

Virginia FFA Guide



Virginia FFA does not discriminate against employees, students, or applicants on the basis of race, color, sex, sexual orientation, disability, age, veteran status, national origin, religion, or political affiliation.

The Virginia FFA Association is a resource and support organization that does not select, control, or supervise local chapter or individual member activities except as expressly provided for in the state FFA constitution, bylaws, or policies.

TRACTOR TROUBLESHOOTING

Philosophy for Virginia FFA Career Development Events

Students are important customers of agricultural education and the FFA who recognize quality and value in products and activities. When provided an opportunity to fashion their educational experiences, they generally make wise decisions based on needs, perceptions, image and the opinions of others influence students. They value change based on their perceived personal needs as well as the needs of others. They sometimes value change for the sake of variety. Adults are concerned about the experiences of students and want to help organize experiences that will meet the future needs of students while accomplishing the purposes of agricultural education and the FFA organization. The Virginia FFA Association should assume the leadership role in developing and continuously improving relevant FFA career development events and awards. Although the Virginia FFA Association should be aware of the needs of local chapters and should react to those needs, it should help initiate opportunities that reflect relevant and emerging technology.

Virginia FFA career development events and awards should be developed with significant input from FFA members, teachers, partners, respective industry sponsors, and others involved in agricultural education. Virginia career development events and awards should reflect instruction that currently takes place in the entire agricultural education program, including classroom instruction, laboratory instruction, individualized instruction, and/or supervised agricultural experience. However, it is appropriate for the state organization to develop career development events and awards that stimulate instruction in emerging areas that reflect both current and future community, national, and global work force needs. The authority for insuring the relevance of an FFA activity is ultimately vested in the Virginia FFA Advisory Council.

The state association should promote individual, chapter, and team career development events and awards. Chapter and team career development events and awards should be based on cooperation and teamwork while recognizing the value of competition and individual achievement. The role of career development events and awards is to motivate students and encourage leadership, personal growth, citizenship, and career development.

Students should be recognized for achievement in career development events and awards. Quality standards should be used as a basis for achievement. The state association should ensure that the recognition is appropriate and meaningful. Recognition for achievement should be reflective of the total effort required by the chapter/team/individual and should take place at all levels of participation.

The Virginia FFA Association shall encourage accessibility and provide opportunities for achievement and recognition for students with diverse backgrounds. High expectations should be consistently communicated to those who are involved in career development events and awards.

GENERAL RULES and OFFICIAL POLICIES

Violations of any of the following rules may be grounds for the event superintendent to disqualify the participants.

State FFA Staff and CDE Superintendents will use the published rules and procedures to organize and implement the State FFA Career Development Events. Event activities may not be conducted due to lack of necessary materials, expertise or extreme impact to event budgets.

TEAM ACTIVITIES

The primary goal of team career development events and awards is to develop individual responsibilities, foster teamwork, and promote communications while recognizing the value of ethical competition and the value of individual achievement. A team career development event/award requires two or more members from one chapter working cooperatively. Team career development events and awards are intended to be an outgrowth of instruction.

Team career development events and awards should:

- include problem solving and critical thinking.
- promote an appreciation for diversity by reducing barriers to participation.
- promote new directions and focus on future needs of members and society.
- include cooperative activities.
- encourage broad participation among members and recognize excellence within levels of experience.
- recognize individual and team achievement, develop general leadership, and recognize levels of ability.
- provide local recognition for superior performance at the state and national level.

