UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
TOP-2-2-602		

4. TITLE (and Subtitle)
US ARMY TEST AND EVALUATION COMMAND
TEST OPERATIONS PROCEDURE
ACCELERATION; MAXIMUM AND MINIMUM SPEEDS

5. TYPE OF REPORT & PERIOD COVERED
Final report

6. PERFORMING ORG. REPORT NUMBER
test operations procedure

7. AUTHOR(s)

8. CONTRACT OR GRANT NUMBER(s)

9. PERFORMING ORGANIZATION NAME AND ADDRESS
US ARMY ABERDEEN PROVING GROUND (STEAP-MT-M)
ABERDEEN PROVING GROUND, MARYLAND 21005

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
DARCOM-R 310-6

11. CONTROLLING OFFICE NAME AND ADDRESS
US ARMY TEST AND EVALUATION COMMAND (DRSTE-AD-M)
ABERDEEN PROVING GROUND, MARYLAND 21005

12. REPORT DATE
8 August 1980

13. NUMBER OF PAGES
7

14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)

15. SECURITY CLASS. (of this report)
Unclassified

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

LEVEL II

16. DISTRIBUTION STATEMENT (of
Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

NOV 18 1980

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Acceleration	Minimum speed
Automatic transmission	Throttle
	Vehicle, tracked
Gear shift	Vehicle, wheeled
Maximum speed	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
Describes the method of acceleration for achieving maximum and minimum speeds of tracked or wheeled vehicles.

80 11 12 041

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

041750

AD A091708

US ARMY TEST AND EVALUATION COMMAND
TEST OPERATIONS PROCEDURE

DRSTE-RP-702-101
*Test Operations Procedure 2-2-602 8 August 1980
AD No.

ACCELERATION; MAXIMUM AND MINIMUM SPEEDS

			Page
Paragraph	1.	SCOPE	1
	2.	FACILITIES AND INSTRUMENTATION	1
	2.1	Facilities	1
	2.2	Instrumentation	2
	3.	PREPARATIONS FOR TESTS	2
	3.1	Vehicle Preparations	2
	3.2	Instrumentation	2
	4.	TEST CONTROLS	2
	5.	PERFORMANCE TESTS	3
	5.1	Acceleration Tests	3
	5.2	Maximum- and Minimum-Speed Tests	4
	6.	DATA REDUCTION AND PRESENTATION	5
	6.1	Acceleration Tests	5
	6.2	Maximum- and Minimum-Speed Tests	5

1. SCOPE. This TOP describes how tracked- and wheeled-vehicle-acceleration and minimum- and maximum-speed tests are conducted. The conditions for the tests are also detailed.

2. FACILITIES AND INSTRUMENTATION.

2.1 Facilities.

ITEM	CHARACTERISTICS
Hard-surfaced, straight road at least 2 km long	Level, bituminous or concrete

Accession For
NTIS GRA&I
DTIC TAB
Unannounced
Justification
By
Distribution/
Availability Codes
Dist | Avail and/or Special
A

*This TOP supersedes MTP 2-2-602, 23 March 1966.

Approved for public release; distribution unlimited.

2.2 Instrumentation.

ITEM	MAXIMUM PERMISSIBLE ERROR OF MEASUREMENT*
Speed-measuring device	± 0.2 km/hr, or ± 0.2 mph
Engine tachometer	± 0.5% of full-scale range
Timing device as appropriate	± 0.1 sec.
Recording device as required	System dependent

*Values may be assumed to represent ± 2 standard deviations; thus, the stated tolerances should not be exceeded in more than 1 measurement out of 20.

