

FDSC
WHERE LEADERS COME TO TRAIN

Fire Engineering

There Is No Such Thing AS A Routine House Fire!

Jim Duffy 2024


1

 **What We're Going To Talk About**

- Safety
- Why Are We Talking About This?
- Our Work Environment
- Command
- Fire Attack
- Ventilation
- Search
- And How They All Fit Together

Private Dwelling Fires

2

 **Safety**

Today We Will Assume:

Full PPE Worn Properly

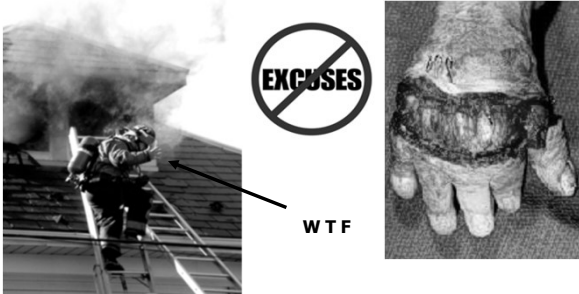
Including SCBA !

Physical Condition

The White Elephant In The Room !

3

**WEAR ALL YOUR PPE...
NO EXCUSES!**



4

What is He Thinking ?



**Which one really has his head
where it does not belong ?????**

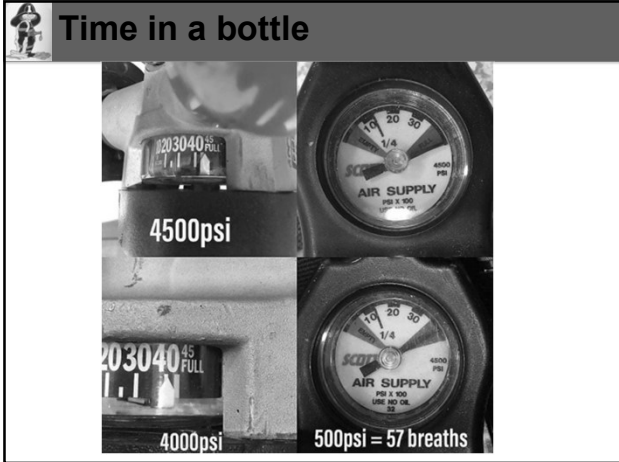
5

**You Can Breathe From a Bottle Now
Or
When You Retire**

You Decide!



6



7



8



9



Why Are We Talking About This?

- **The Most Common Structure Fire Throughout U.S. & Canada!**
- Historically Significant # Of Firefighter Combat Deaths Occur In These Fires
- 75% Of The Civilian Fire Deaths Occur In Residential Dwellings.

Private Dwelling Fires

10



Why Are We Talking About This?

About Twenty-Five Hundred Civilians Die In Residential Fires Each And Every Year!

It's Just a Routine House Fire or IS IT?

11



Why Are We Talking About This?

2023
2,160 Civilians their lives in home fires

538 civilian home fire fatalities reported between January 1 2024 and March 10 2024

12

Why Are We Talking About This?

Occupancy Type

- SFD
- MFD
- Other
- Mobile Homes

2017 -2020 Firefighter Rescue Survey

13

Why Are We Talking About This?

“The attack and extinguishment of a residential structure fire may be the most complex, interdependent, time sensitive set of tasks found in any job.”

Private Dwelling Fires

14

Why Are We Talking About This?

Failure To Coordinate
Fire Attack
Ventilation
Search
Means More Empty Lots!

Private Dwelling Fires

15

Why Are We Talking About This?



Private Dwelling Fires

16

Why Are We Talking About This?



17

The Real Reason




We Have None To Spare!

18

Our Work Environment has Changed

Home Contents have changed



Home Contents

19



Typical American Home

20


Our Work Environment has Changed


From This:



Command Fire Attack Ventilation Search

21

 Our Work Environment has Changed



Command Fire Attack Ventilation Search

22

 Our Work Environment has Changed



McMansions 20 1:04 AM

Command Fire Attack Ventilation Search

23

 Our Work Environment has Changed

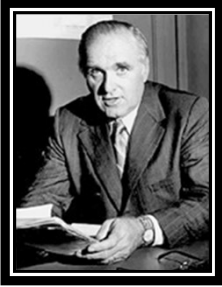
**Large Open Floor Plans
Cathedral or Vaulted Ceilings**



Command Fire Attack Ventilation Search

24

Our Work Environment has Changed



"The building is the enemy, know your enemy"

"The Professor"

Command Fire Attack Ventilation Search

25

Our Work Environment has Changed

Structural Members Being Made Lighter And Cheaper.



