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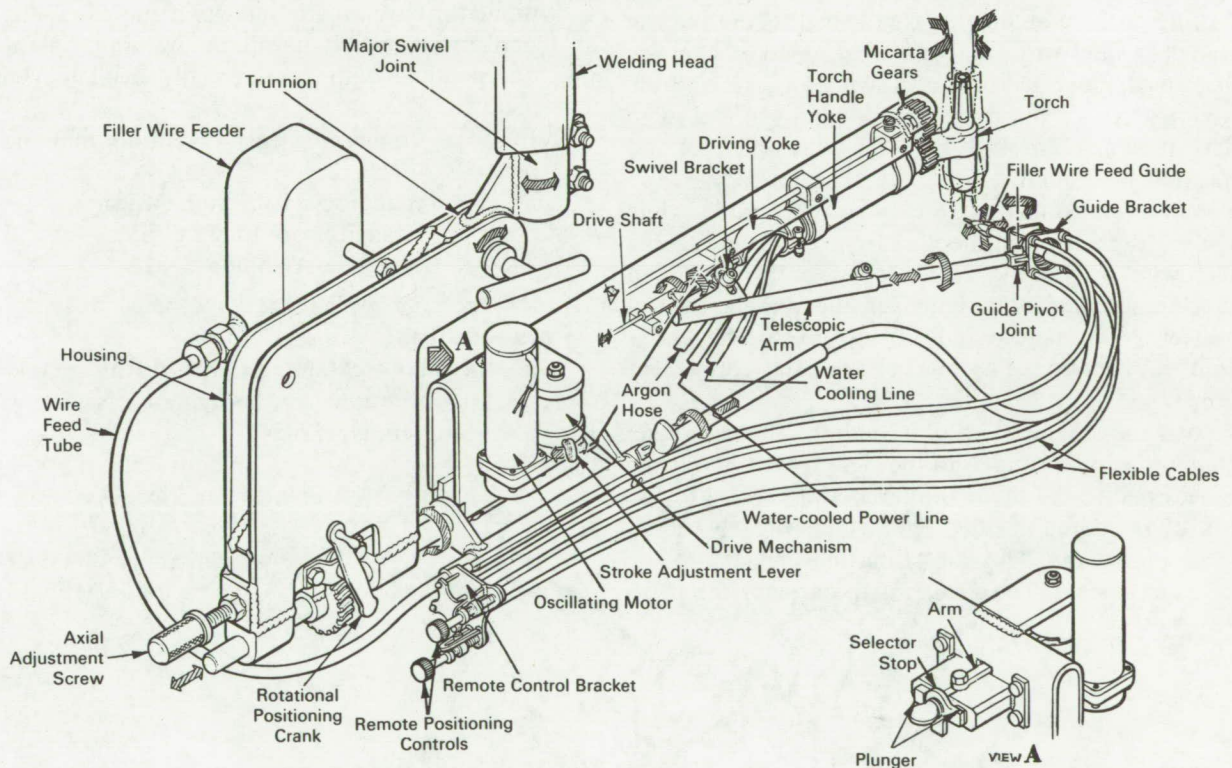
Brief 67-10385

NASA TECH BRIEF



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Welding Torch and Wire Feed Manipulator



The problem:

Automatic welding operations are frequently impaired because of interference between the welding torch, filler wire feed guide, and the area to be welded. These obstacles may be caused by irregular workpiece configuration or by interfering components located adjacent to the weld areas. Variations in workpiece configuration from part to part also require a means for changing the attitude of the weld torch and wire feed to suit the situation.

The solution:

A universal manipulator fabricated to present the weld torch and wire guide to the desired area in a semifixed relationship with each other and the work. The manipulator has the capability of rotating on its horizontal axis to avoid obstacles as they approach the torch. The initial individual attitudes of the torch and wire guide are set with respect to the general configuration of the part. Minute positioning adjustments to the weld torch and the wire feed guide can be made

(continued overleaf)

remotely during weld operations. An x and/or y directional oscillation can be imparted to the torch and wire feed guide for "puddling." The weld torch and connected automatic wire feed guide can be accurately positioned, manipulated, and/or adjusted in relation to the workpiece to maintain an even gap. Use is made of mechanical hinge and swivel joints, telescoping tubes and rods, a screw feed adjustment, screw feed cable adjustment, gear drives, and an electrical oscillator with a selectable reciprocating drive having an adjustable stroke to maintain gap size.

How it's done:

A modified commercially available welding torch is presented to the work in the optimum basic working position relative to a particular workpiece, by adjusting the major swivel joint and trunnion by which the housing of the manipulator is attached to the sensing head. The filler wire feed guide and guide bracket are positioned about the torch by a swivel bracket and the extended axis of the torch handle, and are locked in place at an angular attitude by the telescopic arm and the guide pivot joint.

Minute adjustment of the filler wire guide while welding is achieved in the x and y axes normal to the filler wire by flexible cables operated from remote positioning controls mounted on the remote control bracket. Micrometer axial adjustment to the entire front end is obtained by turning the axial adjustment screw.

To avoid obstacles while welding, the complete front end can be rotated to the right or left about the axis normal to the tip of the torch and parallel to the axis of the torch handle by turning the rotational positioning crank. The oscillating motor actuates the drive mechanism. The stroke of the arm of the drive

mechanism is adjusted by the stroke adjustment lever. The selector stop permits the selection of either a reciprocating motion or an oscillating motion of the weld torch over the work by locking out the plunger of the particular action not desired.

The micarta gears transmit the oscillating motion from the drive shaft to the weld torch. The drive shaft transmits the reciprocating motion to the weld torch. The sensing head, the argon hose, the water-cooled power line, and the water cooling line all enter the torch handle under the driving yoke. The filler weld wire is fed from a modified filler wire feeder through the wire feed tube and out of the filler wire feed guide to the weld.

Notes:

1. Combinations of available adjustments of this manipulator have greatly increased the capability for performing many automatic welding operations not possible with commercially available equipment.
2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B67-10385

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: R. T. Williams
of North American Aviation, Inc.
under contract to
Marshall Space Flight Center
(MFS-13102)