MOELLY TOOL

HUMAN CENTERED DESIGN

DESIGNING FOR FIREFIGHTERS

VAST EXPERIENCE

OPEN RESOURCES

DIVERSE PERSPECTIVES

CONTRIBUTED EXPERIENCE

Over 70 years of combined experience

Capt. Fred Noble, 25yrs
FCFF Kevin English, 4 yrs
Assistant Fire Marshal Tim Henshaw
Billy Gregory, 15 yrs
Aaron Parker, 6yrs
Nick Christopoulos, 7.5yrs
Michele Jackson 10 years

AVAILABLE RESOURCES

14 Local Firestations
Fire Marshal's Office
Fire Prevention Center
Fire Education Center
Equipment Testing Facilities

PRIMARY FOCUSES

GEAR WEIGHT

Weighing the gear, we find that the average gear carried is 60 lbs and depending on the job, it can weigh around 150 lbs.

PHYSICAL FITNESS

When asked, the firefighters said that physical fitness was the most demanding part of the job.

GEAR MANAGEMENT

Many different items are carried at once. Putting it on and keeping it organized is important for mobility.

TURNOUT GEAR POCKETS

Pockets carry 10 to 22 items at once.

- Carabineers
- Door Wedges Rope
- Webbing
- Gloves
- Light Ear Plugs
- Multipurpose Tool
- Lineman Pliers
- Wire Cutters
- Knife
- Quarter Valve Wrench
- Needle Nose Pliers
- Channel Wrench
- Screw Driver

GEAR TEST

A personal experience of what it is like to move around with all turnout gear on and trying to rapidly access the pockets.

There is open space on coat not utilized could allow for an even separation of equipment and more organization.

The belt for the SCBA (Self Contained Breathing Apparatus) covers the coat pockets, prohibiting them from being used.

STORAGE LOCATION

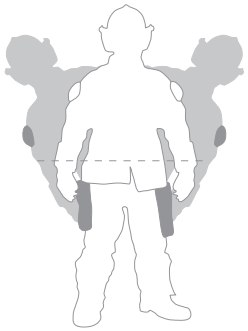
Exploring the best locations for tool storage.

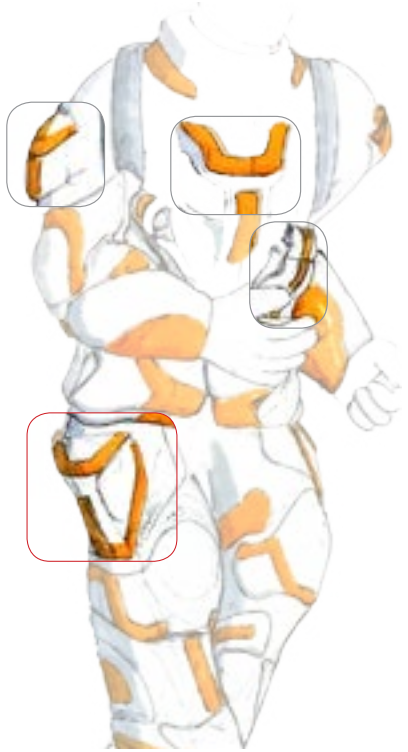
Findings

- Stirring of weight on the upper body is uncomfortable and inhibits mobility.
- Load bearing pockets on the upper body disrupts balance.

WEIGHT POSITION STUDIES

CENTER OF BALANCE





MARKET ANALYSIS

CURRENT SOLUTIONS	PROS	CONS
 Exterior Bag	• Extra storage.	• Entanglement hazard. • Adds extra movement.
 Harness	• Extra storage. • Keeps equipment organized.	• Entanglement hazard. • SCBA harness covers it. • Adds to SCBA harness.
 Retractor	• Easy to access and store. • Separates tools.	• Entanglement hazard. • To many moving parts. • Not fire resistant.
 Multitool	• Minimizes tools needed.	• Not all tools are necessary. • Does not do the job well.
 Pocket Organizer	• Keeps tools organized.	• Difficult to store tools. • Stiffens the pocket. • Blocks other tools.

