

# **SMALL GEAR AND LIGHTING**

## **INTRODUCTION**

The skills and techniques required for the complexities of rescue work can be gained only through a sound program of training. Rescue personnel can best be ready to handle any situation if they are proficient with their rescue tools. Complete knowledge of tools and equipment allow rescuers to rapidly devise a method for the rescue at hand. Basic rescue tools are carried on most fire appliances are referred to as '**small gear**'.

Small gear is the term commonly used in fire service when referring to a miscellany of tools and items of equipment which cannot be classified under any other main heading, but are nevertheless essential to the fire fighters to effectively execute their wide variety of tasks which they may be called upon to perform. These tools can range from a small cold chisel to powered saws for cutting metal or concrete.

## **CATEGORIES**

Small gear can be classified into the following groups:

- i. Cutting away tools - saws, shears, axes, chisel, knives.
- ii. Breaking in tools - sledges, hammers, crowbars, and door breakers.
- iii. Turning over tools - spades, forks, shovels, ceiling hooks, pick axes.
- iv. Rescue gear - rail spreaders, jack, rams and air bags.
- v. Transport tools - folding stretchers, slings, hoisting gear.
- vi. Lighting equipment - torches, hand lamps, tripod mounted lamps, search.

## **STOWAGE**

Because of the difference in design of fire appliances, it is not practicable to adopt to a standard stowage plan for small gear. However, it is essential for each member of a crew to know, especially when working in the dark, exactly where to find each item of equipment.

## **TYPES OF SMALL GEARS**

### **Firefighters' Axe**

The firefighter's axe is normally a part of every fire fighter's personal gear, together with axe pouch. These axes are also carried as spare on some fire appliances as an alternate to issuing personal equipment. There are two (2) types similar in design, except that one has an insulated rubber handle while the other has a wooden handle. The insulation should not be exposed unnecessarily to heat or allowed to come in contact with grease, oil, acid and turpentine. When the insulation becomes soiled, it should be washed with soap and water and dried.

### **Ceiling Hooks**

This is of interest as being one of the few items of small gears which was primarily developed for Fire Brigade use. Its relationship to a boat hook is obvious, but in its present form is exclusively a Fire Brigade tool. It consists of a pole from 2.1 to 2.4m long having at the top a steel point with a spur at right angles with the point and the spur each being 100 mm long. The ceiling hook is a general-purpose tool that is frequently used in turning over and pulling operations and for any job which calls for long reach with a rigid piece of equipment.

### **Crowbars**

Crowbars of various kinds form an essential part of Fire Brigade equipment. The most common type consists of a steel bar approximately 1m in length of which either one or both ends is/are sloped at an angle to provide leverage. One end is usually claw-shaped for use with levering out nails, screws and other fittings whilst the other end is chisel shaped. Crowbars are used to provide necessary leverage to force open doors and windows which may impede fire fighting or rescue operations.

### **Padlock Remover**

This is used to facilitate the rapid removal of padlocks. However, when this special tool is unavailable, wedging the hoop to the door with the hinge and giving the body of the lock a sharp blow with a hammer, axe or other suitable tool can easily force open many padlocks.

## **Persuader**

This tool may be best described as having a cigar-shaped cold chisel to which a steel handle is secured and is used for forcing padlocks which cannot be dealt with by use of padlock removers, crowbars etc. The point of the chisel is blunt since the function of the tool is not to cut but to break a padlock by the expanding effect of the tapered chisel being forced in the loop of the hasp by blows of a heavy hammer.

## **Cutters/Shears**

Cutters of various types are carried on most appliances and are used for cutting metal bolts and padlock hasps to facilitate entry into warehouses and other premises which are protected by heavily bolted doors. They are also used in circumstances where metal obstacles impede fire fighting or rescue operations. The jaws are operated on a double fulcrum and sometimes have a semi-circular slot in each blade to enable the tool to be used as a bolt cutter. The handles are pivoted on ball joints so that when necessary, the head can be used at right angles to the handles.

## **Spreaders**

A variety of expanding tools are used for forcing apart iron bars such as railings, usually to facilitate the release of trapped persons or animals. One type of rail spreader consists of a nut threaded internally to receive 'v'-shaped lugs with threaded stems. A handle fits into a hole bored through the sides of the nut. The 'v'-shaped lugs are placed against the bars to be moved and when the nut is rotated by means of the handle, the lugs are forced outwards, forcing the bars apart.

