

MIL-T-21571A (Weps)  
28 September 1962

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Superseding  
MIL-T-21571 (Aer)  
7 August 1958

## MILITARY SPECIFICATION

TRACTOR, AIRCRAFT TOWING, GED, 4x4,  
2-WHEEL STEER, 18,000 POUNDS DRAWBAR PULL,  
PNEUMATIC RUBBER TIRES, TYPE TA-18

This specification has been approved by the  
Bureau of Naval Weapons, Department of the Navy

### 1. SCOPE

1.1 Scope: This specification covers two types 4x4, front wheel steer, pneumatic tired, GED tractors intended for use as an aircraft towing and spotting vehicle for large aircraft.

### 2. APPLICABLE DOCUMENTS

2.1 The following specifications, standards and publications, of the issue in effect on the date of invitation for bids, form a part of this specification:

#### SPECIFICATIONS:

##### FEDERAL

ZZ-T-381 - Tires, pneumatic; vehicles and portable equipment

##### MILITARY

MIL-S-10379 - Suppression, radio interference, general requirements for vehicles  
MIL-B-11188 - Batteries, storage, lead-acid (starting, lighting and ignition automotive type)  
MIL-B-13689 - Reflectorized sheeting, adhesive (retro-reflective)  
MIL-E-22246 - Extinguishers; fire, dry chemical, portable  
MIL-T-3351 - Tractor, full-tracked, low speed; tractor, wheeled, agriculture, and tractor wheeled industrial and their attachments; packaging of

#### STANDARDS:

##### FEDERAL

FED-STD-595 - Colors

FSC 1730

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MILITARY

- MIL-STD-129 - Marking of shipments
- MIL-STD-130 - Identification marking of U.S. Military Property

## PUBLICATIONS:

AIR FORCE - NAVY BULLETINS

- No. 143 - Bureau of Aeronautics aeronautical requirements

(When requesting specifications, standards and publications refer to both the title and number. Copies of above specifications may be obtained upon application to the Commanding Officer, Naval Supply Depot, 3801 Tabor Avenue, Philadelphia, Pennsylvania, Attention Code CDS).

2.2 Classification: The tractors shall be classified as follows:

2.2.1 Type I, Tractor: Shall have a power train consisting of a gasoline engine, fully automatic transmission with integral torque converter, auxiliary transmission or transfer box, drive shafts and drive axles of double reduction gear type, with final reduction in the outer hub and of planetary type.

2.2.2 Type II, Tractor: Shall have a power train consisting of a gasoline engine, positive displacement variable volume drive pump, connected by hoses to variable volume positive displacement wheel motors coupled to differential planetary gears in the drive wheels.

### 3. REQUIREMENTS

3.1 Preproduction Model: As soon as practicable after award of the contract or order and prior to submission of any complete unit for final Government acceptance, the contractor shall furnish a preproduction model for the purpose of determining conformance to the provisions of the contract and this specification. The preproduction model shall be comprised of or fabricated from the same type or kind of material, produced by the same methods, and shall be fully representative of the planned production units in all details and respects. Approval of the preproduction model by the Government shall not relieve the contractor of the responsibility to supply units conforming to the contract or this specification. No changes or deviations from the preproduction model will be acceptable without written approval of the contracting officer.

3.2 The specific requirements of the tractor shall be as follows:

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3.2.1 Dimensions and Other Pertinent Data

a. Length: (less couplers)	177 inches $\pm$ 2"
b. Width:	96 inches maximum
c. Height: (less cab)	63 inches $\pm$ 2"
d. Turning radius, maximum outside	298 inches $\pm$ 4"
e. Wheelbase:	102 inches $\pm$ 2"
f. Ground Clearance	13 inches $\pm$ 1"
g. Speed:	20 M.P.H.
h. Four Wheel Drive, Front Wheel Steer	
i. Drawbar Pull:	18,000 pounds minimum
j. Minimum GVW: 25,000 pounds equally distributed on front and rear axles	

3.2.2 Engine: The tractor shall be powered by a commercial standard gasoline engine having positive crankcase ventilation. Horsepower and torque characteristics shall be sufficient to provide the performance specified herein. Engine manufacturer's published ratings for the engine shall not be arbitrarily raised to meet the requirements specified herein. Engine torque and horsepower shall be provided at governed RPM which will assure performance with an adequate margin of safety. Engine capacity shall be such that the continuous-duty horsepower input required by all items driven by the engine shall not exceed 75 per cent of the full throttle setting at sea level and at 60°F.