ELIGIBILITY OF PARTICIPANTS

- 1) Each participant must be a current bona fide dues paying FFA member in good standing with the local chapter, state FFA association, and the National FFA Organization at the time of the career development event (or by May 1 for the Virginia FFA, whichever date comes first.) In the event a participant's name is not on the chapter's official roster for the years in which the dues were payable to the National FFA Organization, a past due membership processing fee of \$35, in addition to the dues must be paid.
- 2) The participant, in a State Senior Career Development Event, must be:
 - a. A high school FFA member, (a graduating senior is considered eligible to compete in state career development events the convention directly after graduation.)
(High school refers to grades 9-12.)
 - b. A middle school team consisting of all 8th grade FFA members.
 - c. While in school, be enrolled in at least one agricultural education course during the school year and/or follow a planned course of study; either course must include a supervised agricultural experience program, the objective of which is preparation for an agricultural career. For this purpose a student needs to be enrolled in at least one agricultural education course during the year they qualified for the event. If the student was previously enrolled in an agriculture class and was an FFA member, they may compete in a contest if they have scheduling issues (ex. Advanced Placement classes) that do not allow them be enrolled in an agriculture class but they must still have an SAE.
- 3) The participant in a State Junior Career Development Event must be:
 - a. at the time of the state competition has qualified as either a 7th, 8th or 9th grade member.
 - b. While in school, be enrolled in at least one agricultural education course during the school year and/or follow a planned course of study; either course must include a supervised agricultural experience program, the objective of which is preparation for an agricultural career. For this purpose a student needs to be enrolled in at least one agricultural education course during the year they qualified for the event.
- 4) The participant in a State Middle School Career Development Event must be:
 - a. At the time of the state competition has qualified as either a 6th, 7th or 8th grade member.
 - b. While in school, be enrolled in at least one agricultural education course during the school year and/or follow a planned course of study; either course must include a supervised agricultural experience program, the objective of which is preparation for an agricultural career. For this purpose a student needs to be enrolled in at least one agricultural education course during the year they qualified for the event.

- 5) To compete in the creed speaking event, the member has qualified as either a 7th, 8th or 9th grader by state convention.
- 6) CDE participants who start an event and do not complete the event without notifying event officials at the time of departure will be disqualified. This can affect the overall team rank and position. In some events this will also disqualify the entire team
- 7) The state supervisor/executive secretary of agricultural education must certify that participants are eligible. If an ineligible student is entered in any career development event, the entire team of which that student is a member may be declared ineligible.
- 8) The first contest that a school wins in the current year will be the contest that the individuals on that team will represent Virginia at the National FFA Convention. To explain, if an FFA chapter puts more than one current winner of an FFA contest on an additional team, then the second place team will be declared the State Winner and will compete at the National FFA Convention. If one person is a duplicate and the National rules allow for a three-person team, then the first place team will represent Virginia. If a student that wins a contest is declared ineligible, or cannot attend the Convention, then the other members of the team will be allowed to compete for individual awards only. (A medical waiver may be granted if a member of a winning team is unable to attend due to a medical condition.)
- 9) Individuals who have been state winners or have represented the state in any official national FFA career development event are not eligible to enter the same FFA event again. However, FFA junior division state winners are eligible for state senior division. Individuals on a state winning team cannot compete in that division again.
- 10) A chapter may enter any number of career development events; however, a chapter may have no more than one team in each division in each event.

CHECK-IN

Participants will check-in at the state FFA convention as indicated in the annual State Guidelines. Dates, hours and place of check-in will be sent annually to the agricultural education teacher. All participants will be given an identification number by which they will be designated throughout the event.

ADDITIONAL OPERATIONAL PROCEDURES AND POLICIES

- 1) **Emergency Conditions:** Under emergency conditions, a state team participating in a Virginia FFA Career Development Event may be made up of less than the required members. Fewer than the required number could compete if an emergency condition such as illness, death in the family or an act of God would occur. Those individuals competing would still be eligible to qualify for individual awards.
- 2) Event committees will strive to divide teams into groups so that no two participants from a team will be in the same group. In any case, no two members will be placed side-by-side.
- 3) **Disqualification:**
 - a. Any communication, verbal or non-verbal between participants during a career development event will be sufficient cause to eliminate the team member involved from the career development event. The only exception to this would be communication between team members during the team activity portion of a given career development event.
 - b. Teams arriving after the career development event has begun may be disqualified or penalized. No member substitutions may be made after the career development event begins.
 - c. Any assistance given to a team member from any source other than the career development event officials or assistants will be sufficient cause to eliminate the team from the career development event.
 - d. Event superintendents may stop any participant if they deem their manner to be hazardous either to themselves or others. Such stoppage shall deem the individuals disqualified for that section of the career development event.
 - e. CDE participants who start an event and do not complete the event without notifying event officials at the time of departure will be disqualified. This can affect the overall team rank and position. In some events this will also disqualify the entire team.
 - f. Participants will not be allowed to utilize personal electronic communication devices, other than those approved by the event officials, during the entire course of the event. Participants who access personal electronic communication devices without prior approval of the event officials will be disqualified.