3. PREPARATIONS FOR TESTS.

3.1 Vehicle Preparations.

a. Prepare the engine, transmission, and when applicable, the governor, for maximum performance per vehicle specifications.

b. Make all pertinent adjustments, such as brakes, throttle linkage, track tension, tire inflation, ignition timing, etc., to comply with specifications.

c. Lubricate all components with the proper quantity and grade of lubricant, and maintain proper levels throughout the tests.

d. Load the vehicle with its normal payload or combat weight. Actual or simulated payload weight shall be prepared in advance.

e. Engine, transmission, and vehicle preparations mentioned above do not apply when the vehicle is being tested in an "as received" condition, or when the effect of completed durability operation on speed and acceleration is desired.

3.2 Instrumentation. Install the speed-measuring device, engine tachometer and suitable timing devices.

4. TEST CONTROLS. Observe the following test restrictions:

a. The road surface shall be smooth and hard-surfaced.

b. The grade shall be minimal (0 to 1%).

c. There shall be no precipitation or foreign matter on the road surface.

d. Wind speed shall not be more than 3.2 km/hr (2 mph) if a cross-wind, and not more than 1.6 km/hr if blowing with or against direction of movement.

e. Operate the test item a minimum of one-half hour prior to test to ensure normal, component-operating temperatures.

5. PERFORMANCE TESTS.

5.1 Acceleration Tests.

NOTE: For vehicles that are required to tow a trailer, this test will be performed with and without a fully payloaded trailer.

5.1.1 Methods. Determine full-throttle acceleration under the following conditions:

a. From a standing start, with engine idling, to maximum road speed in each gear or range (or from minimum speeds in the higher gears when torque is insufficient for a standing start). Record time versus vehicle speed at suitable road-speed increments over the operating speed range in each gear to define the characteristic curve.

b. From a standing start, with engine idling, to maximum road speed while shifting only through gears that permit maximum speed to be reached in the shortest possible time. Record time versus vehicle speed at suitable road-speed increments over the operating speed range in each gear to define the characteristic curve.

c. From one predetermined road speed to another, the exact conditions depending upon the type of vehicle being tested. 1/ Record time versus vehicle speed at suitable road-speed increments over the operating speed range in each gear to define the characteristic curve.

d. Make test runs in both directions to negate wind conditions, and make sufficient trials to assure a reliable average value for measurements.

5.1.2 Data Required. Record data as stated in Paragraph 5.1.1.

NOTE: Acceleration time shall be measured from the instant vehicle motion begins. If system-response lag is significant, acceleration time should also be measured from the instant the accelerator is moved.

1/ This subtest is not essential to every test program, but may be conducted at the discretion of the evaluator.

5.2 Maximum- and Minimum-Speed Tests.

NOTE: For vehicles that are required to tow a trailer, this test will be performed with and without a fully payloaded trailer.

5.2.1 Method for Maximum Speed.

a. Set the vehicle to full throttle in the lowest gear or range to obtain maximum speed in that gear.

b. With the vehicle in motion, set the vehicle to full throttle in the next higher gear or range to obtain maximum speed in that gear.

c. Repeat above until all gears or ranges have been tested.

d. Repeat procedures with the vehicle moving in the opposite direction.

5.2.2 Method for Minimum Speed.

a. Set the vehicle to part throttle in the highest gear or range and adjust throttle until minimum speed in that gear is obtained.

b. With the vehicle in motion, set the vehicle to part throttle in the next lower gear or range to obtain minimum speed in that gear.

c. Repeat until all gears or ranges have been tested.

d. Repeat procedures with the vehicle moving in the opposite direction.

NOTE: Minimum speeds are the lowest speeds compatible with smooth engine performance in any given gear or range.

5.2.3 Data Required. Record the following for each measurement taken:

a. Gear or range.

b. Maximum road speed (km/hr) and engine speed (rpm) obtained for each gear or range in each direction.

c. Minimum road speed (km/hr) and engine speed (rpm) obtained for each gear or range in each direction.

6. DATA REDUCTION AND PRESENTATION.

6.1 Acceleration Tests. The average of the data obtained shall be plotted as time (seconds) versus speed (kilometers per hour) as illustrated in Figure 1.