3.2.2.1 The engine torque, speed, cubic-inch displacement, and horsepower curve shall be compiled and prepared by the engine manufacturer and submitted with the bid on the end item.

3.2.3 Ignition: The tractor shall be equipped with a nominal 12-volt, ignition system. The system shall include ignition switch, ammeter ignition coil, high tension cables, low tension cables, and spark plugs. Grommets shall be provided whenever wiring passes through bulkheads, partitions, or structural members, the system shall comply with the Underwriters' Laboratories, Inc. "Standards for Safety" power-operated industrial trucks (UL 583).

3.2.3.1 Ignition Coil and Ignition Switch: The ignition coil shall be conveniently and accessibly mounted in a position isolated from excessive engine heat such as exhaust manifolds, etc. The ignition switch shall be a heavy duty keyless type, with not less than two positions, "ON" and "OFF" legibly marked.

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3.2.3.2 Distributor: The distributor shall be equipped with a fully automatic centrifugal governor to advance and retard the spark in accordance with standard automotive practice.

3.2.3.3 Alternator and Regulator: An alternator and regulator shall be provided to keep the battery charged and to furnish current for ignition, starting, lighting, and electrical accessories.

3.2.3.4 Alternator: The alternator shall be 12 volt, 60 amp, and shall charge at 20 amp at engine manufacturer's recommended engine idling speed.

3.3 Starting System: The starting system shall consist of a starting motor, solenoid relay switch, neutral safety switch, starter button on the instrument panel and the necessary wiring and heavy duty cables properly assembled in a complete unit.

### 3.3.1 Lighting System Battery and Horn

3.3.1.1 Headlights: The tractor shall be equipped with two dual headlights of not less than 32-candle power. Lamps shall be equipped with wide dispersion type lens, shall be adequately recessed behind the front bumper to prevent damage, and shall be vertically and horizontally readily adjustable in accordance with automotive practice. A protective grill will not be required. The on-off control switch shall be mounted on the instrument panel.

3.3.1.2 Stop and Tail Lights: One red reflector type combination stop light and tail lamp of not less than 15-candle power and 3-candle power respectively, shall be mounted on the rear of the tractor, and be adequately recessed or guarded to protect it against easy damage. The stop light shall operate automatically upon actuation of the service brake. Materials and installation shall conform with the best acceptable automotive practices.

3.3.1.3 Pintle Light: One clear light of not less than 15-candle power shall be mounted on the rear of the tractor for illuminating the rear pintle and tow bar. This light shall be adequately recessed or guarded to protect it against any damage. The on-off control switch shall be mounted on the instrument panel.

3.3.2 Batteries: Each tractor shall be equipped with one 12-volt battery conforming to Type 6TN, Specification MIL-B-11188.

3.3.2.1 Battery Mountings: The battery shall be mounted under the engine hood, or in an easily accessible compartment and readily removable. If mounted outside the battery shall be housed in an individual box, which shall be fitted with a quick release cover to provide for easy inspection and servicing. Covering and positioning shall adequately protect against short circuit contact of electrical wiring and battery straps.

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3.3.2.2 Horn: Tractor shall be equipped with an electrical horn with push button mounted in center of steering wheel. Horn button assembly and the electrical wiring for the horn shall be adequately protected against moisture and inclement weather conditions. Tilt ring in lieu of a push button switch is not acceptable.