FIREFIGHTER MULTITOOL

Combining multiple tools into one pocket sized rescue tool.

- Can provide a backup for larger tools.
- Will be lighter than carrying multiple tools.
- One large tool will be easier to access than many small
- Can fill a specific need not being filled.
- Robust size can allow for firefighters to use with gloves on.
- There would be less risk of mistakenly pulling out extra tools.

Findings

- Any switches or levers will make the tool hard to use. The tool should have all the tools readily available without much extra operation.
- A flashlight on a face of the tool that is constantly making impact with hard will break.

TOOL PRIORITY

The percentage of which tools a most advantageous for a firefighter to carry.

"Rescue tools are important to carry but small tools like screwdrivers are only helpful when we have extra time and in that case we can get it from the truck's toolbox."

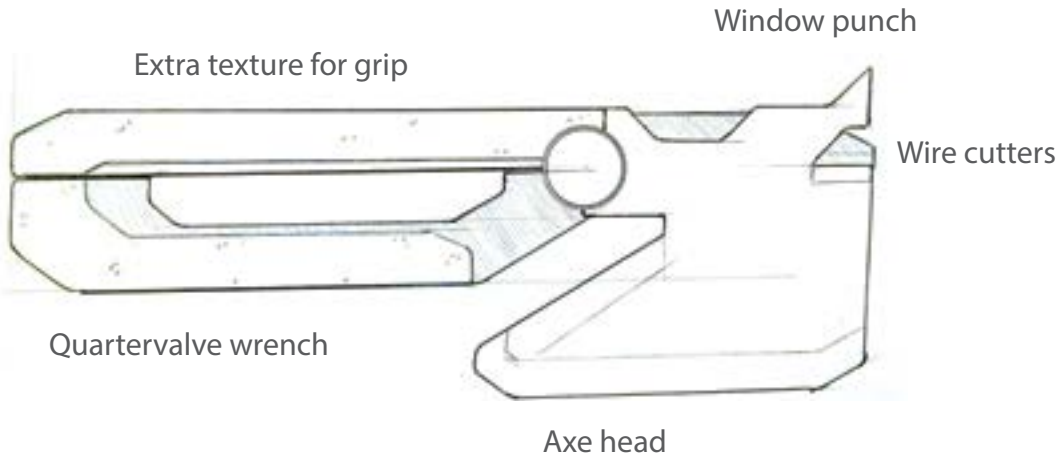
Firefighter Mike Jackson

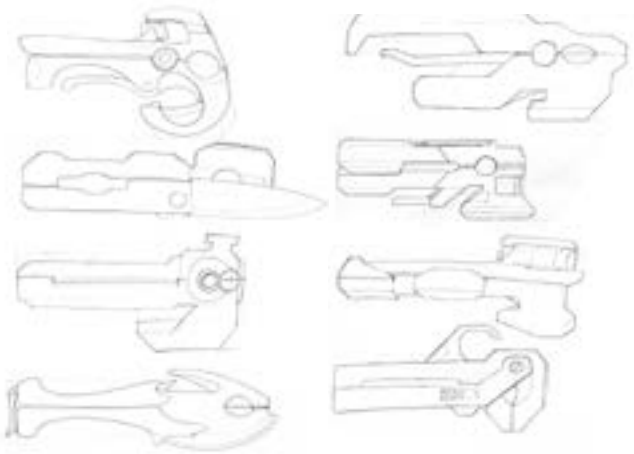
FUNCTION SKETCHES

Sketching out what could be added to the tool and how it would be attached.

Firefighters' Notes

- Something for extra grip
- Make the gap in between the handles into a quarter valve wrench for turning off gas.
- Make the wire cutters be able to cut one inch thick wire.





