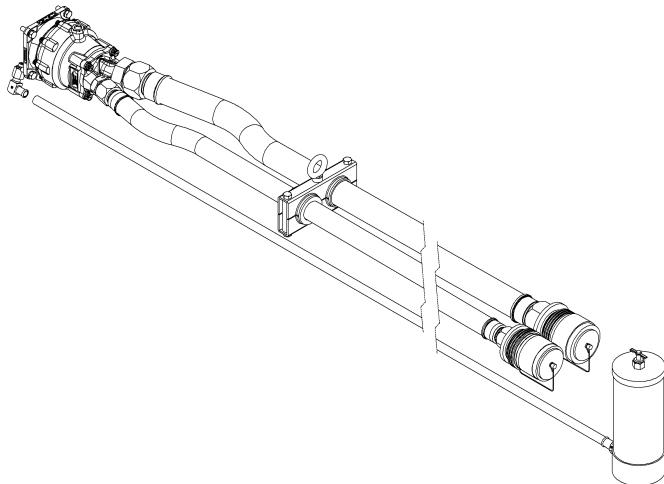




OPERATION & SERVICE MANUAL



**Models: AGE10600E
Ground Test Tool
A318-A340, 747-8 Ram Air Turbine**



02/2025 – Rev. 03

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| REVISION | DATE | TEXT AFFECTED |
|----------|---------|---|
| 01 | 01/2019 | Original release |
| 02 | 06/2020 | Updated Parts List |
| 03 | 02/2025 | Modified 1.5 Relevant Standards, 9.3 Technical Specifications, and Parts List |

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This product can not be modified without the written approval of Tronair, Inc. Any modifications done without written approval voids all warranties and releases Tronair, Inc., its suppliers, distributors, employees, or financial institutions from any liability from consequences that may occur. Only Tronair OEM replacement parts shall be used.

1.0 PRODUCT INFORMATION**1.1 DESCRIPTION**

Ground Test Tool

1.2 MODEL & SERIAL NUMBER

Reference nameplate on unit

1.3 MANUFACTURER

TRONAIR, Inc.

1 Air Cargo Pkwy East
Swanton, Ohio 43558 USA

Telephone: (419) 866-6301 or 800-426-6301

Fax: (419) 867-0634

E-mail: sales@tronair.com

Website: www.tronair.com

1.4 FUNCTION

The Ground Test Tool (GTT), powered by a suitable hydraulic cart, is used to back drive the Ram Air Turbine (RAT) during ground check out. The ground tests are to be performed in accordance with the airframer's AMM and RAT manufacturer's instructions.

This Ground Test Tool is to be operated only by qualified trained technicians.

This Operation and Service Manual is to be used only by qualified trained technicians.

1.5 RELEVANT STANDARDS

1. The GTT has been designed to comply with the following directives:

— 2006/42/EC: Machinery Directive

2. The following standards were used as guides to design the GTT:

— ISO 4413:2010

— BS EN 1915-1.2013

1.6 OVERVIEW

The GTT is composed of a hydraulic motor, and adaptor plate, a splined adaptor shaft, two hoses approximately 20 ft (6.1 m) long with couplings for connection to a hydraulic cart, a strap and hook assembly for supporting the hose by the fuselage, and a storage case.

1.7 MATING COUPLINGS AND PLUGS

Couplings:

Inlet..... Tronair # N-2479

Outlet Tronair # N-2480

Plugs:

Inlet Tronair # N-2474-04

Outlet Tronair # N-2474-05

Ref: KHC-1468 Coupling Kit

2.0 SAFETY INFORMATION**2.1 USAGE AND SAFETY INFORMATION**

To ensure safe operations please read the following statements and understand their meaning. Also refer to your equipment manufacturer's manual for other important safety information. This manual contains safety precautions which are explained below. Please read carefully.



WARNING! — Warning is used to indicate the presence of a hazard that ***can cause severe personal injury, death, or substantial property damage*** if the warning notice is ignored.