3.3.3 Fuel Tank: The capacity of the fuel tank shall insure 8 hours of continuous heavy operating duty. Fuel tank shall be mounted in a protected location not projecting beneath frame of truck, and shall be equipped with a filler tube, a safety filler cap, a float-type rheostat or fuel gauge indicator, a fuel shut-off cock with fuel line connection, an easily accessible drain plug in tank bottom, and an overflow which shall be designed to carry the overflow fuel away from the engine, muffler or muffler tail pipe.

3.3.4 Instruments: The tractor shall be equipped with waterproof gauges and switches. The gauges shall illuminate by rear lighting. Each gauge and switch shall be identified by a metal decal fastened to the instrument panel by two screws. The panel shall contain the following:

Coolant Temperature Gage

Torque Converter Temperature Gage (Type I)

Oil Pressure Gage

Light Switches

Starter Switch

Ignition Switch

Dash Light

Hour Meter

Parking Brake Flasher Light

Ammeter

Fuel Gage

Oil Temperature Gage (Type II)

3.3.5 Radio Suppression: Radio interference suppression shall be in accordance with MIL-S-10379 for non-tactical vehicles.

3.3.6 Dual Exhaust System: The exhaust system shall consist of dual exhaust manifolds and pipes connected to mufflers and extended tail pipes. The tail pipes shall not extend beyond the end of the tractor and shall be secured with adequate brackets. The exhaust gases shall be emitted in a horizontal direction at the rear of the tractor. Muffler and exhaust system shall be constructed, protected or concealed so that inadvertent injuries through burns to operating personnel are virtually impossible.

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3.3.6.1 Muffler: The mufflers shall conform to accepted commercial automotive practice and shall be capable of withstanding repeated backfire (not less than 20 effective trials) of engine without mechanical failure. Spark arresting mufflers are required.

3.3.7 Transmission for Type I: The transmission shall be a heavy duty fully automatic type with integral torque converter and lock-up clutch. It shall have six (6) speeds forward and one (1) speed reverse. All shifting shall be done with a single lever. A neutral safety switch shall be incorporated to allow engine to start in neutral only. The clutches in the transmission shall be of a disc type, oil cooled, hydraulic operated and shall not require adjustment. The torque converter shall be externally cooled by an oil to air cooler located in the engine fan air stream. When transmission is up-shifting or down-shifting shock shall not be transmitted to towed load.

3.3.7.1 Auxiliary Transmission for Type II: An auxiliary transmission or transfer box shall be provided to split the power to front and rear axle. This unit shall contain an inter axle differential of a torque proportioning type, capable of transmitting up to five times the torque of one axle to the other.

3.3.8 Steering for Type I: Steering shall be hydraulic power boosted (2 hydraulic cylinders mounted integrally with axle) accomplished by an automotive type steering wheel.

3.3.8.1 Steering for Type II: Steering shall be hydraulic power boosted (2 hydraulic cylinders mounted integrally and anchored to the frame) accomplished by an automotive steering wheel.

3.3.9 Service Brakes: The service brakes shall be capable of stopping the tractor within 35 feet from a speed of 20 MPH.

3.3.9.1 Parking Brakes: The parking brake on transmission shall be capable of holding the tractor on a 45 per cent grade.

3.3.10 Tire Clearances: When the vehicle is loaded to its gross rated capacity and with the tires inflated to the manufacturer's recommended pressure, sufficient clearance shall be provided for the installation of heavy duty tire chains.

3.3.10.1 Tires: Tires shall be pneumatic, high pressure, conventional, commercial non-directional type tread, conforming to Federal Specification ZZ-T-381. All four tires shall be 11:00 x 24 (12 ply) tube type.

3.3.11 Axles for Type I: The rear drive axle shall be of double reduction gear type. The final reduction shall be in the outer wheel hub



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and shall be of the planetary type. The front axle shall be same as rear except equipped with steering knuckles. Axle to be equipped with a torque proportioning type differential. The outer wheel reduction shall be specified in bid proposal.

3.3.11.1 Wheel Motor Units for Type II: Wheel motor units shall be integral with regard to wheel motor and planetary gear box and suitable means shall be provided for steering and mounting on one end of the vehicle and suitable for rigid mounting on the other end.