- 4) Advisors
 - a. Advisors are not allowed to be in contact with their students at any point or time during the competition.
 - b. Advisors may only be allowed at the contest site if they are assigned to supervise a group or part of the contest
- 5) Participants are expected to observe the National FFA Code of Ethics and the Proper Use of the FFA Jacket during the career development events. (Please see the latest edition of the Official FFA Manual.)
- 6) Official FFA dress is highly recommended for all participants where appropriate and is required for the awards presentation and recognition.
- 7) Participants or advisors will not be allowed in the career development event area as designated in the specific career development event rules. Infractions of this statement may result in team disqualification.
- 8) Accessibility for all students—all special needs requests should be submitted two weeks prior to the event for scheduling of assistance during event.
- 9) Results of all Virginia State FFA Career Development Events will be announced during sessions at State Convention.

TEAM AND INDIVIDUAL AWARDS

The ranking of teams and individuals in each of the career development events will be on the basis of three logical groups within the total range of scores. Awards will be distributed to the winning teams and individuals at award programs following the completion of the career development events.

VIRGINIA FFA ADVISORY COUNCIL

Purpose: To advise the State Staff on issues impacting both FFA Career Development Events and Awards to ensure:

- 1) All activities are consistent with industry needs.
- 2) All activities are available to all members.
- 3) All activities are conducted openly, fairly and in a quality manner.
- 4) Cooperation among various activities occurs, to the degree possible, to promote the interconnectedness of agriculture (i.e. forestry and agricultural mechanics or farm business management and dairy or livestock) and agricultural education (classroom, SAE, FFA).
- 5) New and innovative activities are being put forward for consideration.
- 6) As many students as possible have the opportunity to participate.
- 7) A constant process of local advisor in-service on proper use of these activities as tools for learning is being championed.
- 8) All activities are operated consistently with Advisory Council policy.
- 9) Activities are conducted within available budgets approved by the FFA Advisory Council and, if appropriate, Virginia FFA Foundation Board.

The Virginia FFA Advisory Council is a committee made up of sixteen members from all across the Commonwealth that meet bi-yearly. Along with sending their advice on important issues to the National FFA Board of Directors, the Council also discusses the past year's events, how to advance their association in the future, and address the suggestions and concerns brought up by agricultural teachers and other leaders of agriculture.

Membership of the Advisory Council

- 1) Ten members of the Virginia FFA Advisory Council are selected by the areas.
- 2) One member, who is agricultural education middle school advisor.
- 3) One member, who is a representative from Virginia Tech.
- 4) One member, who is a representative of Virginia State.
- 5) One member, who is the State FFA Advisor.

- 6) One member, who is a representative of FFA members, selected when elected State FFA President.
- 7) One member, who is the State FFA Specialist (State FFA Executive Secretary.)

Term

Members serve a three-year term except for the one FFA member representative who will serve a one-year term.

Chair

The chair of the advisory committee on awards and career development events will be elected each year.

Meeting Schedule

- 1) Annual fall meeting to report on the completion of activities at convention and provide input into the winter meeting agenda.
- 2) The annual spring meeting will allow for most of the committee's work to be conducted as a whole group and in sub-groups focused on specific issues or specific types of activities (e.g. team career development events, individual awards, chapter awards).

Local advisors should submit concerns suggestions to the state FFA Specialist/chair of the advisory board and their area representative at least two weeks in advance of the meeting.

Rules Committee on State Career Development Events

The advisory committee will meet only when needed and will make all final decisions on interpretation of the rules and regulations of the State FFA Career Development Events or awards programs.

Official judges' decisions are final. The announced results are the official results and awards may be duplicated as a result of the appeal.

Conflict of Interest

If there is a violation of a student whose advisor is a member of the advisory board, the advisor may not vote on the violation. A teacher from that area maybe used to fill in for the advisor whose student has possible committed the violation.

