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SPARK ARRESTER GUIDE

**Multiposition Small
Engine (MSE)
Volume 2**

Prepared by:
NWCG Fire Equipment Working Team

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WE WANT YOUR COMMENTS....

We would like to know what you think of the
Multiposition Small Engine Spark Arrester Guide.

Does it meet your needs?

What do you like best?

What needs to be improved?

How can these improvements be incorporated?

Your Name _____

Agency _____

Address _____

Telephone No. _____

E-mail address _____

Please fold, staple, stamp and mail



**USDA Forest Service
San Dimas Technology & Development Center
444 East Bonita Avenue
San Dimas, CA 91773-3198**

Attn: Spark Arrester Project Leader



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FOREWORD

In 1986 the National Wildfire Coordinating Group (NWCG) authorized the Fire Equipment Working Team (FEWT) to establish a subcommittee to improve and update the Spark Arrester Guide (SAG). The subcommittee reduced the size of the previous SAG and redesigned it to improve its effectiveness and expand its applicability to more wildland fire agencies and geographic regions. The SAG is published for the guidance of cooperating Federal, State, and local agencies. Federal and State laws and administrative requirements prescribe when and where spark arresters are required.

Appropriate Standards referenced in this Guide establish the minimum performance and maintenance requirements of spark arresters for internal combustion engines to be operated on or near grass, timber, brush, or other wildland fuels. During periods of very high or extreme fire danger, spark arresters meeting these Standards will not give complete protection against exhaust spark fires. Additional measures, including shutdown of operations, may be required during such periods.

The U.S. Department of Agriculture maintains a general purpose spark arrester test facility and performs multiposition small engine spark arrester qualification evaluations at the Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, CA 91773, 909-599-1267. Qualified spark arrester lists are maintained and published through the Center. The camera-ready copy for the Spark Arrester Guide was produced at the SDTDC for the NWCG by the following personnel:

Ralph Gonzales—Mechanical Engineer
Janie Ybarra—Visual Information Specialist
Karla Rodriguez—Forestry Aide



GENERAL INSTRUCTIONS FOR USE OF THE SPARK ARRESTER GUIDE (SAG)

The Multiposition Small Engine (MSE) SAG is a compilation of information, lists, and illustrations of qualified MSE spark arrester systems and engines including their identifying markings, design, and assembly.

The intent of the SAG is to provide field inspectors with adequate information to determine if a multi-position small engine and exhaust system combination have been tested and qualified by the San Dimas Technology and Development Center (SDTDC) as meeting the Standard for spark arresting exhaust systems. This SAG also includes information on chain saws manufactured prior to June 1978.

The SAG is printed as two publications. This SAG covers **Multiposition Small Engine (MSE)** spark arresters, and the other Guide covers **General Purpose and Locomotive (GP&L)** spark arresters.

In each publication, there is a section for each type of arrester with illustrations of spark arresters listed in alphabetical order by the manufacturer's name, and lists of qualified and rated spark arresters of that type. Inspectors can use these sections to identify unknown arresters and to verify qualification status. Specific instructions for use of each section precedes the section.

Use of the SAG is also illustrated in the video *Spark Arresters and the Prevention of Wildland Fires* and may be used as a supplemental instruction tool. The video contains five separate modules titled, *Introduction, Multiposition Small Engine, General Purpose, Off Highway, and Railroad.*

SAG users can obtain copies of the two publications and the video by sending a purchase order or requisition by mail or FAX to the following address:

National Interagency Fire Center (NIFC)
Attn: Supply
3833 S. Development Ave.
Boise, ID 83705
FAX 208-387-5573

You will be billed 30 days after shipping.

Order numbers are:

NFES 2363—Multiposition Small Engine Spark Arrester Guide (MSE) Volume 2.

NFES 1363—General Purpose and Locomotive Spark Arrester Guide Volume 1.

NFES 2237—Spark Arresters and the Prevention of Wildland Fires, 1992, 68 minutes, VHS.

UPDATES TO THE SAG

Qualification evaluation of newly submitted MSE spark arresters and the associated power unit is an ongoing process at SDTDC. An updated listing with drawings is available on the Online spark Arrester Guide—<http://fsweb.sdtc.wo.fs.fed.us/programs/fire/spark/sag-index.html>

REPRINT INFORMATION

SDTDC will determine when adequate information has been compiled to require a revision of each publication. It is anticipated that a revision will be required every year for the **Multiposition Small Engine (MSE) SAG** and the **General Purpose and Locomotive (GP&L) SAG**.

SDTDC will include the following criteria in their reprint decision:

1. Determination of usable life of the SAG.
2. Volume and complexity of questions received from field users. Major users will be contacted periodically for feedback.



3. Number of SAG updates which have been issued.

4. Inventory at NIFC. Reprinting will be done to meet supply and demand requirements.

BASIC DEFINITIONS AND TEST STANDARDS

Multiposition Small Engine (MSE)—defined by the Society of Automotive Engineers (SAE) Recommended Practice J335 as being a hand-held, internal combustion engine operable in more than one position. MSE configurations include, for example, such devices as chain saws, weed trimmers, brushcutters, blowers, hedge trimmers, and cut-off saws.

