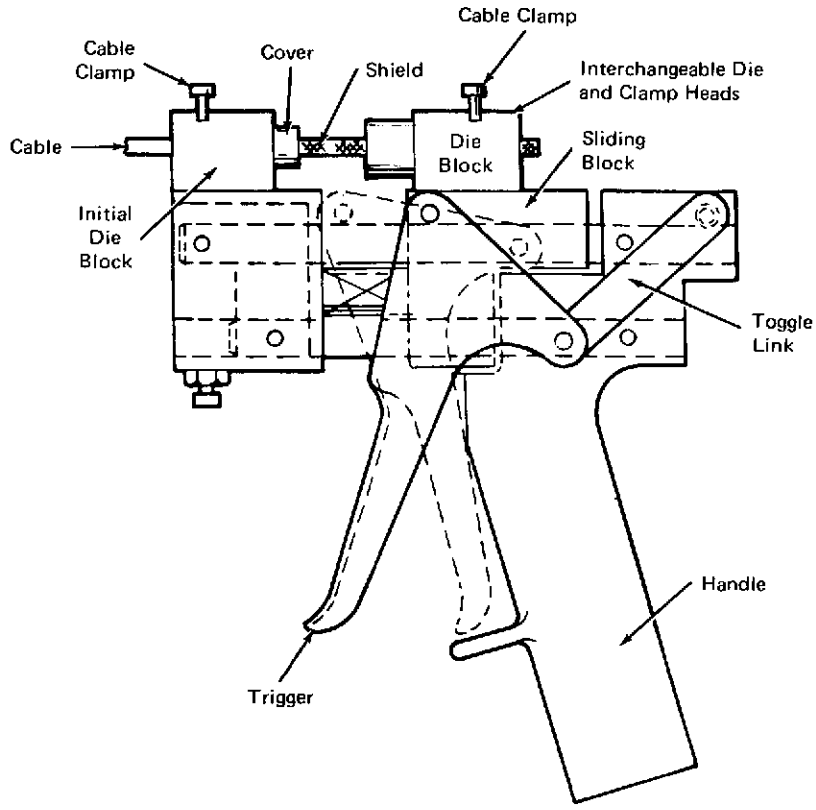
The tool kit (see Figure 1) consists of a split housing with a tube clamp for tool-holder bearing location, a port for vacuum-chip-removal, and four tool-holders, one to perform each of the following machining operations: Braze alloy removal, reaming inside diameter, chamfering outside diameter, and facing.

The use of the tool kit in reaming the tube I.D. is shown in Figure 2. The I.D. reaming tool is installed, and the housing is clamped to the tube O.D. The vacuum attachment is connected to the chip-removal port, and a positive purge-gas flow is provided through the tube. A ratcheting socket is attached to the hex head of the tool holder, a vacuum is drawn, and the reaming tool is rotated. The vacuum is necessary to remove loose chips which could cause contamination.

Source: S. A. Peterson, A. H. Carlson, and J. Stein of Rockwell International Corp. under contract to Johnson Space Center (MSC-11564)

No further documentation is available.

IMPROVED ELECTRICAL CABLE-SHIELD CUTTER



Improved Coax Cable-Shield Cutter

An improvement has been made to the standard plier-type cable-shield cutter to permit its use for precision, high reliability shielded-cable terminations. A straight-line precision movement for the punch and die sets replaces the rotary action of the standard tool. The straight-line movement permits closer die clearance for a cleaner shield cut off and eliminates the slightly tapered cuts which result from shield compression along an arc.

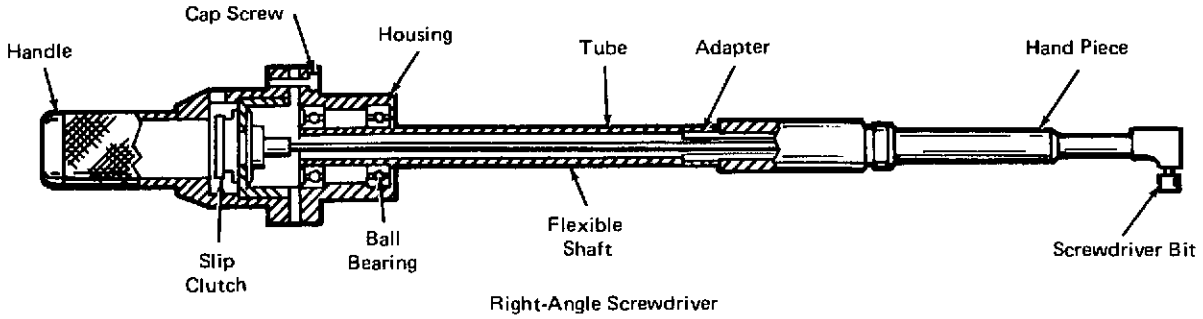
The improved electrical-shield cable-cutter (see figure) has a gun-grip handle and trigger with straight-line toggle action to increase the force at the cutting point. The stops are arranged for an initial release to accommodate a fixed advance of the sheath to cover the inner ferrule. An adjustable final stop varies the "bulging" travel for different sized cables. The improved tool also has interchangeable, combination "soft grip" cable-clamp and die-block sets to permit precision alignment and clamping of different sized cables. Ring magnets have been used in place of plastic enclosures with magnetic tape.