SKETCH MODEL

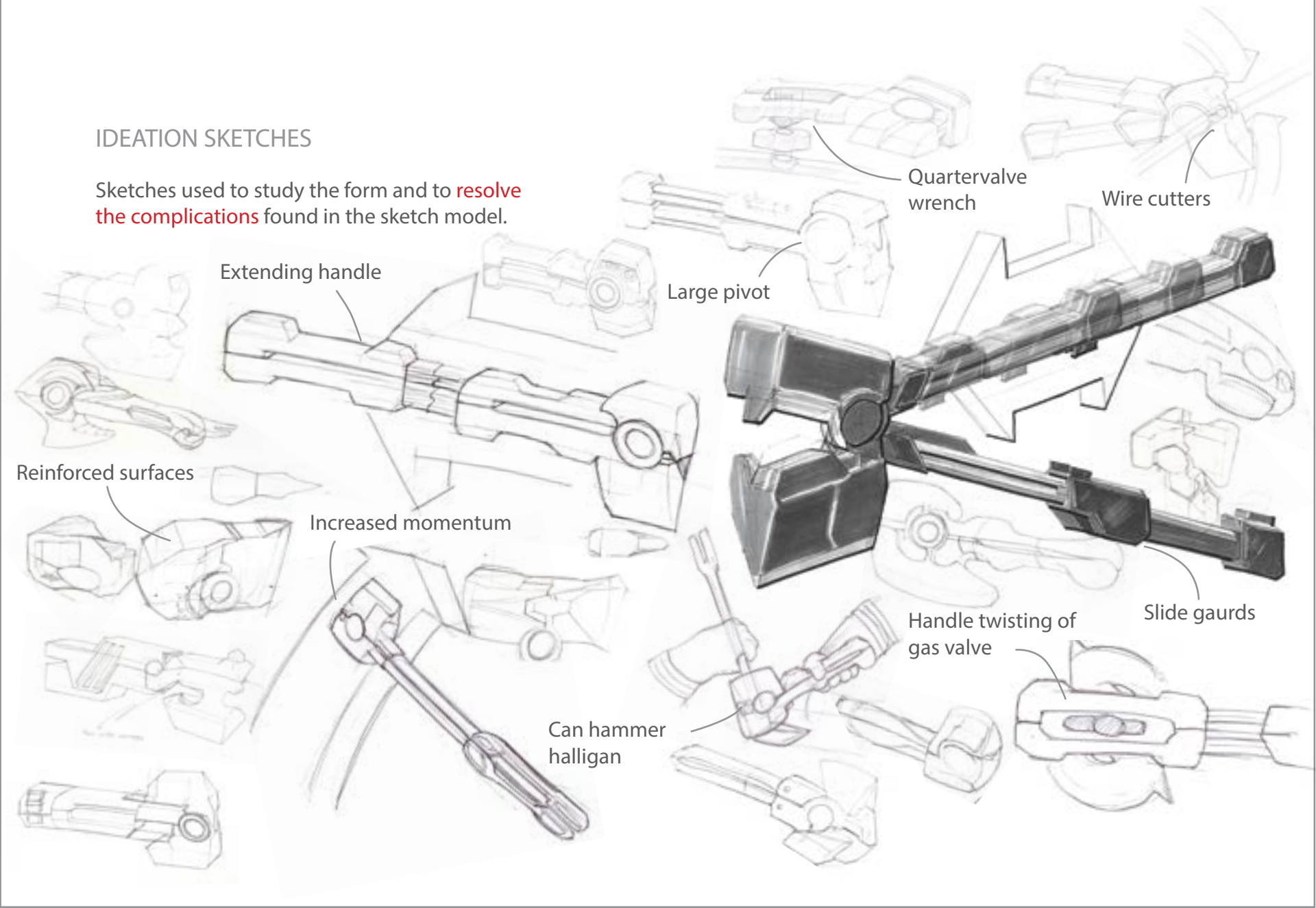
A form study model to better understand the touch points of the design.