3.3.12 Body: The tractor body configuration shall be similar to Figure 1, and shall be constructed of heavy steel plate and shall enclose the engine and all parts requiring protection. The entire outside of the body shall be free of all commercial markings. An adjustable seat with back rest shall be mounted on a spring or an adjustable innerspring arrangement or pneumatic cushion and shall be located directly behind the steering wheel. A cushioned seat shall be provided on the right side for a crew member and a cushion fastened to the frame shall be provided for an additional man. The body shall be designed for and incorporate provisions for mounting a 3-man cab which will completely enclose and protect the driver and two crew members from the elements.

3.3.12.1 Cab: When required, an easily removable cab shall be provided. This cab shall be removed from the first vehicle and reinstalled to verify the ease of removal and reinstallation. The cab shall be designed so that it can be installed or removed from the body without the use of special tools, it shall be equipped with a door on each side, glare proof safety plate windshield. A glare proof glass panel over operator's head, afford maximum visibility in all directions, have three electric windshield wipers, two on front windshield and one on rear windshield. Cab shall be equipped with a heavy duty heater and defroster.

3.3.12.2 Cowl or Hood: The engine shall be completely enclosed with a cowl or hood that is hinged in front and can be easily opened by one man so that the engine could be removed without removing the hood. The cowl or hood shall have sufficient strength to support a 200-pound man.

3.3.13 Pintle: The pintle shall be the Holland Hitch Company automatic coupler, model 400-CA, or the equivalent, and shall be provided on the front and rear of the tractor approximately 16 inches front and 16 inches and 28 inches rear above the ground line.

3.4 Instruction Plates: Each unit shall be equipped with instruction plates, suitably located, describing any special or important procedures to be followed in operating or servicing the unit.

3.5 Fire Extinguisher: A 10-pound capacity dry chemical fire extinguisher in accordance with specification MIL-E-22246 shall be mounted in the cab in a position from which the extinguisher can be readily released in one operation with one hand.

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### 3.6 Finish

3.6.1 Treating and Painting: All exterior surfaces which are normally painted in commercial practice shall be thoroughly cleaned and painted with not less than one coat of metallic base primer and two coats of synthetic enamel in accordance with manufacturer's normal practice. The finish color shall be Yellow No. 13538 conforming to Federal Standard No. 595. Gas tank filler spout and cap shall be painted Brilliant Red.

3.6.2 Striping: The rear flat surface of the vehicle shall be painted Black No. 1775, conforming to Federal Specification No. 595. Then 4-inch stripes of yellow reflectorized-sheeting conforming to MIL-E-13689 shall be applied 4 inches apart, at an incline of 45 degrees from the left and right of vertical to simulate an inverted "V" pattern of yellow and black stripes.

3.6.3 Navy Registration Numbers: Navy registration numbers shall be applied on the vehicle in accordance with Part B, Section 2 of NAVDOCKS TP-TR-2 except red reflectorized sheeting adhesive with aluminum numbers, or letters, as specified in MIL-E-13689 shall be applied in lieu of paint. Registration numbers shall be requested from the Contracting Officer at least four (4) weeks to anticipated shipment date of such item.

## 4. QUALITY ASSURANCE PROVISIONS

4.1 Inspection Responsibility: Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of Tests: The inspection and testing of tractor shall be classified as follows:

- a. Preproduction Testing, paragraphs 4.5 through 4.9
- b. Acceptance Tests, paragraphs 4.6.1 through 4.7.1.1, and paragraph 4.8.2

4.3 Inspection and Tests: The equipment and preparation for delivery thereof shall be given such inspection and tests as may be necessary to determine conformance with this specification.

4.4 Notification: The contractor shall notify the Government Inspector and the Chief of the Bureau of Naval Weapons (SEQ) in sufficient time prior to presenting the preproduction model for acceptance tests so that government representatives may witness all tests. All test equip-



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ment necessary for conducting tests in accordance with this specification shall be supplied by the Contractor. It is to be understood that the methods described herein will in general be used; however, the government reserves the right to use such additional information or methods deemed necessary to determine compliance with the requirements of this specification.