## **Rubber Gloves**

It is important that a firefighter, especially when handling potentially charged electrical items, wear rubber gloves. Rubber mats and special rubber boots are carried by some Fire Brigade appliances usually in conjunction with rubber gloves to give an additional measure of protection against injury by electric shock.

## **Asbestos Equipment**

Asbestos as an aid to firefighting is largely confined to asbestos blankets which

are used for smothering purposes and in some instances, the production of firefighting clothing. However, studies have shown that asbestos has carcinogenic (cancer forming) properties which have caused a drastic reduction in the use of asbestos in favour of synthetic materials such as Numex.

## **Lamps and Lighting Sets**

A wide variety of lamps and equipment sets are used by Fire Brigades. The choice of lamps and lighting equipment is a matter determined by local requirements and preferences. Various patterns of conventional battery-operated hand lamps usually form part of each firefighters' personal equipment as well as being carried on Fire Appliances.

Searchlights and floodlights of various kinds are used by Fire Brigades to provide sustained illumination at scenes of fires and other incidents. Searchlights are designed to throw a concentrated beam of light which is used for such purposes as illuminating a specific part of an incident. Floodlights however, are designed to give illumination over a wide area.

Most Fire Appliances carry a swivel-mounted searchlight which operates from the vehicle battery and is attached to a reel of flexible cable so that it can be removed from the appliance when necessary and placed elsewhere (eg. tripod). Large types of electric search lights and floodlights are usually carried on emergency tenders where a suitable power supply is available in the form of a built on or portable generator as well as fixed and / or portable reels or cable to enable the lamp to be strategically sited at incidents.

## **POWERED TOOLS**

Tools may be powered by pneumatics, hydraulics, electricity and some engines that are driven by internal combustion are becoming increasingly popular within the Fire Brigade. Examples of powered tools are saws, cutters and spreaders: eg. jaws-of-life, jacks and rams, air bags, drills and chisels.

Hydraulic equipment is based on a simple concept: *the transmission of forces from one point to another through fluids*. Most hydraulic machines use some sort of incompressible fluid which is a fluid at its maximum density.

The name *jaws-of-life* is actually a brand of tools but the name is often used when talking about other brands of rescue systems. Jaws-of-life refers to several

types of hydraulic tools such as spreaders, cutters and rams which are used to pry open vehicles involved in accidents when a victim may be trapped.

Spreaders and cutters are probably the two pieces of equipment most people think about when they hear about *jaws-of-life*. They are hydraulic cutters as well as spreaders. The spreader is used to pull pieces of the structure apart or it can be inserted into the side of the vehicle to tear a section out.

The cutter, as the name suggests, is used to cut through the material like a pair of giant bold cutters. The mechanics of how these two devices work are similar and some jaws-of-life equipment combine the cutter and spreader into one machine.

## **TYPES OF POWERED TOOLS**

### **Rams**

The ram is the most basic type of hydraulic system. It is just a matter of using hydraulic fluid to move a piston head inside a cylinder to extend and retract a piston rod. The ram's function is to push apart sections of the car (or other structure). For instance, a rescue worker can place a ram on the door frame of a vehicle and extend the piston to push the dash board up, creating enough space to free crash victims.

### **Air Bags**

Air bars are another type of extricating equipment which utilizes power imparted by pneumatics. **Pneumatics are tools that use the energy released by compressed air for power eg. air chisel.**

The main purpose of air bag is for lifting during extrication. It is also used to protect casualties against sharp edges and hot surfaces.

When operating the air bag, particular interest must be placed on establishing a solid point to push from/against.

*Stack two bags with larger at the bottom and is inflated first. Ensure that the operating pressure is between 95 – 145 lbs per square inch.*

In the case of abnormalcy during extrication operation, the turning of the dead man's switch which is found on the generator itself, should be deactivate the generator.

## **Chisel**

Chisels are helpful and versatile. However, if used improperly can be dangerous. A chisel must be examined before use for defects. Pneumatic powered chisels are very useful for rescue work. These chisels can be powered by breathing apparatus air cylinder, a cascade system or a truck's air brake system. The air chisel is especially effective for auto extrication, cutting through the top seat bolts and door lock assemblies. It is excellent for cutting medium to heavy gauge sheet metal and for popping rivets and bolts.