Official Dress Recommendations, Number of Participants, and Number of Scores from Team Total

Event	Official Dress Appropriate	Number of Participants	Number of Scores Allowed (per team) for Team Total
Agricultural Communications	Yes	5	5
Agricultural Issues Forum	Yes	3-7	Team Score Event
Agricultural Mechanics Sr.	FFA Shirt	4	Top 3 Scores
Agricultural Mechanics Jr.	FFA Shirt	3	3
Agricultural Sales	Yes	4	4
Crops Judging	*Yes/FFA Shirt	4	3
Computer Applications	Yes	1	1
Creed Speaking	Yes	1	Individual Event
Dairy Cattle Evaluation	*Yes	4	Top 3 Scores
Dairy Cattle Handlers' Activity	White/Jacket	1	Individual Event
Dairy Foods	Yes	4	Top 3 Scores
Envirothon	*Yes/FFA Shirt	4	4
Extemporaneous Public Speaking	Yes	1	Individual Event
Farm Business Management	Yes	4	Top 3 Scores
Floriculture	*Yes/FFA Shirt	4	4
Food Science and Technology	Yes	4	4
Forestry Field Day	FFA Shirt	7	7
Forestry Senior	FFA Shirt	4	Top 3 Scores
Forestry Junior	FFA Shirt	4	3
Horse Evaluation	*Yes	4	Top 3 Scores
Horse Hippology	Yes	4	Top 3 Scores
Horticulture Demonstration	FFA Shirt	1/2	1/2
Job Interview	Yes	1	Individual Event
Jr. Dairyman's	FFA Shirt	4	Top 3 Scores
Jr. Forester's	FFA Shirt	4	Top 3 Scores
Jr. Stockman's	FFA Shirt	4	Top 3 Scores
Livestock Evaluation	*Yes	4	Top 3 Scores
Marketing Plan	Yes	3	Team Score Event
Meats Evaluation & Technology	FFA Shirt	4	Top 3 Scores
Middle School Agriscience Technology	FFA Shirt	4	3
Middle School FFA Quiz Bowl	Yes	4	4
Middle School Food & Fiber	FFA Shirt	4	3
Middle School Plant Science	FFA Shirt	4	3
Middle School Small Animal Care	FFA Shirt	4	3
Nursery/Landscape	FFA Shirt	4	Top 3 Scores
Parliamentary Procedure Senior	Yes	6	Team Score Event
Parliamentary Procedure Junior	Yes	6	Team Score Event
Poultry Evaluation	FFA Shirt	4	Top 3 Scores
Prepared Public Speaking Senior	Yes	1	Individual Event
Prepared Public Speaking Junior	Yes	1	1
Small Engines	FFA Shirt	1	1
Soils Judging	FFA Shirt	4	Top 3 Scores
Tractor Operator's	FFA Shirt	1	1
Tractor Troubleshooting	FFA Shirt	2	2

Please remember that all participants are required to wear complete official dress, as outlined in the National FFA Official Manual, to all award functions.

***Official Dress is required for the reasons part of this CDE**

-An FFA Shirt is any shirt purchased from the National, State or Local FFA or any plain shirt that has an FFA emblem or FFA sticker on it.

TRACTOR TROUBLESHOOTING

Description:

Three components constitute this event: a written test, a diagnostic component, and a repair component. These three are designed to allow participants to demonstrate their knowledge of the theory of tractor operation, their ability to diagnose tractor malfunctions, and their skills in making repairs.

Date Due:

State Fair of Virginia

General Event Information

1. Each team consists of two members.
2. Local FFA advisors must use a competitive basis for determining participants to represent their schools.
3. Area events are subject to the same rules and regulations as the state event and must be held before June 1st of each year.
4. The winning area team competes in the state event.
5. FFA members who have competed in but have not won the state event are eligible to compete.
6. Safety glasses must be worn during the diagnostic component and the repair component. The school advisor is responsible for having the team suitably attired.
7. Smoking is not permitted in the event area.
8. Teams may be disqualified for any of the following reasons:
 - a. failing to follow rules and regulations
 - b. failing to obey judges' instructions
 - c. operating tractors recklessly or violating common safety rules
 - d. leaving tractors in an unsatisfactory condition
 - e. behaving in a manner unbecoming a gentleman or lady or not in the spirit of the event or the school represented.
9. Each team must furnish its own equipment as follows:
 - a. One set of tools consisting of sockets, wrenches, feeler gauge, screwdriver, and hammer.
 - b. Test equipment is limited to the following:

1 hydrometer	1 volt-ampere meter
1 dwell meter	1 tachometer
1 vacuum gauge	1 fuel pressure gage
1 compression gauge	1 test light
1 jumper wire set 36" long	1 timing light
1 torque wrench	1 OHM kilovolt meter.
10. Results of the written test, diagnostic component, and repair component are totaled to determine each team's score.

11. The winning team receives a plaque for their school and a medal for each member. Second- and third place teams receive medals for each team member.

Preparation for the Event

1. The state Executive Secretary serves as the event coordinator and establishes an event committee.
2. The event committee consists of the event coordinator, a timekeeper, and team judges.
3. The event coordinator is responsible for the following:
 - a. developing a written test
 - b. securing tractors
 - c. supervising the placement of tractors at the event site
 - d. determining and supervising the installation of the malfunctions
 - e. providing the tune-up specifications
 - f. assembling the judges prior to the event to check each tractor for correct specifications and malfunctions
 - g. informing teams of the makes and models of tractors used in the event
 - h. briefing the judges and participants before the event
 - i. ensuring that dry chemical fire extinguishers are accessible
 - j. managing the overall operation of the event.
4. The timekeeper is selected by the event coordinator. The timekeeper is responsible for the following:
 - a. supervising the drawing for event vehicles
 - b. recording the time for each team
 - c. ensuring that team judges remain in the assigned area and comply with all requirements.
5. The advisors of the competing teams serve as team judges. The judges observe the progress of diagnosis and repair but do not interfere unless the repairs are damaging the vehicle or endangering the participants. Judges may not assist the teams in locating or correcting malfunctions. Team judges also are responsible for the following:
 - a. ensuring that all malfunctions are corrected before the team leaves the event site
 - b. remaining with participants throughout the event
 - c. signaling the timekeeper when a team is finished
 - d. ensuring that tractors are in perfect running order after the repair event is completed.

Event Components

A. Procedures for the Written Test

1. Advisors of teams competing in the event are responsible for submitting 10 test questions to the state Executive Secretary at least 10 days before the event. The state Executive Secretary serving as event coordinator selects 50 questions for the test. The written test questions are not made available to participant before the testing event.
2. Each participant must take the written test. The test is composed of 50 true/false and multiple-choice questions.
3. The time limit for the test is 25 minutes.
4. Each question is worth one point. The highest score per team member is 50 points; the highest team score is 100 points.

5. All questions will be taken from the following references:
 - a. Tractor Maintenance—Principles and Procedures (AAVIM)
 - b. Fundamentals of Service: Tractors (John Deere)
 - c. Fundamentals of Maintenance Service (John Deere)
 - d. Fundamentals of Machine Operation: Agricultural Machinery Safety (John Deere).
 - e. Fundamentals of Service: Engines (John Deere).

B. Procedures for the Diagnostic Event

1. The number of tractors used in the event is equal to the number of teams.
2. Each event has two malfunctions. A short description of the problem to be diagnosed appears on each tractor.
3. Each team has 15 minutes per tractor to identify the two malfunctions. No repair work is done in this phase of the event.
4. Teams rotate to each tractor in the event.
5. Different tractor models, including both gasoline and diesel engines, are used in the event.
6. Malfunctions relate to air; fuel; power train; and electrical, braking, and hydraulic systems.
7. A list of possible malfunctions is provided at the end of the event rules.
8. Teams receive 10 points for each malfunction that is diagnosed correctly.

C. Procedures for the Repair Event

1. After the diagnostic event, teams draw for tractors.
2. Each team has 20 minutes to correct the two malfunctions.
3. Road testing of tractors is not allowed.
4. New parts are not provided. If a part is broken by the team, no credit is given for repairing the malfunction. If a defective part is found, the original part is made available for replacement.
5. All work must be performed within the designated repair area. Only judges and team members are allowed in this area.
6. Stall testing is not allowed.
7. Test equipment used by the teams in making repairs is left by the tractor for use by the judges in checking the completed work.
8. Once repairs are completed, the tractor should operate according to standards provided by the event coordinator prior to the event.