Complications

- Window punch will catch on pocket and quickly destroy the pockets.
- Pivot point will have to be at the head to create strongest cutting potential.
- The handle is not long enough to create the leverage necessary for cutting one inch wire.
- Axe head is too large to open fully.
- Handle is too wide for hand to hold comfortably.
- There is no grip to keep hands from sliding off.

IDEATION SKETCHES

Sketches used to study the form and to resolve the complications found in the sketch model.



MODIFIED ERGONOMICS

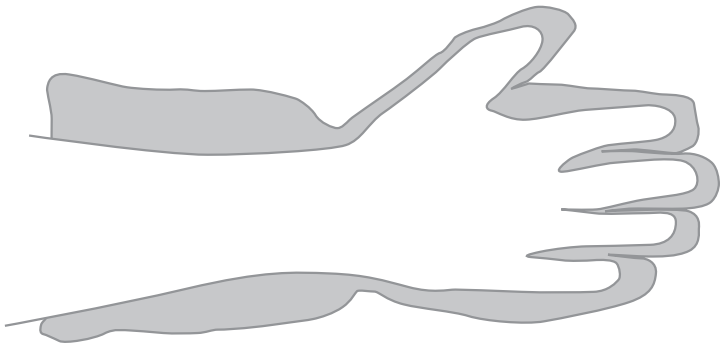
The ergonomics for a normal hand must be altered to fit the size of a hand inside of a firefighter's glove.

Size Change

A model was made to find the correct length of the handle.

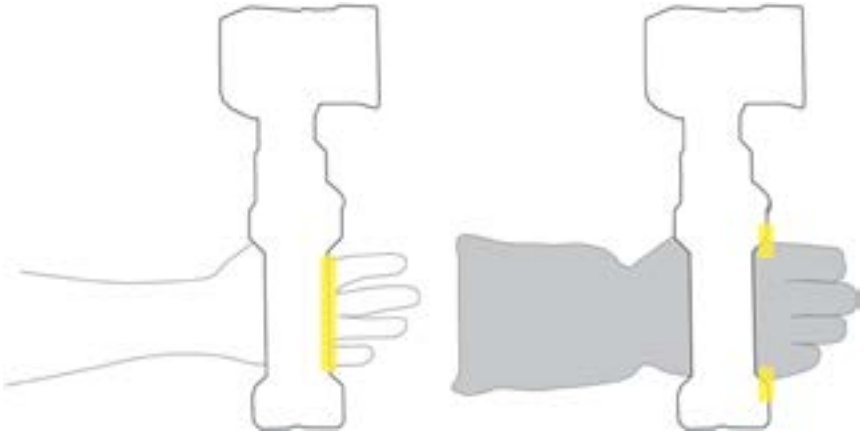
An opening for a normal hand would be 3.5 inches but with a glove on the size goes up an inch to 4.5 inches.

If the size was not changed, the firefighter's hand would be on top of the hand grips. The hand would be suspended from the outsides instead of equally across.