These Lightweight "Engineered" Structural Members Are Prone To Collapse After Just A Few Minutes Of Fire Involvement.

26

That's When it is Assembled Correctly



27



28

28

 **Our Work Environment has Changed**

Arrival Conditions Then:



Command Fire Attack Ventilation Search

29

 **Our Work Environment has Changed**

Arrival Conditions Today:



Command Fire Attack Ventilation Search

30


 **Our Work Environment has Changed**

Buildings Are More Energy Efficient.



Command Fire Attack Ventilation Search

31


 **Our Work Environment Has Changed**

Higher Heat Release Ratios
More Energy Efficient Homes
Increases Thermal Feedback Heating

**QUICKER
FLASHOVER!**

Command Fire Attack Ventilation Search

32

 **Fuel Loads Have Changed**

**Wood & Paper Contain About
7 - 8,000 Btus Per Lb.**

**Plastic About
12 - 20,000**

Command Fire Attack Ventilation Search

33

More Science

What I Was Taught

Gas temperature, T_g

Time [t]

Growth period Fully developed fire Decay period

$0.8(T_{gm} - T_c)$

Command Fire Attack Ventilation Search

34

Temperature

Time

Ignition

Fire Becomes Ventilation Controlled

Firefighters Make Entry (Creating a Ventilation Opening)

Oxygen Reaches Fuel

(Varies)

How long does it take the air to reach the fire?

The time it takes a ventilation limited fire to grow/flashover depends on a variety of factors... (NEXT SLIDE)

35

It's Not This Complicated!

Impact of Ventilation on Living Room Temperatures

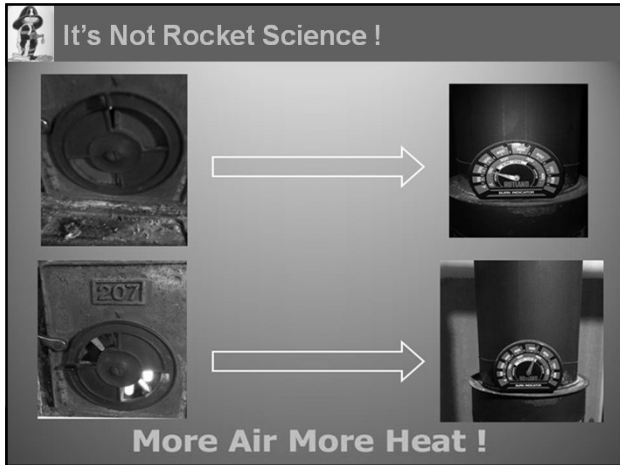
Impact of Door Control

Impact of Door Control During Scuttle Test

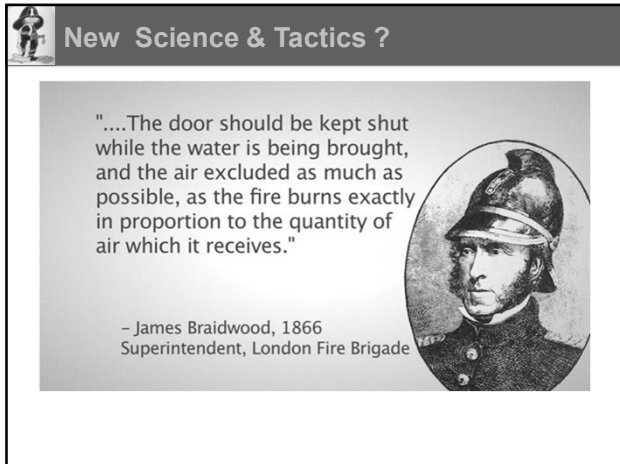
Living Room Rear Temperatures

Command Fire Attack Ventilation Search

36



37



38



39

But,

**Experience+education+research
= Our Strategies & Tactics**

Learning By Experience ?

