

TOOL EXPERIMENTS FOR ASSEMBLY, MAINTENANCE
AND REPAIR IN SPACE

by

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The future need for high power in space assembly, maintenance, and repair operations was pointed out, and the advantages of energy storage and the pulse power concept were discussed. A typical solar charged pulse power system was described, and some typical pulse power tools which already exist were shown. Applications for space assembly and maintenance and repair were considered. Experiments were described which were intended to develop apparatus and techniques for creating at will cohesion and perhaps even adhesion in vacuum environments of 10^{-9} Torr or less. The system will ultimately use magnetomotive force as the driving mechanism, and promises to be an ideal joining technique in space. Actual tool performance and operational simulation experiments were treated. Preliminary neutral buoyancy simulation studies of tool performance were also described. Conclusions were drawn, regarding ordinary hand tools, certain types of lanyards and tethers, large or complicated vehicle or structural assembly, maintenance and repair tasks, and the mechanical advantages associated with pulse, and ordinary power tools. Also included were comments denoting the

benefits associated with neutral buoyancy immersion techniques in the development of space tools , tool systems and applications , and the contention was further made that working with the actual one-to-one ratio hardware , preferably under neutral buoyancy immersion conditions , constituted a decided advantage .