CAUTION! — Caution is used to indicate the presence of a hazard that ***will or can cause minor personal injury or property damage*** if the caution notice is ignored.

2.2 EXPLANATION OF WARNING AND DANGER SIGNS

- Misuse of machine can cause personal injury and/or property damage.
- Operation of the GTT must be in accordance with this manual, and the Airframe/RAT Manufacturer's Instructions

2.3 COMPONENT SAFETY FEATURES

Pressure rating safety factors are in accordance with EN 982:1996.

2.4 FEATURES FOR OPERATOR SAFETY

- Safeguards against hazards created during the ground checkout must be provided by others in accordance with the Airframe/RAT Manufacturer's Instructions, and all applicable regulations.
- Motor Drain Kit – a hose and container for capturing fluid should a motor shaft seal fail. Hydraulic power MUST BE REMOVED IMMEDIATELY if fluid is seen in the clear hose or container.

2.5 PERSONAL PROTECTIVE EQUIPMENT

- Operators must use personal protective equipment in accordance with their employer's requirements.
- See airframe/RAT manufacturer's information on maximum sound levels during ground check out.

2.6 SAFETY GUIDELINES

Any uses other than those identified in Section 1.1 of this manual are prohibited.

2.7 CONDITIONS FOR SAFE USE

- Temperature Range: -10° F thru +120° F (-23° C thru +49° C)
- Operate in accordance with airframe/RAT manufacturer's instructions.

2.8 TECHNICAL EXPERTISE**2.8.1 For Installation**

The installation of this tool is to be completed by qualified aircraft technicians. See Section 4 for installation information.

2.8.2 For Operation

This tool is to be used by skilled and trained aircraft technicians in accordance with this manual, and the airframe/RAT manufacturer's instructions. See Section 6 for Operation Instructions.

2.8.3 For Maintenance

This machine is to be maintained by qualified maintenance personnel. See Section 10 for maintenance information.

2.9 Additional Safety Information

Safeguards in accordance with airframe/RAT manufacturer's instruction must be used.

**WARNING!**

- **ALWAYS follow the airframe/RAT manufacturer's instructions when testing the RAT.**
- **ALWAYS use applicable safety equipment required for RAT ground checkout tests.**

3.0 PREPARATION PRIOR TO FIRST USE

Attach the fluid drain kit hose to the fitting on the bottom of the hydraulic motor.

3.1 INSTALLATION REQUIREMENTS

Hydraulic Cart requirements: 37 gpm @ 3,000 psi (140 lpm @ 207 bar)



WARNING!

Do not exceed 3,100 psi (214 bar) rated supply pressure to motor.

3.2 PERSONNEL REQUIREMENTS (TECHNICAL EXPERTISE) FOR INSTALLATION

This tool is to be installed and used by qualified aircraft mechanics in accordance with this manual, and employer and airframe/RAT manufacturer instructions.

3.3 SPECIFICATIONS AND STANDARDS

Motor/Adaptor/Spline/Fitting Weight.....Approximately 9 lbs (4 kg)

Hose Length.....Approximately 20 ft (6.1 m)

FluidAviation Phosphate Ester Type IV or V

Note: The Tronair nameplate information supersedes the motor manufacturer's data plate.

3.4 REQUIRED MATERIALS FOR INSTALLATION

- 37 gpm @ 3,000 psi (140 lpm @ 207 bar) Hydraulic Cart
- Aviation Phosphate Ester Type IV or V hydraulic fluid as required

3.5 INSTALLATION PROCEDURE

NOTE: See Section 6.5 Preparation Prior to First Use before attaching the GTT to the RAT.

