

**TEST REPORT
FOR THE
POWERALL POWER UNIT**

**PREPARED BY
ALAN P. SCHLIE
FORCE INTEGRATION TEAM**

**DIRECTORATE OF COMBAT DEVELOPMENTS
U.S. ARMY ENGINEER SCHOOL
FORT LEONARD WOOD, MISSOURI**

Purpose/Objective

Evaluate use of a single power source – the PowerAll Power Pack system to replace three separate systems: a trailer mounted air compressor, a trailer mounted electric pioneer tool set, and the hydraulic tools associated with the Small Emplacement Excavator (SEE) and selected combat vehicles (M1 and M88) – to complete selected construction METL tasks.

Description

A commercially available power unit, providing three types of power circuits – hydraulic, pneumatic, and electric – is used to power construction type, power operated hand tools. Included are: two hydraulic tool circuits of 0-15gpm @ 2000psi, pneumatic tool circuit of 185cfm @ 125psi, electrical power outlets which will provide 9000W, 120/240 VAC, 60HZ. This system will be utilized to accomplish selected METL tasks and other activities in a combat heavy engineer unit.

Evaluation Concept

The 52nd Engineer Battalion, Fort Carson, CO will participate as the test unit, designating an evaluation team and a test unit. TEXCOM and USAES will monitor all tests. Once the data is compiled, an evaluation will be made to determine if the PowerAll Power Pack system meets USAES needs.

Scope

The test unit will be provided with a commercially available power unit capable of providing all three types of power circuits and selected hand tools. The power unit will be utilized to accomplish tasks in various scenarios – maintenance work with pneumatic hand tools and construction work with electric, pneumatic, and hydraulic hand tools. Use a combination of hand tools from the power unit supplier and power tools all ready available in the army system and on-hand in the unit. In addition to the operating power tools for construction and various maintenance tasks, the unit can provide power to operate electrical devices such as computers, test equipment, welders, and radios. The power pack adequacy and versatility will be evaluated by comparison to current MTOE equipment. If an equipment comparison is not possible, pertinent comments will be made by subject matter experts and provide data as necessary to be used in developing an evaluation report. Scenarios will allow the test unit to utilize the equipment to perform METL and administrative tasks across the widest spectrum of operating, terrain, and weather conditions.

Background

The PowerAll Power Pack system is a commercially available unit leased through Mobile Tool International, of Westminster, CO. It is a truck mounted unit which shows promise of replacing multiple, single-type power sources. Aviation and Troop Support Command (ATCOM) is currently developing a Pioneer Tool Outfit capable of providing pneumatic and hydraulic power for hand tool operation, but the developmental process is very slow. This commercially available unit is being evaluated for use as a truck mounted unit and as a trailer mounted unit.

Concept of Employment

It is envisioned that the PowerAll power pack will perform a variety of tasks that would normally require the use of several pieces of equipment. The power pack will be used during troop construction projects, maintenance activities, field training exercises, and deployments.

Operational Issues and Criteria

- 1.0 **Issue.** Can engineer units effectively operate the PowerAll Power Pack equipped medium truck to power construction type power tools and equipment?
- 1.1 **Scope.** This issue addresses the operational effectiveness by examining both the users capability to operate the Power All Power Pack and it's capability to perform a wide range of construction tasks. User data will be collected on the complexity of operating and connect/disconnect of the power tools and equipment. The PowerAll Power Pack medium truck provided for the evaluation will be evaluated in a benign environment, IAW scenarios supporting Corps operations. The issue will also provide an indication as to whether an advantage is gained, in comparison to organic equipment by using the PowerAll Power Pack truck. Some criteria do not provide a measure of performance and are meant to be investigative in nature to provide data for the evaluator.
- 1.2 Criteria
 - 1.2.1 The PowerAll Power Pack truck must not present a cumbersome task to operate construction power tools and equipment.
 - 1.2.2 The PowerAll Power Pack medium truck must allow the operator to adequately perform construction missions within reasonable time as compared to other organic power tool assets.
- 2.0 **Issue.** Is the PowerAll Power Pack truck operationally safe and dependable?
- 2.1 **Scope.** This issue addresses the PowerAll Power Pack medium truck capability to provide safe and dependable operation while conducting construction missions. Data will generally be collected on data collection forms, however, when an unsafe act or incident occurs, operations will cease and the incident will be investigated and all resulting data stored on a test incident report (TIR). Once the test officer is satisfied the incident was corrected, the evaluation will resume. Data will also be collected by data collection forms and TIR, when applicable, and on all failures of the PowerAll Power Pack medium truck during all phases of the evaluation. Some criteria do not provide a measure of performance and are meant to be investigative in nature to provide data for the evaluator.
- 2.2 Criteria
 - 2.2.1 The PowerAll Power Pack medium truck must not present a driving hazard to its operator.
 - 2.2.2 Operation, hook-up and disconnect of power tools must not present a safety hazard to the operator or bystanders while performing operational missions IAW parameters established for normal operation of the PowerAll Power Pack medium truck.
 - 2.2.3 The PowerAll Power Pack medium truck must provide the users a reliable means relative to maintenance and availability; in comparison with other organic haul assets.