To use the improved tool, the coaxial cable is stripped-back from the end and entered into the initial die block until the cover end is even with the die edge. The cable is clamped into the adjustable block, and the trigger is activated to move the cable so that it is retracted into the initial die block to allow for shield cutoff at the cover end. The cable is then clamped in the initial die block, the travel stop released, and the trigger further activated to bulge and cut off the cable shield.

Source: L. P. David and E. C. Briggs of
Rockwell International Corp.
under contract to
Johnson Space Center
(MSC-19111)

Circle 4 on Reader Service Card.

RIGHT-ANGLE SCREWDRIVER



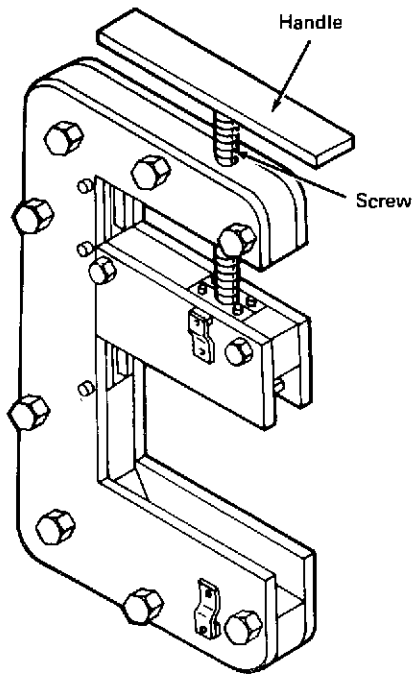
Right-Angle Screwdriver

By combining portions of commercially available tools, a new tool has been developed, which permits the application of a specified torque value to relatively inaccessible fasteners. The right-angle screwdriver (see figure) is a nonslip self-guiding low-profile screwdriver with controllable torque, that prevents breakage of screws during assembly or disassembly. Prior to using this screwdriver, the slip clutch is adjusted to a specific torque limit. By using interchangeable screwdriver bits, a wide variety of screws can be torqued by this tool.

Source: B. R. Bergstrom of
TRW, Inc.
under contract to
Goddard Space Flight Center
(GSC-10455)

No further documentation is available.

PORTABLE PRESS FOR CABLE-TERMINATION GROUND RINGS



Press for Cable-Termination Rings

Effective shielding of the conductors in control and instrumentation cables is essential to safe, reliable operation of circuits. Ground rings are used to contain multiple shields for grounding purposes. An inner ring is installed over a series of wires, and the braiding from each wire is laid over the inner ring. An outer ring is then installed over the braiding and compressed to seal the assembly. The apparatus normally used in the assembly operation is a bulky hydraulic press. The purpose of the new portable press is to permit the compression of various sizes of rings in the field with a small, lightweight, manual unit.

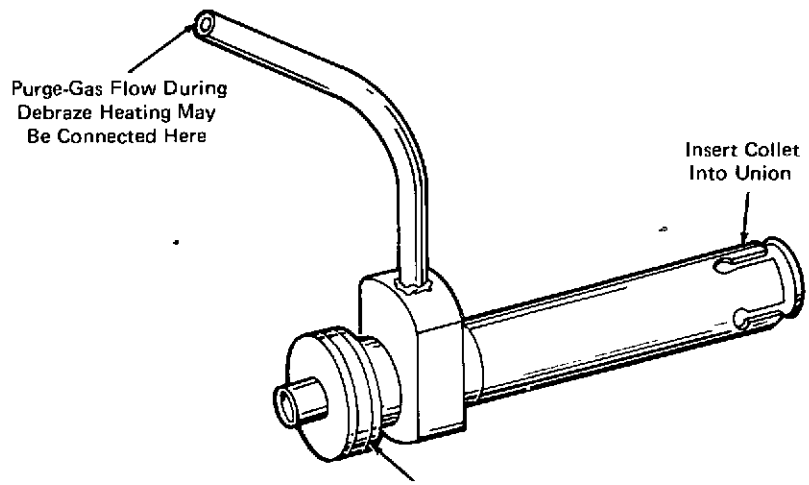
The new apparatus measures 28.6 x 16.5 x 3.2 cm (11-1/4 x 6-1/2 x 1-1/4-in.) and weighs only 1.8 kg (4 lb). The hydraulic press, on the other hand, consists of a pump, measuring 61 x 20.3 x 10.2 cm (24 x 8 x 4 in.), a 1.52-meter (5-foot) hose and a compression head measuring 30.5 x 5 x 3.2 cm (12 x 2 x 1-1/4 in.). The portable press is shown here without the replaceable dies. Thirty-four sets of replaceable dies are provided to accommodate different sizes of ground rings.