1. Remove any protective covers on the RAT generator/GTT interface.
2. Remove the GTT from the case by carefully un-coiling the hoses, and lift the motor out of the case. Do NOT lift motor by the hoses as premature wear may occur.
3. Attach the GTT to the interface on the back of the RAT generator, with drain hose facing downward, while ensuring the splined shaft properly engages the mating female spline in the RAT generator shaft.
4. Secure the GTT to the RAT by tightening the four (4) 5/16-28 fasteners to 86 – 95 lb-in (9.7 – 10.7 N-m).
5. Be sure to support the hoses attached to the motor by hanging them from the RAT bay opening.
6. Connect the pressure hose to the proper coupling directly on the hydraulic cart (supply). Do NOT use additional lengths of hose as diminished performance may occur.
7. Connect the return hose to the proper coupling directly on the hydraulic cart (return to tank). Do NOT use additional lengths of hose as diminished performance may occur.

3.6 INSPECTION AND TESTING PROCEDURE UPON INSTALLATION

- Verify that the couplings are properly engaged.
- Verify that all fasteners on the GTT are properly tightened.
- Verify that all hydraulic connections are tight.
- Verify that the support is properly installed.
- Verify the drain hose is facing downward off the motor and connected to the container.

4.0 TRAINING

4.1 TRAINING REQUIREMENTS

- GTT operators **MUST** be properly trained in all aspects of aircraft RAT ground check out.
- It is the employer's responsibility to ensure that the operator is qualified to use this tool.
- This GTT Operation and Maintenance Manual does not provide qualified training to perform aircraft RAT ground checkout tests.

4.2 TRAINING PROGRAMS, MANUALS, METHODS, SUPERVISORS, AND OPERATORS

- Tronair does not provide training materials beyond the scope of this manual.
- It is the employer's responsibility to provide any training requirements beyond the scope of this manual.

5.0 OPERATION**5.1 OPERATING PARAMETERS**

- Ground checkout tests
- Temperature Range: -10° F thru +120° F (-23° C thru +49° C)

5.2 NUMERICAL VALUES AND LIMITS**5.2.1 General****Phosphate Ester fluid**

Fluid consumption 37 gpm (140 lpm)
Maximum Pressure 3,100 psi (214 bar)

5.2.2 DIMENSIONS**Case:**

| | |
|----------------------------|----------------------|
| Length | 42 3/4 in (108.6 cm) |
| Width | 42 3/4 in (108.6 cm) |
| Height | 12 in (30.5 cm) high |
| Pressure Supply Hose | 20 ft (6.1 m) long |
| Return Hose | 20 ft (6.1 m) long |
| Motor weight | 9.0 lbs (4 kg) |

5.3 FEATURES

- The hydraulic motor provides power and speed capabilities consistent with the requirements of the ground checkout procedure in a weight and envelope that can safely be supported by the RAT.
- The GTT tool provides custom designed adaptor plate and splined shaft developed in conjunction with Hamilton Sundstrand for proper fit and operation.
- The specially designed storage case can be used for shipping the tool.

5.4 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment must be used in accordance with employer's instructions, and local and federal regulations.

5.5 CHECKS PRIOR TO START UP

- Verify that the couplings are properly engaged.
- Verify that all fasteners on the GTT are properly tightened.
- Verify that all hydraulic connections are tight.
- Verify that the return port on the ground cart is open before applying supply pressure.
- Verify that the support is properly installed.

5.6 START UP PROCEDURE

Ensure that steps in 5.5 have been completed.

CAUTION!**To prevent personal injury and/or damage to aircraft:**

- **ALWAYS follow the airframe/RAT manufacturer's instructions when testing the RAT.**
- **ALWAYS use applicable safety equipment required for RAT ground checkout tests.**

5.7 OPERATING PROCEDURES

Basic Operation: Use the hydraulic cart to power the GTT in accordance with the instruction provided with the cart, and the ground checkout procedures for the RAT provided by the airframe/RAT manufacturer.

5.8 STOPPING PROCEDURES

To stop the GTT, reduce or remove the supply of pressurized fluid to the motor.

5.9 EMERGENCY STOPPING PROCEDURES

Follow the emergency stopping procedures provided in the instructions for the hydraulic test cart, and the airframe/RAT ground checkout procedures.

6.0 PACKAGING AND STORAGE**6.1 PACKAGING REQUIREMENTS**

This tool is provided with a storage case that is suitable for shipment.