Command Fire Attack Ventilation Search

40

Command

41

Be Advised

**This is NOT a Blue Card
or a NIMS
Command Class**

42

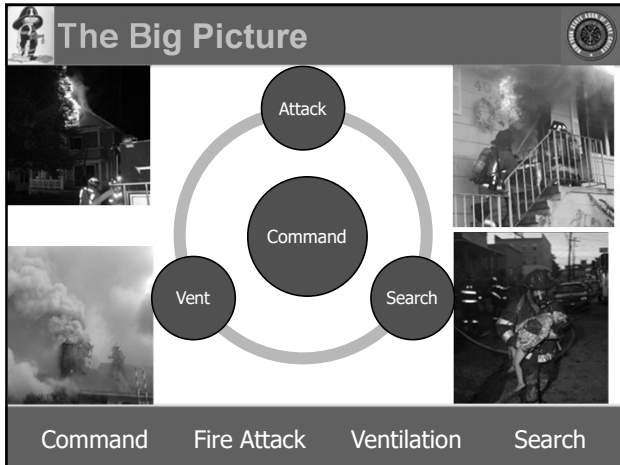
Command

Should Look Like This



43

The Big Picture



Attack

Command

Vent

Search

Command Fire Attack Ventilation Search

44

The Big Picture



Command Fire Attack Ventilation Search

45

 **Incident Priorities**


Life Safety

Incident Stabilization

Property Conservation

Command Fire Attack Ventilation Search

46

 **FIREGROUND OBJECTIVES**

RESCUE

EXPOSURES **VENTILATION**


CONFINEMENT

EXTINGUISH **SALVAGE**

OVERHAUL

Command Fire Attack Ventilation Search

47

 **FIREGROUND OBJECTIVES ?**

Structural Fire Tactical Goals
S.L.I.C.E.R.S.

Sequential Actions
Size Up
Locate the Fire
Identify and Control Flow Path
Cool the Space from Safest Location
Extinguish the Fire

Actions of Opportunity
Rescue
Salvage

Command Fire Attack Ventilation Search

48

Size-Up

Wallace Was Hot
CAN
WTF?
Coal Was Wealth

What ya Got- What Ya Doin- What Ya Need –Whats Gona Hurt the Members?

Command Fire Attack Ventilation Search

49

Size-UP 13 Points Thanks to John

- C-Construction
- O-Occupancy
- A-Area
- L-Life
- W-Water supply
- A-Apparatus
- S-Street condition
- W-Weather
- E-Exposures
- A-Appliances
- L-Location/extent
- T-Time of day
- H-Hazards

Command Fire Attack Ventilation Search


50

Size-Up

What Is Your Definition ?

Command Fire Attack Ventilation Search

51

 **Size-up**

What Is The Real Problem


Starts With Receipt Of Alarm Preplan

Dispatch Information?
Useful Or Not

Occupant Information ?
Useful Or Not

Command Fire Attack Ventilation Search

52


 **Size-Up**

ID real problem so correct solution can be applied

- Occupied Vs. Vacant
- Room/Contents Vs. Structure
- Time of Day - Sleeping - Volunteer
- Weather Conditions
- Water Supply

Command Fire Attack Ventilation Search

53

 **Size-Up**

- Where is Visible Fire
- Where is Visible Smoke
- Smoke Velocity – Smoke Volume
- Light weight Construction Materials
- Where is Fire Going

Command Fire Attack Ventilation Search


54

 **Size-up**

- Has Flashover Occurred
- Is It About To Occur Based On Conditions (Ventilation Limited)
- Smoke Velocity – Smoke Volume
- Light Weight Construction Materials
- Collapse Possibility
- Remember Murphy's Law

Command Fire Attack Ventilation Search

55

 **Size-up**

Murphy's is Always on scene!

Command Fire Attack Ventilation Search

56

 **Size-Up**



What ya Got- What Ya Doin- What Ya Need –Whats Gona Hurt the Members?

Command C A N Report

57

Size-Up



What ya Got- What Ya Doin- What Ya Need –Whats Gona Hurt the Members?