4.5           Preproduction Test Model: Unless otherwise specified in the contract or order, tests of preproduction test model shall be made at the place of manufacture.

4.5.1       Preproduction Sample: The preproduction sample shall be examined, inspected and tested to determine compliance with all provisions of this specification. This model shall be examined and tested also to determine acceptability on the basis of conformance to accepted engineering design practice and of efficiency and safety of the operational characteristics normally available in similar commercial equipment.

4.6           Tests on the preproduction test model shall include, but not necessarily be limited to, the following:

4.6.1       Preliminary Examination

4.6.1.1      Inspect the tractor for the following conditions:

4.6.1.1.2    Check the coolant level, engine crank case oil, hydraulic oil levels, check the fuel level, check fuel gage for accuracy at full, one-half full, and empty.

4.6.2       Lubrication Inspection: Observe the lubrication of every fitting on the machine in order to determine compliance with the following requirements of this specification.

4.6.2.1      That the tractor is designed for lubrication by standard military lubricants.

4.6.2.2      All fittings easily accessible.

4.6.2.3      Fittings in vulnerable positions are protected by recessing or bosses.

4.7           Automatic Transmission Brake Band

4.7.1        Check APERTURES in the floor boards to determine if they are large enough to allow easy adjustments to the transmission bands, if applicable.

4.7.1.1      Check to determine that oil cooler brackets or other obstacles

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do not interfere with the adjustments of the transmission bands.

#### 4.8 Preliminary Examination

4.8.1 Tests on the preproduction test model shall include, but not necessarily be limited to, the following:

4.8.2 Drawbar Pull: Tractive effort shall be measured to determine minimum requirements of ultimate drawbar pull of 18,000 pounds at a speed of not less than 1 MPH. This test shall be conducted on all production units.

4.8.3 Endurance Test: The tractor, with a towed load of not less than 150,000 pounds, shall be driven over a smooth paved road at a sustained speed of not less than 10 miles per hour for a period of not less than four hours. During this operation observe temperature gages for overheating, pressure gages for low pressure, ammeter for low charging rate, unusual noises and operating deficiencies.

4.8.4 Torque Converter Test for Type I: Immediately following the test outlined in paragraph 4.8.3, the vehicle torque converter fluid temperature shall be recorded. With the vehicle transmission in the maximum reduction, hold vehicle from moving with vehicle brakes, accelerate engine to just below stall RPM. The vehicle shall be held in stationary position for a period of one minute. The converter oil temperature shall not exceed 250°F in an ambient temperature of 125°F. For testing purposes and to avoid the necessity of operation in a 125°F ambient, the differential between actual ambient and 125°F will be appropriately added or subtracted.

4.8.5 Turning Test: The tractor shall be driven in full 360° turns to the right and to the left and the turning radius shall not exceed 272 inches.

4.8.6 Pull Test for Type I: With a towed load of 75,000 pounds the tractor gear shall be shifted through all forward gears without stopping the tractor. On a 10 per cent incline the tractor shall be capable of being shifted to lower gear ranges without stopping and with a minimum effort to the operator.

4.8.6.1 Pull Test for Type II: With a towed load of 75,000 pounds the tractor shall be driven through all gears or through the complete stepless range without stopping the tractor. On a 10 per cent incline the tractor shall be capable of being shifted to lower ranges without stopping and with a minimum effort by the operator.

4.8.7 Radio Interference Suppression: The production test model, radio

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interference suppressed in accordance with the requirements of Specification MIL-S-10379 will be tested as described in that specification by authorized representatives of the Contracting Officer.

4.8.8 Breaking Test: The tractor shall be capable of coming to a complete stop within 35 feet from the instant of brake pedal application at a speed of 20 m.p.h. The parking brake shall be capable of holding the tractor on a 45 per cent grade. This test must be repeated six times without engine power available.

4.8.9 The main frame and related structure shall withstand the impact of driving over 4 x 4 inch boards spaced at frequent intervals at a speed not less than 8 M.P.H. and sufficient trials to satisfy Government Inspector that no overstressed parts exist.