9. Teams earn 50 points per corrected malfunction. The following standards apply:
 - a. Timing is within 2 degrees of specification.
 - b. Point gap is within .002 of specification.
 - c. Engine speed is within 50 rpm of specification.
 - d. Bolts are torqued within 10 lbs. of specification.
 - e. Clutch free travel is within 1/2" of specification.
 - f. Brake pedal travel is within 1" of specification.
 - g. Valve clearance is within .001 of specification.
 - h. Other standards are announced before the event.
10. Teams completing repair work before 20 minutes have elapsed receive additional credit of two points for each minute or major fraction thereof left in the 20-minute time period.
11. If a mechanical failure over which no one has any control should occur, the event is deemed an act of nature without claim or recourse on behalf of the participant.
12. The event committee rules on any condition not covered herein. Their decision is final.

Results:

Top individuals and teams will be recognized at the state fair at the conclusion of the event.

TRACTOR TROUBLESHOOTING SCORE SHEET

EVENT	TOTAL
I. Written Test 1 point per question x 2 (50 questions; total possible points = 100)	_____
II. Diagnosis 10 points per correctly diagnosed malfunction (2 malfunctions per tractor) Tractor A _____ Tractor B _____ Tractor C _____ Tractor D _____ Tractor E _____ Tractor F _____	_____
III. Repair Minutes or major fraction remaining in time allotment x 2 = _____	
50 points per correction x 2 = _____ No points are given in the applicable areas unless the following standards are met: _____ timing within 2 degrees of specification _____ point gap within .002 of specification _____ engine speed within 50 rpm of specification _____ bolts torqued within 10 lbs. of specification _____ clutch free travel within 1/2" of specification _____ brake pedal travel within 1" of specification _____ valve clearance within .001 of specification _____ other standards announced prior to the event	_____
GRAND TOTAL	_____

ENGINE MALFUNCTIONS

The following list contains example of engine and hydraulic system malfunctions for both diesel and gasoline tractors.

Diesel Tractor

Failure of Engine To Crank

- dual-range shift lever not in neutral position
- loose, grounded, shorted, or broken wiring
- discharged or weak battery
- inoperative starting motor

Engine Cranks but Fails To Start

Fuel System

- lack of fuel in tank
- excessive air
- fuel shut-off control rod in the "off" position
- fuel tank sediment bowl shut-off valve in the "off" position
- fuel filters clogged
- injection pump idle speed set too slow

Air System

- air cleaner inlet tube restricted
- plugged or clogged air cleaner

Rough Engine Operation

- injection pump incorrectly timed
- faulty injectors
- faulty injection pump

Excessive Engine Exhaust Smoke

- faulty injectors
- incorrect injection pump timing
- clogged air cleaner
- improper valve adjustment
- burned, worn, or sticking valves
- excessive operation at low idle speed or loads

Loss of Power

- plugged fuel filter
- worn rings, pistons, or sleeves, burned or sticking valves
- faulty injection pump governor action
- faulty throttle or governor linkage
- blown head gasket
- brakes dragging
- improper valve adjustment
- connecting rod or main bearings too tight
- clogged air cleaner
- fuel shut-off rod linkage incorrect
- faulty pump timing

Excessive Fuel Consumption

- faulty injectors
- pump timing incorrect
- excessive fuel pressure line leakage
- throttle linkage incorrect
- burned, worn, or sticking valves
- worn pistons, rings, or sleeves
- improper valve adjustment, worn or bent push rods
- engine overheating
- clutch slippage
- brakes dragging
- excessive exhaust back pressure
- faulty cooling system thermostat
- clogged air cleaner or air pipe

Erratic Misfire

- faulty injectors
- weak or broken valve springs
- sticky valves
- excessive air in the system
- plugged fuel filters
- water in fuel

Gasoline Tractor

Failure of Engine To Crank

- dual-range shift lever not in neutral position
- loose, grounded, shorted, or broken wiring
- discharged battery
- inoperative starting motor