58

Size-Up 360



Minimum 3 Sides

Command Fire Attack Ventilation Search

59

Size-Up

One of the Simplest Things I know about Size-Up at a Fire I Learned from the Great Yankee Catcher

Yogi Berra

"You Can Observe A Lot Just By Watching!"

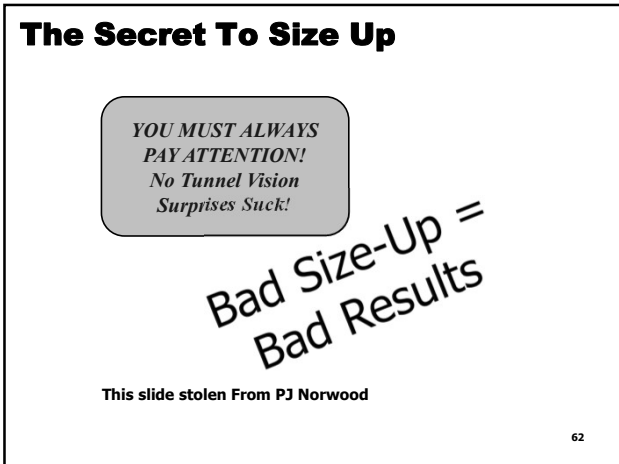



Command Fire Attack Ventilation Search

60



61



62



63

Size-Up



What ya Got- What Ya Doin- What Ya Need –Whats Gona Hurt the Members?

Command Fire Attack Ventilation Search

64

Size-Up



Command Fire Attack Ventilation Search

65

Size-Up This is a big problem



Command Fire Attack Ventilation Search

66



67

Command Rule #1

Now That You Have The Information

You Can't Stand & Stare

You Can't Scream & Panic

You Can't Be A Moth To Flame

See Rule #1

Command Fire Attack Ventilation Search

68

Command Rule #1

In any moment of Decision

The Best Thing You can Do
Is Make The Right Decision

The Next Best Thing
Is To Make The Wrong Decision

The Worst Thing
Is To Make No Decision

Teddy Roosevelt

Duffy

Command Fire Attack Ventilation Search

69

Fire Ground SOPs (Gs)

**If You Have Good SOPs
For First In Companies
It Is Much Easier To Manage**

**Your Companies Will Know What
Your Expectations Of Them Are!**

Command Fire Attack Ventilation Search

70

Communications

Reports from Interior Companies

Urgent Message

Pars

Reports From Roof & From Rear

Frequent Status reports

What you can't see will get you in trouble

Command Fire Attack Ventilation Search

71

Radio Operations

**Everyone Should have a Radio
not Everybody Should Talk on It!**

Does
It
Matter

What
I'm
Transmitting

Acronym by Jim Duffy
Ricci Associates

Tactical Building Blocks Fire Engineering

Command Fire Attack Ventilation Search

72

Communication

- Maintain Radio Discipline ?
- Concise Transmissions
- Actions Needed or Taken
- Problems Encountered
- Future Tactics

Command

73

Communication

IT'S GAUFFER
GETTING IN THE LINE
WE NEED MORE PRESSURE HOT UP HERE

"Squad to Gauffer"
 "We lost water chief"
 "112 Ladder to the Battalion"
 "COME ON BACK MIKE"
 "The roof is open k"
 "Mayday mayday mayday Squad 48 to the battalion Mayday"
 "I Need a ladder to the roof"
 "Battalion 2 to squad go with your Mayday"

Command Fire Attack Ventilation Search

74

Urgent

- Loss Of Water
- Minor Injury Not Needing Rit
- Collapse Feared
- Fire In Exposure
- Other Important Info

75

Responsibilities

Command Owns Everything Not Delegated

RIT EMS




Command Fire Attack Ventilation Search

76

Do You Use an Accountability System

Or Is it more Like This?

IS IT TIME? YES! ?



Command

77

Operational Mode

? Offensive / Defensive ? Hard from ?

Def ?

Become a Student Of The Fire Service!

Indirect ?


? ?


What Does it all Mean ?