HAND WIDTH
3.5″

GLOVE WIDTH
4.5″

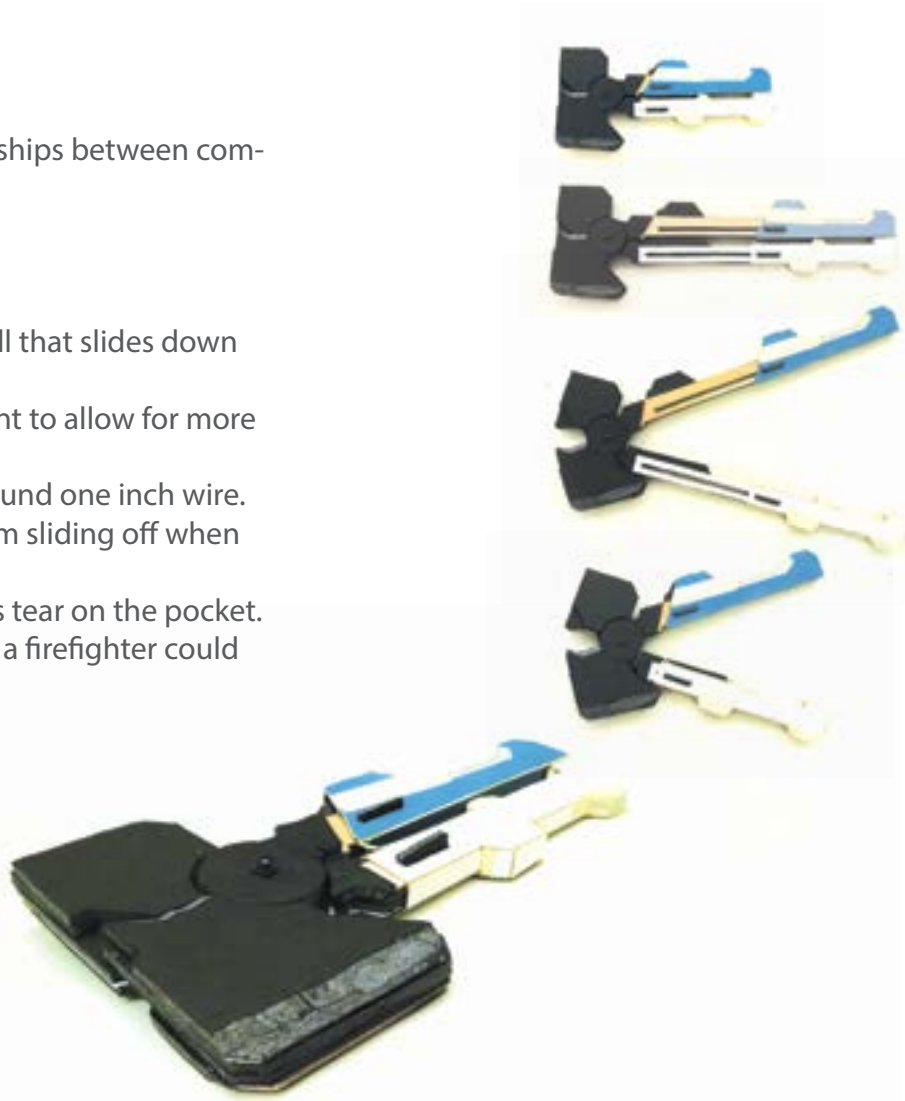


DESIGN DEVELOPMENT MODEL

A Model used for examination of the relationships between components and user.

Functions

- The handle extends by having and out shell that slides down the inner structure.
- The pivot point has been moved to the front to allow for more leverage when cutting wire.
- The mouth of the wire cutter can reach around one inch wire.
- The hand grips work well to keep hand from sliding off when opening and closing it.
- A hammer has been added to allow for less tear on the pocket. Having a hand held hammer also means that a firefighter could hammer a halligan into a door without help.



TEST RUN

Having Someone fully equipped as if they were in a real situation and testing how the model feels in different scenarios.

Trials

- Taking the Tool out and placing it back into the pocket of the turnout gear.
- Moving around with the tool
- Fitting the cutter on a large diameter piece of metal.
- Feeling how the body would move when hitting a halligan with the tool in one hand and the halligan in the other.
- Extending and retracting the handle.