4.8.10 Tire Chains: The tire chains shall be installed and the tractor driven to show that ample room exists.

4.8.11 Cab: When required the cab shall be removed from the body and shall be reinstalled to demonstrate the ease or difficulty of changing cabs.

4.8.12 After Tests: After the foregoing performance tests, and after any individual test made at his discretion, the Government Inspector shall check carefully to determine conformance with the requirements of this specification. Excessive noise in the power train which, in the opinion of the inspector, is due to defective material or workmanship, shall be cause for disassembly and repair of the power train of the tractor under test, and of all other tractors of the same contractor where the same fault is revealed.

4.9 Service Tests: The Government reserves the right to conduct an extended service test of 500 miles or more on any tractor being furnished under the contract as deemed necessary by the Bureau of Naval Weapons. Unless otherwise specified the test will be conducted at a government proving ground. This test shall be for the purpose of determining mechanical faults, if any, which are due to poor workmanship or the use of inferior materials. All such faults revealed by these tests shall be corrected by the Contractor at no expense to the government, on all tractors where the same faults are revealed.

4.10 Production Tests: The Government Inspector shall test not less than 4 per cent of the units produced under a given contract as outlined under paragraphs 4.5 through 4.8.12.

4.11 Acceptance Tests: All vehicles shall be inspected and tested in accordance with paragraphs 4.6 through 4.7.1.1.

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## 5. PREPARATION FOR DELIVERY

5.1 Level B, Type III: When specified in the contract or order the tractors, component parts, accessories, repair parts, tools and publications shall be packed in accordance with Specification MIL-T-3351, Type III.

5.2 Level C: Unless otherwise specified the tractors, component parts, accessories, repair parts, tools and publications shall be packed in accordance with Specification MIL-T-3351.

5.3 Marking: In addition to any special marking required, packages, shipping containers, unboxed tractors and semi-boxed tractors shall be marked in accordance with Standard MIL-STD-129.

## 6. NOTES

6.1 Intended Use: Tractors covered by this specification are intended for use in towing aircraft and other aeronautical equipment in all types of weather and from minus 25°F to plus 125°F. The tractor will be used in towing aircraft in rain, snow and sleet storms on concrete, sand, clay or rough terrain.

6.2 Service Organizations: A major factor in approving a manufacturer for the herein described unit shall be the ability of said manufacturer to provide an adequate service organization in the close vicinity of Naval Air Station, Brunswick, Maine; Naval Air Station, Patuxent River, Maryland; Naval Air Station, Alameda, California; Naval Air Station, Jacksonville, Florida. A service organization shall be considered adequate when it can provide:

- a. Normal field replacement parts.
- b. Services of factory trained mechanics that have had experience on all wheel drive vehicles.
- c. Repair and/or overhaul facilities.
- d. Expedite handling or service problems requiring factory coordination.

The name and address of the bidder's distributor shall be submitted with the bid proposal.

6.3 Requirements For Descriptive Literature: Descriptive literature as specified in this Invitation for Bids must be furnished as part of the bid and must be received before the time set for opening bids. The literature furnished must be identified to show the item in the bid to which it per-

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tains. The descriptive literature is required to establish, for the purpose of bid evaluation and award, details of the product the bidder proposes to furnish as to the following items:

- a. Make and model of engine.
- b. Make and model of transmission and of torque converter.
- c. Type of inter-axle differential for Type I.
- d. Make and type of axles for Type I.
- e. Make and model of alternator.
- f. Make and model of starter.
- g. Make and type of steering gear and steering pump.
- h. Weight of tractor including fuel, oil and coolant.
- i. Weight of front of tractor.
- j. Weight of rear tractor.
- k. A flat size drawing to scale with dimensions, showing the left side view, top view, rear view and front view.

Failure of descriptive literature to show that the product offered conforms to the specifications and other requirements of this Invitation for Bids will require rejection of the bid. Failure to furnish the descriptive literature by the time specified in the Invitation for Bids will require rejection of the bid, except that if the material is transmitted by mail and is received late, it may be considered under the provisions for considering late bids, as set forth elsewhere in this Invitation for Bids.