Command Fire Attack Ventilation Search


78

Operational Mode



 **Offensive**


Defensive 

 **Investigating**

Command Fire Attack Ventilation Search


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Operational Mode



Tactical Considerations

- Life Hazard
- Location Of Fire
- Extent Of Fire
- Extension Probability
- Type Of Fire
- Size Of Fire




- Manpower
- Equipment
- Water Supply

Command Fire Attack Ventilation Search


80

Operational Mode



Investigating

- Nothing Showing
- Find Out What Is Going on Investigate
- Relay Information to Incoming units



Command Fire Attack Ventilation Search

81

Operational Mode

Defensive

- All Efforts to Stop Spread of Fire
- Interior Attack Abandoned
- Write off Real Estate
- **FIREFIGHTER SAFETY**
- Large Master Streams
- Protect Immediate and Future Exposures

Command Fire Attack Ventilation Search

82

Operational Mode

Offensive

- Aggressive Interior Attack to Quickly Bring Fire Under Control
- Occupied Building - People in Trouble
- Primary Search / Ventilation
- Straight Streams / Backup Lines

GPM

Command Fire Attack Ventilation Search

83

Command JD2015


Remember:

**Command Has a Lot of Jobs
But None More Important
Than Ensuring All Runs Come
With a Round Trip Ticket**



Command Fire Attack Ventilation Search

84


 **Command & L O D D s**

Top 5 Findings in NIOSH LODD investigations

- Poor Risk Assessment Size up
- Lack of Incident Command
- Lack of Accountability
- Poor Communications
- Lack of SOPs or Failure to Follow SOPs

Command Fire Attack Ventilation Search

85

 **Bottom Line on Command**

Prevention Is Better Than Intervention

There May Be Less of A Chance Of Needing
RIT

Command Fire Attack Ventilation Search

86

 **No one cares how much you know
Till they know How much you care !**
Teddy Roosevelt



87



Fire Attack

88



89




The Initial Attack Line

90

Fire Attack

"Put the fire out and most of the other problems go away"



It Must be coordinated with all other tactics

Command Fire Attack Ventilation Search

91

Before You Flow Water

Estimate Stretch



Fire Attack

92

Before You Flow Water

Bleed



Fire Attack

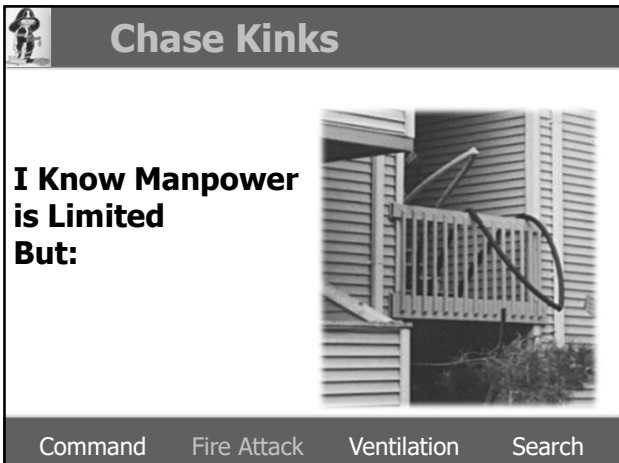
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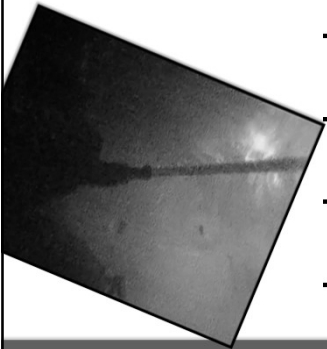


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96

Before You Flow Water



- Slow Down
- Look at Floor Plan
- Look for Victims
- Listen!

Command Fire Attack Ventilation Search

97

Before You Flow Water


GPM vs BTU

Command Fire Attack Ventilation Search

98


Before You Flow Water

How much Hose Do You Need?




Command Fire Attack Ventilation Search

99

Before You Flow Water 

How much Hose Do You Need?




Command Fire Attack Ventilation Search


100



101

Before You Flow Water 

How much Hose Do You Need?



102

First Line



Command Fire Attack Ventilation Search

103

Unburned To Burned?