NOTE: Points for which the engine speed exceeded maximum-rated rpm shall be re-run at maximum-rated speed.

6.2 Maximum- and Minimum-Speed Tests. The two readings for each gear or range (one in each direction) for both maximum and minimum speed shall be averaged and presented as the maximum and minimum speed for the individual gear or range.

Recommended changes to this publication should be forwarded to Commander, US Army Test and Evaluation Command, ATTN: DRSTE-AD-M, Aberdeen Proving Ground, MD 21005. Technical information may be obtained from the preparing activity: Commander, US Army Aberdeen Proving Ground, ATTN: STEAP-MT-M, Aberdeen Proving Ground, MD 21005. Additional copies are available from the Defense Technical Information Center, Cameron Station, Alexandria, VA 22314. This document is identified by the accession number (AD No.) printed on the first page.

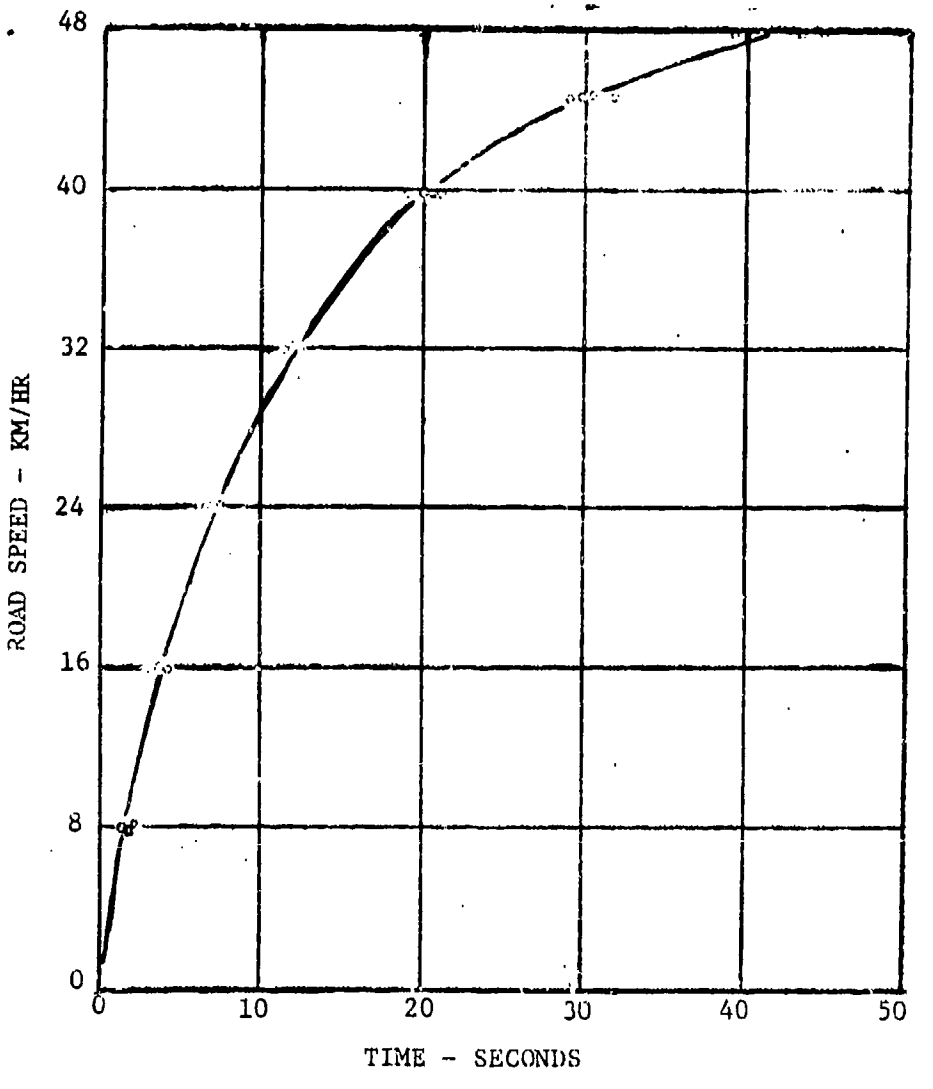


Figure 1. Acceleration (Time-Velocity) Characteristics.