In operation, the proper-size outer ring is placed over the cable-termination braiding and inner ring, and the corresponding dies are inserted in the portable press. With the hand screw retracted so that the dies will accommodate the ground ring assembly, the ring is inserted between the dies and the compression handle is rotated clockwise until the assembly can be visually checked and the necessary force can be applied to compress the ring without the danger of collapsing the ring. Upon completion of compression, the compression handle is rotated counter-clockwise to release the ring.

Source: R. A. McMillan of
Bendix Corp.
under contract to
Kennedy Space Center
(KSC-10330)

Circle 5 on Reader Service Card.

UNION REMOVAL TOOL FOR DEBRAZING



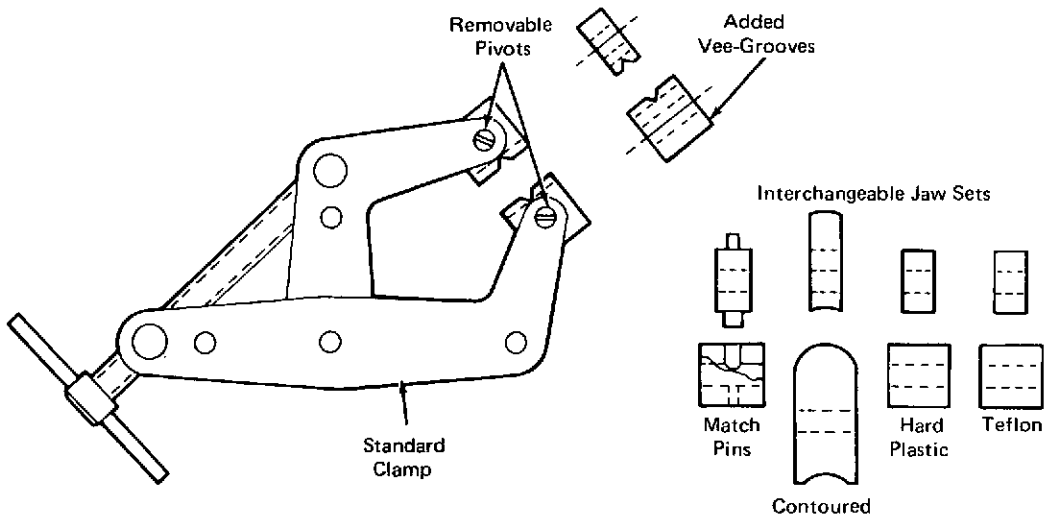
Union Removal Tool

A novel collet clamp with a purge-gas elbow connection provides a positive means of gripping inside the open end of a tubing union during debraze heating. It allows the union to be removed easily when the braze flow point is reached. The previous method for union removal used a short length of expanded tubing which was driven into the open end of the union from which the tubing assembly had been debrazed. A purge-gas connection was then made to the end of the expanded tubing. In many cases, the tubing slipped out of the union. This new removal tool requires less set-up time and will not slip during use.

Source: J. A. Stein and C. D. Murray of
Rockwell International Corp.
under contract to
Johnson Space Center
(MSC-17062)

No further documentation is available.

IMPROVEMENTS TO STANDARD CLAMP



Improvements To Standard Clamp

A standard clamp has been modified to permit the use of interchangeable jaws for gripping various surfaces. To accomplish the modification, the original, jaw pivot-pins are removed and replaced with threaded removable pivot pins. Jaw sets are then made to grasp specific surfaces (see figure), e.g., Vee-grooves can be added to standard clamp jaws, contoured jaws can be made for curved surfaces, plastic jaws can be used to prevent marring of finished surfaces, Teflon jaws can be used when using epoxy to bond assemblies, and match pins are useful in aligning holes in two parts.

Source: L. W. Barnett of
Rockwell International Corp.
under contract to
Johnson Space Center
(MSC-17015)

No further documentation is available.