Exhaust Particles—All internal combustion engines produce exhaust particles which are predominantly carbon with contaminants. These particles originate from deposits formed on the internal surfaces of the engine or exhaust system and, depending on their exact origin, may be expelled at temperatures in excess of 3,000 °F. Depending on the nature of the contaminants, these particles are capable of glowing or sometimes flaming combustion. When expelled through the exhaust system into the atmosphere, the combustion process may continue or even be accelerated during flight. Such particles, if larger than 0.023-inch in diameter and at temperatures of 1,200 °F are capable of igniting cellulose materials upon contact.

A Spark Arrester—a device which traps or pulverizes exhaust carbon particles to a size below 0.023-inch in diameter, as they are expelled from an exhaust system. A spark arrester system includes the following components: Internal combustion engine, internal parts, external parts (bumper spikes, wrap-around handle bar, chain brakes, covers, muffler, and spark arrester.) Those components specified in the “Qualified List” are minimum

requirements. Example: If a medium sized spike is required, then larger spikes are permitted. Optional components are limited to only those specified. Example: If only K&N and foam air filters are listed, all other air filters are excluded.

Testing of MSE’s is conducted in accordance with the Society of Automotive Engineers (SAE) procedure J335. This provides the methods of testing to evaluate the fire ignition potential of exhaust systems used in MSE’S. These methods include tests for screens, and surface and exhaust gas temperatures. Screens and mounting systems are checked for openings not to exceed 0.023 inch. Surfaces and exhaust gases are checked while the MSE is operated under optimal load conditions. Temperatures shall not exceed 550° F for exposed surfaces and 475° F for exhaust gases.

Modification—any modification or damage to any part of the system as it was presented to SDTDC for testing **voids** the qualification of the spark arrester on the equipment. Modifications usually consist of removal of screen, change in exhaust outlets, smaller bumper spikes, removing chain brakes or hand guards, incorrect handle bar on chain saws, or other modifications to the engine or body parts. These changes may permit hot exhaust gases to come into closer contact with combustible fuels. Follow your agency policies when a modified spark arrester system is encountered.

MULTIPOSITION SMALL ENGINE SPARK ARRESTER INSPECTION PROCEDURES

The first step for identifying the spark arrester is to check for the model number and/or manufacturer’s identification or trademark. The words “Qualified” or “Approved” are not required, and **do not** indicate that the unit is in fact a qualified arrester.



1. Once Identification is established, refer to the “Qualified List.”

2. If the arrester cannot be positively identified, use the following procedure:

a. **DETERMINE** the make and model of the MSE the spark arrester is mounted on.

b. **CHECK** the “Qualified List” for specific information on approved spark arresters for that particular MSE make and model.

c. **REVIEW** the “Drawing Section” to match the arrester and verify the description.

3. If not on the “Qualified” list, be sure to check any SAG update information. The absence of an arrester from these lists indicates the arrester may not have been qualified.

4. After the arrester has been identified, check the component requirements indicated on the “Qualified” list. Then turn to the Drawing Section and check the Spark Arrester illustration for an exact match on the configuration. The drawing must match the arrester you are inspecting.

5. Tools needed for inspection:

a. Miscellaneous small hand tools for the operator, to remove or take apart spark arresters for inspection, including flat and cross tipped screwdrivers, needle nosed pliers and several types of chain saw combination tools available from local dealers.

b. Flashlight

c. 0.024-inch wire gauge to qualify screen size.

6. Inspect the exhaust system for:

a. Screen is in good condition with proper fit in it’s holder and no openings larger than 0.023 inch.

b. Condition and presence of all required parts assembled in their proper order.

c. Verify configuration for necessary covers or shields.

d. Required additional equipment such as correct handle bar, bumper spike(s), or chain brake are in place.

e. Any modifications. None are allowed to the exhaust system or engine.

7. More detailed instructions are available in the NWCG video, *Spark Arresters and the Prevention of Wildland Fires*.

INSPECTION PROCEDURE FOR CHAIN SAWS MANUFACTURED PRIOR TO 1978

Chain saws manufactured prior to June 30, 1978, are required to have all exhaust gasses pass through a screen with no opening larger than 0.023 inch. The screen must be heat and corrosion resistant, and shall provide at least 100 hours of service life.

Many manufacturers provide specific spark arrester screens for their pre-1978 brand and model of saws. On the other hand, many do not—but they meet the spark arrester requirement with a general purpose stainless steel screen (0.023 inch) which is allowed **only** on pre-1978 chainsaws not listed in the SAG.

It is acceptable for chain saw shops and chain saw owners to size and install approved arrester screens only on saws manufactured before June 1978.

How do you determine a pre-1978 chain saw? Ask the operator or call the dealer with the serial number.