NOTICE: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any other obligation whatsoever; and the fact that the Government may have formulated, furnished or in any way supplied the said drawings, specifications or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

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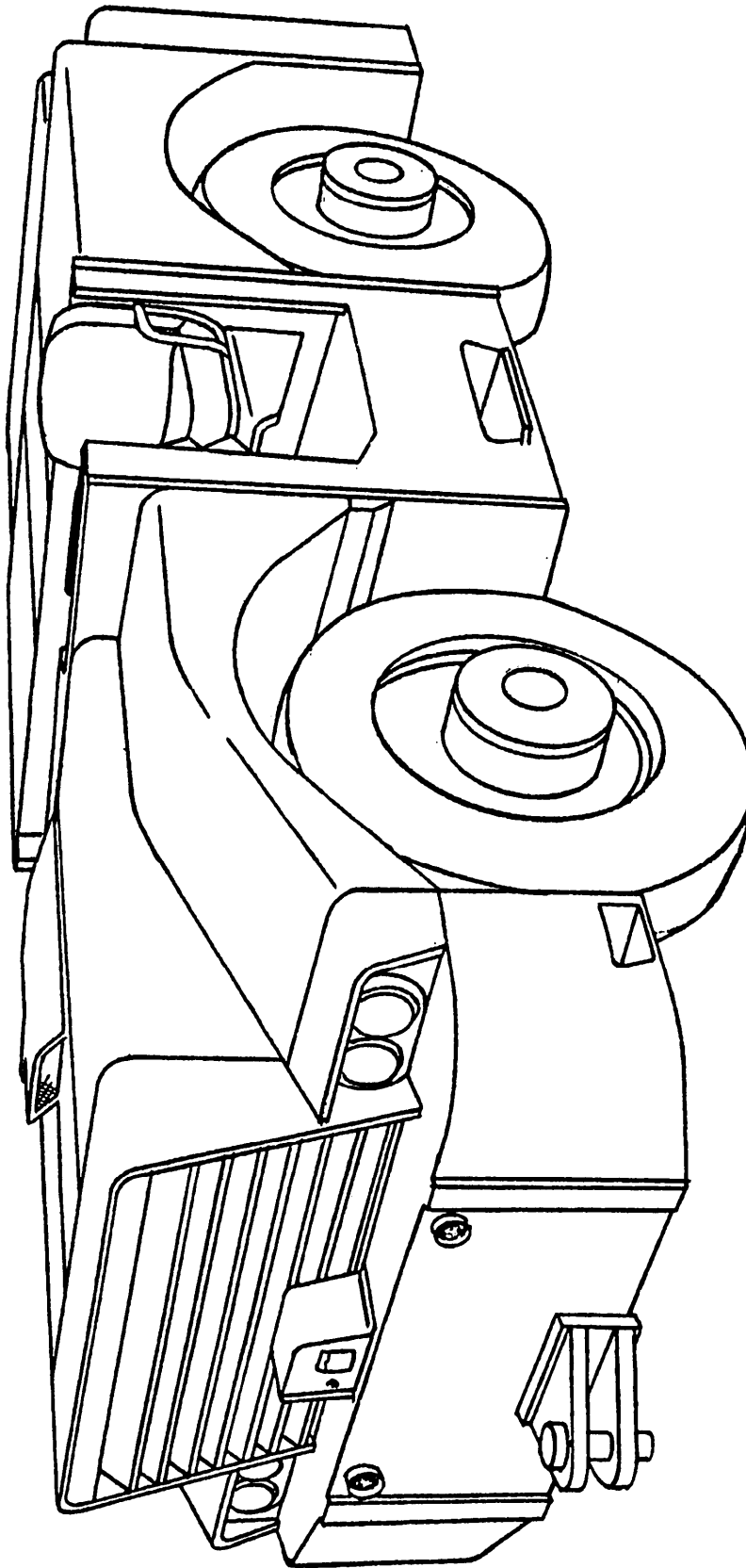


FIGURE #1