MOELLY TOOL

RESCUE TOOL FOR FIREFIGHTERS

FUNCTIONS

One inch wire cutters

Single handed hammer
for use with halligan

Quarter valve wrench for
cutting off gas valves

Axe

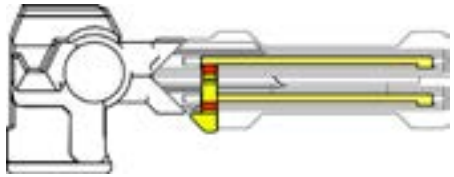
TECHNICAL ANALYSIS OF HANDLE LOCK

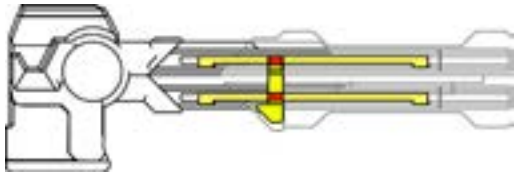
LOCK ERGONOMICS

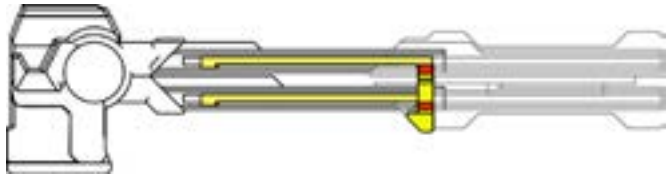
One trigger on the outside of the grips unlocks the handles so they can extend.

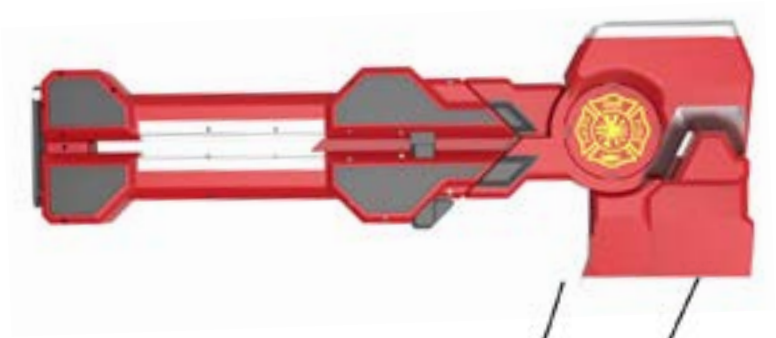
LOCK MECHANICS

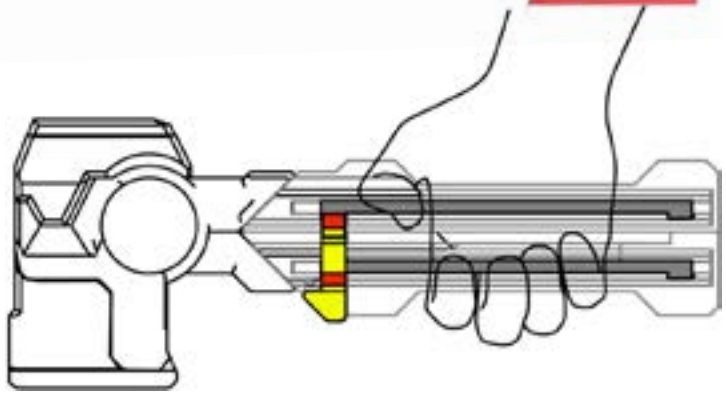
When the trigger is pressed it pushes the glide pins out of the front lock, allowing it to slide down to the end where it will fall into the back lock and vise versa.

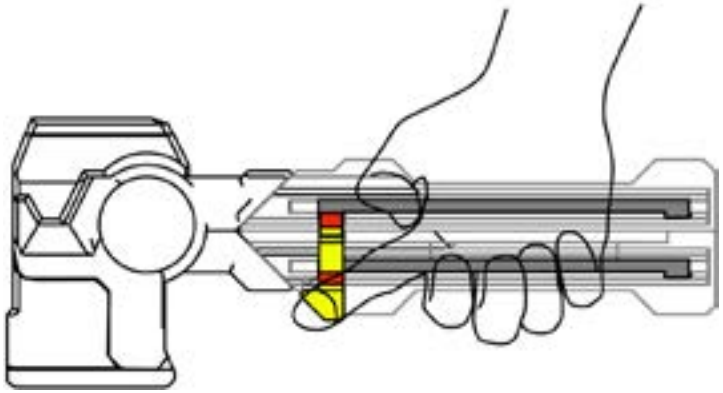













FIRE
DEPT

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RESCUE TOOL FOR FIREFIGHTERS