SWIVEL HANDLE FOR LOW CLEARANCE, RIGHT-ANGLE SCREWDRIVER: A CONCEPT

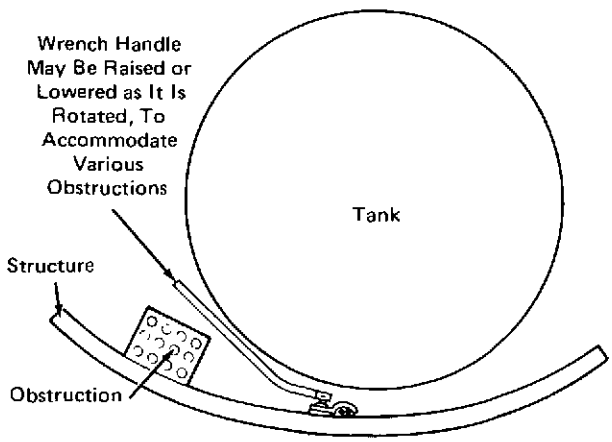


Figure 1. Swivel Handle Clears Obstruction While Maintaining Alignment With Recessed-Head Screw

A special handle with a swivel attachment permits better engagement of screwdriver bits in recessed-head screws located in restricted access areas (see Figure 1). Fixed right-angle handles for recessed-head screwdriver bits can not maintain proper alignment when obstructions protrude into its plane of rotation. The swivel handle (see Figure 2) moves around obstructions while maintaining proper alignment to insure burr-free torquing of the screw heads.

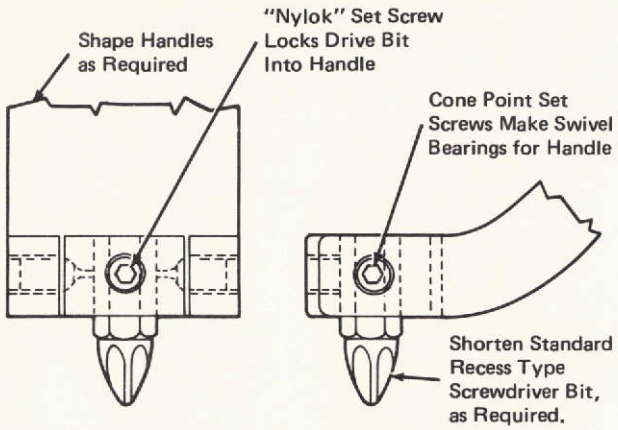
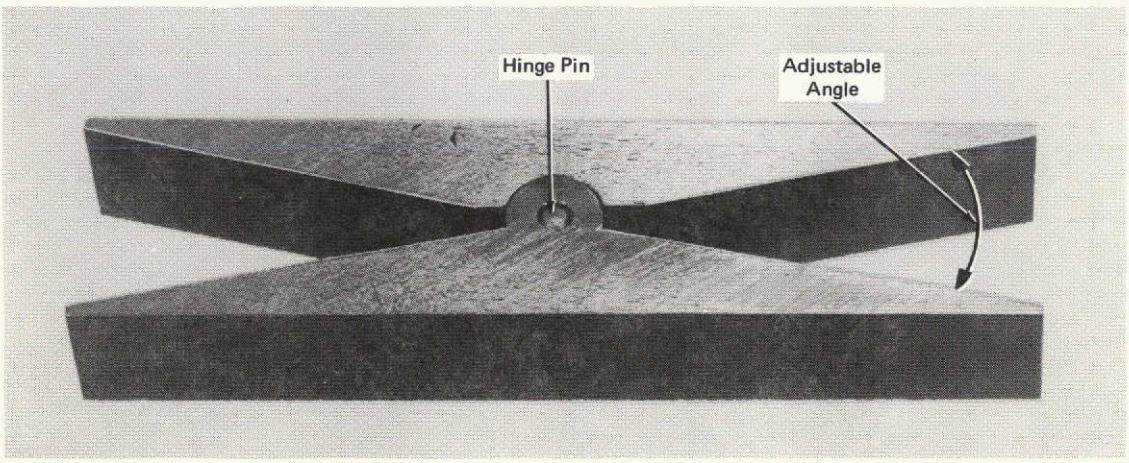


Figure 2. Low Clearance Right-Angle Screwdriver with Swivel Handle

Source: H. M. Baird of Rockwell International Corp. under contract to Johnson Space Center (MSC-17109)

No further documentaiton is available.

SELF-ADJUSTING ANGLE BACKING BLOCK



Self-Adjusting Angle Backing Block

A self-adjusting angle backing block converts a fixed-jaw vise to an adjustable-jaw vise. The device (see figure) consists of two metal triangles joined by a hinge pin at their apexes to allow use at any angle. The unit makes holding odd-shaped parts in a vise easier and faster, cuts down setup time, self-adjusts to almost any angle or shape, and can be used on any machine where a vise is needed.

Source: F. H. Gregory and L. W. Barnett of Rockwell International Corp. under contract to Johnson Space Center (MSC-17386)

No further documentation is available.