Engine Cranks but Fails To Start

(Ignition Spark Failure)

- loose, grounded, shorted, or broken ignition wiring
- mechanical failure of spark plugs-cracked or broken porcelain, incorrect gap setting, electrodes fouled
- distributor failure
- faulty coil

Engine Cranks but Fails To Start (Carburetion Failure)

- choke not pulled out when engine is cold
- throttle closed
- fuel shut-off valve not open
- fuel tank empty
- clogged vent in fuel cap
- clogged fuel filter or screens
- restricted fuel line
- restricted carburetor passages
- maladjustment of needle valves
- water deposits in carburetor
- air cleaner inlet tube restricted
- clogged air cleaner
- throttle and/or governor linkage inoperative or incorrectly adjusted
- air leak in fuel line
- cracked or broken intake manifold
- valves sticking

Engine Cranks Slowly

- weak battery
- crankcase oil too heavy for temperature
- defective starter or connections

Excessive Fuel Consumption

- fuel leak
- fouled air cleaner
- idle adjustment incorrect
- main jet adjustment incorrect
- timing incorrect
- automatic spark advance not working properly
- distributor points need replacing
- spark plugs need torquing or replacing
- faulty wiring
- improper valve timing
- burned, worn, or sticking valves
- worn pistons, rings, or sleeves
- improper valve adjustment, worn or bent push rods
- engine overheating
- clutch slipping
- brakes dragging
- excessive exhaust back pressure

Excessive Oil Consumption

- oil leak
- plugged breather pipe
- worn valve guides
- worn, broken, or ill-fitted rings
- worn, scored, or out-of-round cylinders or pistons
- worn ring grooves
- inverted rings
- stuck piston rings
- worn neoprene oil guard gaskets on the intake valves

Loss of Power

- dirty or improperly adjusted carburetor
- faulty ignition
- worn rings, pistons, or sleeves; burned or sticking valves
- faulty governor operation
- faulty throttle, governor, or choke linkage
- crank in intake manifold or leaky gasket
- blown head gasket
- brakes dragging
- improper valve adjustment, worn or bent push rods
- connecting rods or main bearings too tight
- excessive exhaust back pressure
- clogged air cleaner

Erratic Misfire

- dirty carburetor
- weak or broken valve springs
- sticking valves
- faulty ignition

Pre-ignition

- poor grade of fuel
- ignition timing too far advanced
- engine overheating
- heavy carbon deposits in the combustion chamber
- spark plugs of improper heat range
- insufficient tappet clearance
- burned or worn valves
- improper distributor advance

Continuous Misfire

- stuck or burned valves
- blown head gasket
- faulty ignition
- improper timing

Engine Overheating

- thermostat stuck closed
- water leakage
- fan belt slippage
- clogged radiator core
- carburetor mixture too lean
- improper ignition timing
- fouled cooling system
- engine too tight
- improper valve timing

Hydraulic System Problems

Low Oil Pressure (Power Shift Transmission)

- clogged transmission oil filter element
- clogged hydraulic oil filter element
- low oil supply

Transmission Oil Overheats

(Power Shift Transmission)

- low oil supply
- oil cooler air passages clogged
- excessive shifting under heavy load

Hydraulic Oil Overheats

- low oil supply
- oil cooler air passage clogged

Insufficient Hitch Transport Clearance

- center link too long
- lift links too long
- implement not level
- implement improperly adjusted

Hitch Fails To Lift

- excessive load on hitch

Hitch Drops Slowly

- speed-of-drop valve set improperly

Hitch Too Active

- selector lever in wrong position

No Hitch Response To Draft Load

- selector level in wrong position
- speed-of-drop too slow

Remote Cylinder Will Not Lift Load

- excessive load
- breakaway coupler not completely engaged

Remote Cylinder Rate of Travel Incorrect

- incorrect flow control valve setting

No Remote Cylinder Float Position

- control rod in lower hole on control lever

Direction of Remote Cylinder Travel Reversed

- improper hose connections

Brake Pedal Bottoms When Engine Stops

- bleed screws left open
- air in system