6.2 METHODS OF HANDLING

- The GTT case can be rolled freely by hand.
- No provisions for lifting by overhead crane are provided.
- No specific methods of handling are required.

6.3 STORAGE

The GTT is suitable for indoor storage. Protect the tool from moist environments.

6.4 STORAGE SPACE AND HANDLING FACILITIES

Minimum Length.....42 $\frac{3}{4}$ in (108.6 cm)

Minimum Width42 $\frac{3}{4}$ in (108.6 cm)

Minimum Height12 in (30.5 cm)

No specific handling facilities are required

7.0 TRANSPORTATION**7.1 HANDLING POINTS**

Handles are provided on three sides of the case for lifting and pulling.

7.2 WEIGHT

78 lbs (35.5 kg)

8.0 TROUBLE SHOOTING

| PROBLEM | PROBABLE CAUSE | REMEDY |
|--|--------------------------|--|
| GTT does not turn the turbine assembly | Turbine lock on | Unlock RAT turbine |
| | Low supply pressure | Ensure hydraulic cart is operating correctly |
| | No flow to motor | Open valves on hydraulic cart |
| | GTT improperly mounted | Correct mounting of GTT |
| | Turbine cannot be turned | Repair RAT turbine |

9.0 MAINTENANCE**9.1 DESCRIPTION OF EQUIPMENT**

Hydraulic Motor – Rebuild services available

9.2 INSPECTION POINTS

- Inspect splined shaft for wear
- Inspect hose connections for leaks

9.3 TECHNICAL SPECIFICATIONS

FluidAviation Phosphate Ester Fluid, Type IV or V

Fluid consumption37 gpm (140 lpm), 3000 psi (207 bar)

9.4 MAINTENANCE PERSONNEL REQUIREMENTS

Maintenance personnel should have a basic knowledge of hydraulic systems.

10.0 PROVISION OF SPARES**10.1 SOURCE OF SPARE PARTS**

Spare parts may be obtained from the manufacturer:

TRONAIR, Inc. Telephone: (419) 866-6301 or 800-426-6301
1 Air Cargo Pkwy East Fax: (419) 867-0634
Swanton, Ohio 43558 USA E-mail: sales@tronair.com
Website: www.tronair.com



For Spare Parts, Operations & Service Manuals or Service Needs:
Scan the QR code or visit Tronair.com/aftermarket

10.2 RECOMMENDED SPARE PARTS LISTS

TF-1117-19*240 Hose, Return
TF-1117-18*240 Hose, Pressure

11.0 IN SERVICE SUPPORT

Contact Tronair, Inc. for technical services and information.

12.0 GUARANTEES/LIMITATION OF LIABILITY

Tronair products are warranted to be free of manufacturing or material defects for a period of one year after shipment to the original customer. This is solely limited to the repair or replacement of defective components. This warranty does not cover the following items:

- a) Parts required for normal maintenance
- b) Parts covered by a component manufacturers warranty
- c) Replacement parts have a 90-day warranty from date of shipment

If you have a problem that may require service, contact Tronair immediately. Do not attempt to repair or disassemble a product without first contacting Tronair, any action may affect warranty coverage. When you contact Tronair be prepared to provide the following information:

- a) Product Model Number
- b) Product Serial Number
- c) Description of the problem

If warranty coverage is approved, either replacement parts will be sent or the product will have to be returned to Tronair for repairs. If the product is to be returned, a Return Material Authorization (RMA) number will be issued for reference purposes on any shipping documents. Failure to obtain a RMA in advance of returning an item will result in a service fee. A decision on the extent of warranty coverage on returned products is reserved pending inspection at Tronair. Any shipments to Tronair must be shipped freight prepaid. Freight costs on shipments to customers will be paid by Tronair on any warranty claims only. Any unauthorized modification of the Tronair products or use of the Tronair products in violation of cautions and warnings in any manual (including updates) or safety bulletins published or delivered by Tronair will immediately void any warranty, express or implied.