SUPPLEMENTARY

INFORMATION

AD-A091708

US ARMY TEST AND EVALUATION COMMAND
Aberdeen Proving Ground, Maryland 21005

TOP 2-2-602
AD A091708
Change 1

28 January 1981

ACCELERATION; MAXIMUM AND MINIMUM SPEEDS

TOP 2-2-602, 8 August 1980, is changed as follows:

1. Remove pages and insert new pages as indicated below:

Remove pages--	Insert pages--
3 and 4	3 and 4

2. A vertical line in the left margin indicates the changed portion of the revised pages.

3. Attach this sheet to the front of the reference copy for information.

d. Wind speed shall not be more than 10 km/hr (6 mph).

e. Operate the test item a minimum of one-half hour prior to test to ensure normal, component-operating temperatures.

5. PERFORMANCE TESTS.

5.1 Acceleration Tests.

NOTE: For vehicles that are required to tow a trailer, this test will be performed with and without a fully payloaded trailer.

5.1.1 Methods. Determine full-throttle acceleration under the following conditions:

a. From a standing start, with engine idling, to maximum road speed in each gear or range (or from minimum speeds in the higher gears when torque is insufficient for a standing start). Record time versus vehicle speed at suitable road-speed increments over the operating speed range in each gear to define the characteristic curve.

b. From a standing start, with engine idling, to maximum road speed while shifting only through gears that permit maximum speed to be reached in the shortest possible time. Record time versus vehicle speed at suitable road-speed increments over the operating speed range in each gear to define the characteristic curve.

c. From one predetermined road speed to another, the exact conditions depending upon the type of vehicle being tested. 1/ Record time versus vehicle speed at suitable road-speed increments over the operating speed range in each gear to define the characteristic curve.

d. Make test runs in both directions to negate wind conditions, and make sufficient trials to assure a reliable average value for measurements.

5.1.2 Data Required. Record data as stated in Paragraph 5.1.1.

NOTE: Acceleration time shall be measured from the instant vehicle motion begins. If system-response lag is significant, acceleration time should also be measured from the instant the accelerator is moved.

1/ This subtest is not essential to every test program, but may be conducted at the discretion of the evaluator.

5.2 Maximum- and Minimum-Speed Tests.

NOTE: For vehicles that are required to tow a trailer, this test will be performed with and without a fully payloaded trailer.

5.2.1 Method for Maximum Speed.

a. Set the vehicle to full throttle in the lowest gear or range to obtain maximum speed in that gear.

b. With the vehicle in motion, set the vehicle to full throttle in the next higher gear or range to obtain maximum speed in that gear.

c. Repeat above until all gears or ranges have been tested.

d. Repeat procedures with the vehicle moving in the opposite direction.

5.2.2 Method for Minimum Speed.

a. Set the vehicle to part throttle in the highest gear or range and adjust throttle until minimum speed in that gear is obtained.

b. With the vehicle in motion, set the vehicle to part throttle in the next lower gear or range to obtain minimum speed in that gear.

c. Repeat until all gears or ranges have been tested.

d. Repeat procedures with the vehicle moving in the opposite direction.

NOTE: Minimum speeds are the lowest speeds compatible with smooth engine performance in any given gear or range.

5.2.3 Data Required. Record the following for each measurement taken:

a. Gear or range.

b. Maximum road speed (km/hr) and engine speed (rpm) obtained for each gear or range in each direction.

c. Minimum road speed (km/hr) and engine speed (rpm) obtained for each gear or range in each direction.