Analysis of Results

- a. Is any special training needed to operate the PowerAll Power Pack system? **No.** Operation of the PowerAll, while requiring some specific training, did not consist of skills different than for other systems, which are unit taught.
- b. Was there a noticeable difference in the operation of tools powered by the PowerAll Power Pack, when compared with the normal power source? **No.** Tools were interchangeably powered by the PowerAll, and generators, or air compressors, or hydraulic units, without a noticeable difference.
- c. The PowerAll unit represented a much needed improvement to task completion: Tools were securable, adequate in operation; the unit was maneuverable at the job site, and the savings in time realized were based on these characteristics. The time spent in relocating power sources and securing them at the end of the work day represented a significant investiture of man-hours that were more profitably spent completing tasks on the job site.
- d. Did the PowerAll Power Pack provide an operational advantage when compared to other organic power sources? **Yes.** The PowerAll's advantage lay in its configuration of three separate power sources on a single chassis, all drawing power from a single source – the vehicle engine via the PTO. The other three separate units, each with a power producing engine, increased maintenance time and parts.
- e. Did the PowerAll Power Pack present an obstacle or hindrance at the jobsite? **No.** The truck mounted PowerAll increased usability on the job site because of its mobility and location of connection points. It could be repositioned easily, even for short distances, and did not require a separate prime mover each time a trailer unit had to be moved or returned to the motor pool, as opposed to the relocation of a generator, which could take 4-6 people to manhandle, once they were drawn away from the tasks they were engaged in.
- f. Were deficiencies noted on the PowerAll Power Pack system operational performance? **No.** Throughout the test period, problems encountered by the SME's were corrected by the operators, unit mechanics, or MTI personnel.

SME Comments

1. Saved manpower, eliminated need to manhandle separate, trailer or ground mounted power sources.
2. Saved time on the work site during setup and operation, power provided where and when needed, and control of tools.
3. Gauges and controls are easily accessible from a soldier standing on the ground. No protuberances.
4. Automatic shutoff of power unit allowed for foolsafe operation. System shut down automatically if the operator did something wrong, or a problem was diagnosed.
5. PowerAll was quieter than the generators currently used in the field.

Overall Evaluation

- a. The effectiveness of the PowerAll Power Pack in replacing three separate power systems- a trailer mounted air compressor, a generator from a trailer mounted electric tool trailer, and a hydraulic power unit, such as is associated with a Small Emplacement Excavator (SEE) – to provide the power to operate selected hand tools in the completion of selected METL tasks was evaluation against two issues consisting of five criteria.
- b. The first issue determined if engineer units could effectively operate the PowerAll Power Pack system equipped to power construction type power tools and equipment. The first criteria were that the PowerAll must provide adequate electrical, hydraulic, and pneumatic power to operate the construction tools currently associate with the SEE, trailer mounted air compressor and the trailer mounted electric pioneer tool set. The second criteria was that the PowerAll and medium truck as a system must allow the operator to adequately perform construction missions within reasonable time as compared to other organic power assets.
- c. The second issue was to determine if the PowerAll Power Pack and truck system were operationally safe and dependable. The first criterion was to determine if the PowerAll or truck presented an operational or driving hazard to the operator. Secondly, did the operation of the tools, or associated activities, provide a safety hazard to the operator or bystanders. And thirdly, was the system reliable relative to maintenance and availability.

Conclusions

- a. The PowerAll Power Pack provides an improved method of supplying pneumatic, hydraulic and electric power for the operation of construction hand tools as currently exist within engineer TOEs.
- b. The PowerAll unit compares favorably in safety of operation, training required and maintenance procedures to current systems. It provides a marked advantage in being a single system replacing three systems from both the operational and sustainable aspects. Its commonality with existing TOE hand tools, current commercial hand tools, and future hand tools is also a plus.
- c. Being vehicular mounted could be a potential drawback when compared to the current systems and planned Pioneer Tool Outfit, all of which are trailer-mounted systems.

Recommendations

Through NDI, development of tow complete (with tools) systems – one vehicular mounted and the other trailer mounted. One of each system to be fielded to selected engineer companies to replace the current air compressors, hydraulic tool sets, and Pioneer electrical tool sets.