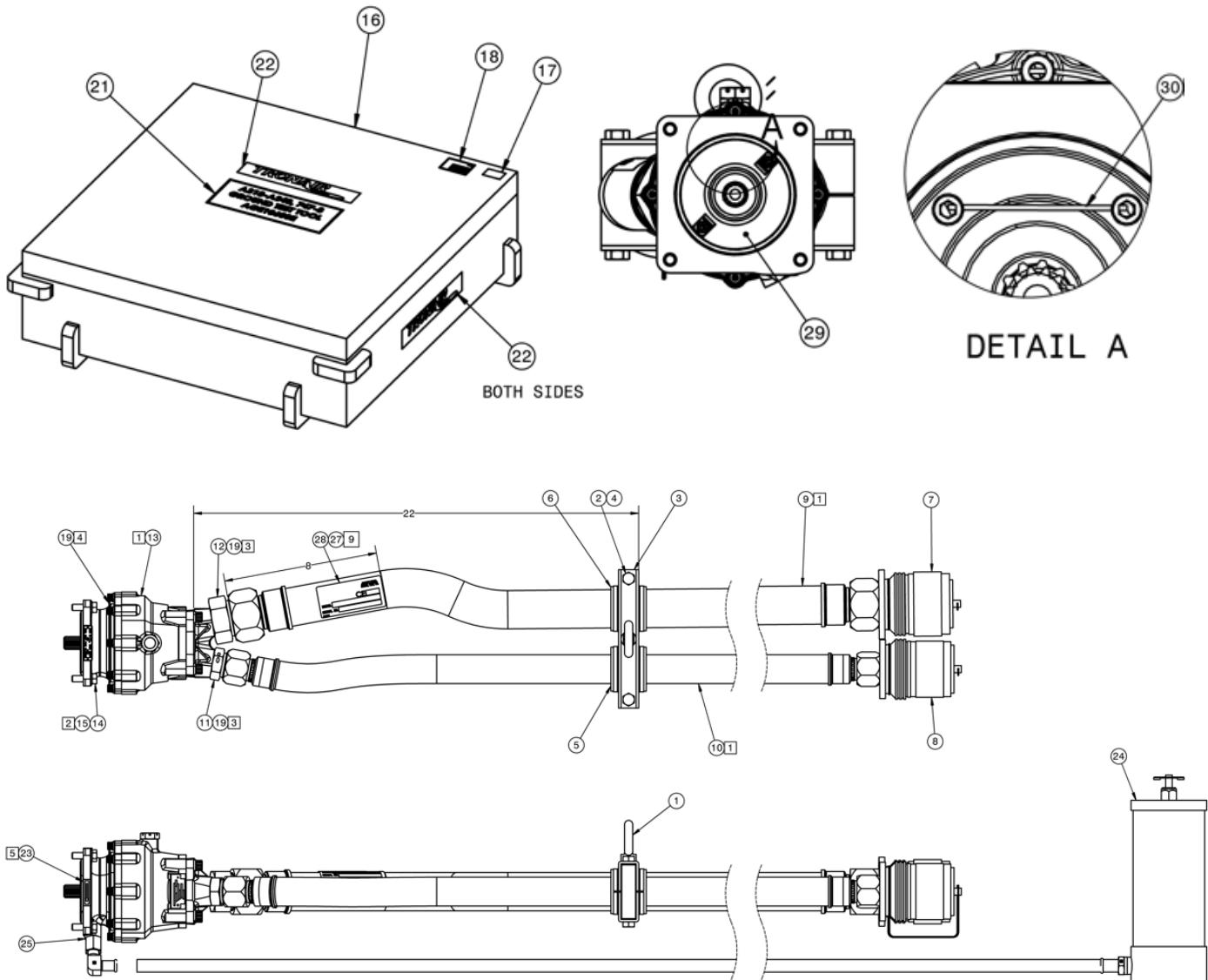
The obligations of Tronair expressly stated herein are in lieu of all other warranties or conditions expressed or implied. **Any unauthorized modification of the Tronair products or use of the Tronair products in violations of cautions and warnings in any manual (including updates) or safety bulletins published or delivered by Tronair will immediately void any warranty, express or implied and Tronair disclaims any and all liability for injury (WITHOUT LIMITATION and including DEATH), loss or damage arising from or relating to such misuse.**

13.0 APPENDICES

APPENDIX I Declaration of Conformity

Parts List

When ordering replacement parts/kits, please specify model, serial number and color of your unit.



Parts List

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

| Item | Part Number | Description | Qty |
|------|----------------|-------------------------------------|-----|
| 1 | G-1330-03 | EYEBOLT, THREADED | 1 |
| 2 | G-1100-107010 | BOLT, 3/8-16 X 1.0" HEX HD GR 5 | 5 |
| 3 | HC-2185-01 | CLAMP, MULTI | 1 |
| 4 | HC-2187-03 | NUT, STACKING | 3 |
| 5 | HC-2186-09 | BUSHING, SPLIT MULTICLAMP | 1 |
| 6 | HC-2186-11 | BUSHING, SPLIT MULTICLAMP | 1 |
| 7 | N-2657 | COUPLING, QUICK DISCONNECT | 1 |
| 8 | N-2656 | COUPLING, QUICK DISCONNECT | 1 |
| 9 | TF-1117-19-240 | ASSEMBLY, HOSE | 1 |
| 10 | TF-1117-18-240 | ASSEMBLY, HOSE #16 (PE) | 1 |
| 11 | N-2841-01-S-E | CONNECTOR, STR THD | 1 |
| 12 | N-2841-02-S-E | CONNECTOR, STR THD | 1 |
| 13 | HC-2442 | MOTOR, HYDRAULIC (PE) | 1 |
| 14 | G-1115 | BOLT, MS | 4 |
| 15 | G-1255-06 | WASHER, 5/16 AN | 4 |
| 16 | H-3768 | CASE RAT STORAGE & TRANSPORT | 1 |
| 17 | V-1001 | LABEL, MADE IN USA | 1 |
| 18 | V-2533 | LABEL, IDENTIFICATION | 1 |
| 19 | H-1608-36.0 | WIRE, SAFETY | 1 |
| 21 | V-2531 | LABEL, AGE10600 | 1 |
| 22 | V-1033 | LABEL, TRONAIR | 3 |
| 23 | V-2543 | LABEL, DIRECTIONAL ARROW | 1 |
| 24 | HC-2822 | ASSEMBLY, DRAIN KIT | 1 |
| 25 | HC-2013-904 | O-RING, SERIES 3 | 1 |
| 27 | V-2609 | LABEL, CLEAR HEAT SHRINK (PRESSURE) | 1 |
| 28 | V-2661 | LABEL, SERIAL NUMBER (CE) | 1 |
| 29 | S-4817 | SHIELD, SPLASH - FORMED | 1 |
| 30 | H-1608-1.77 | WIRE, SAFETY | 2 |



APPENDIX I

Declaration of Conformity



EU Declaration of Conformity

Model Number(s) AGE10600E
Product Type/Name: Ground Test Tool

Declaration: Tronair has assessed the equipment described above against the Essential Health and Safety Requirements of one or more Directives. Based on this assessment, the equipment described above is deemed to comply with the directive(s) listed below.

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Directives: European Machinery Directive 2006/42/EC

Standards: ISO 4413:2010 Hydraulic fluid power –General rules and safety requirements for systems and their components
BS EN 1915-1.2013 Aircraft ground support equipment – General requirements – basic safety requirements

Markings:

The technical documentation for the machinery is available from:

RAUH Hydraulic GmbH
Hallstadtler Straße 63
Email: tronair@rauh-hydraulik.de

Location of Issue: Tronair, 1 Air Cargo Parkway East, Swanton, OH 43558

Identification of person empowered to sign on behalf of the Manufacturer:

Patrick Finch
Quality Assurance Representative