Avenue of least resistance is safest, most efficient way to control the fire.

House fires this usually means the front door

WHY?

Command Fire Attack Ventilation Search

104

Why the Front Door ?

Command Fire Attack Ventilation Search

105

 **First Line**



What is real Problem ?

Command Fire Attack Ventilation Search

106

 **First Line**



Command Fire Attack Ventilation Search

107

 **First Line**



Command Fire Attack Ventilation Search

108



109



110



111



112



113



114

Fire Attack Pet Peeves

**Always Stretching Dry
Because it is Easier**



Remember
Ventilation Limited
80-90 seconds

We need to make a conscious decision as to why

115

Fire Attack Pet Peeves




We need to make a conscious decision as to why

116

Fire Attack Pet Peeves

**Crowding
The Nozzle Team**



Command Fire Attack Ventilation Search

117

Fire Attack Pet Peeves

Crowding The Stairs



Command Fire Attack Ventilation Search

118

Fire Attack Pet Peeves

**More Than 2 Lines
Through Same Opening**



Command Fire Attack Ventilation Search

119

What Would You Do?



120

Fire Attack Summary

- Fire Flow and GPM critical in fire attack
- Training is more important than nozzle selection
- You **MUST** get the first line in place and operational
- Coordinate the attack
- Identify and Control Flow Paths
- Water flowing is the most important task!


121

 **Ventilation**



Command Fire Attack Ventilation Search


122

 **Ventilation**

Done correctly and timed right it will make search and fire attack go more efficiently & more importantly, It will be safer for the crews operating on the interior.

Command Fire Attack Ventilation Search


123

 **Ventilation**

Necessary to:
Limit fire spread
Protect firefighters
Increase survivability of victims


Command Fire Attack Ventilation Search

124

 **Ventilation Sizeup**

Location

- Size Of Fire
- Extension Fire, Heat, Flow Path
- Roof Construction Access
- Windows Location/Type
- Natural Openings
- Hazards



Command Fire Attack Ventilation Search

125

 **Vertical Ventilation Hazards**

- Chimneys
- Satellite Dishes
- Antennas
- Power Lines
- Construction & Landscaping
- Condition of Roof



Command Fire Attack Ventilation Search

126

 **Vertical Ventilation Hazards**



Command Fire Attack Ventilation Search


127

 **Solar ?**



Command Fire Attack Ventilation Search


128

 **Ventilation**

Ventilation should be a primary
Concern at Residential fires!!!!
Not an Afterthought

Command Fire Attack Ventilation Search

129

 **Ventilation Errors**

Premature Ventilation
Venting Remote From Fire
Not Venting Fire Compartment
i.e. living space or attic space
Venting Behind Attack Crew

Command Fire Attack Ventilation Search


130


 **Venting The Right Space?**



Command Fire Attack Ventilation Search

131

 **Venting The Right Space?**




Command Fire Attack Ventilation Search

132

Forcing Entry is Ventilation

FLOW



PATH

Command Fire Attack Ventilation Search

133

Venting side note

Rotating ventilators are more efficient! Don't Remove!



Command Fire Attack Ventilation Search

134

If You Don't Have a Truck?

You Still Have to Do Truck Stuff



135

 **Search**



Command Fire Attack Ventilation Search

136

 **Remember**



We Have None To Spare!

137

 **Remember**




**A FARMER
Firefighter**

HAS TO BE AN
OPTIMIST, OR HE
WOULDN'T STILL
BE A FARMER.

Firefighter
-WILL RODGERS

-MIT FODGES

138


 **Search**

Searching aggressively and thoroughly can help reduce these numbers
YOU have the proper gear
You are wearing SCBA
You should have the proper training!

Mr. & Mrs. Smith and all the little Smiths Do not.

Command Fire Attack Ventilation Search

139

 **Search**

Searching aggressively and thoroughly can help reduce these numbers

Command Fire Attack Ventilation Search


140

 **Search**

A successful search is their only hope
Whether you are career FF in Miami, Toronto or New York City or a volunteer in Durham CT or Mineola NY
THIS IS YOUR RESPONSIBILITY !

Command Fire Attack Ventilation Search

141

 **Coordination**

Search Must Be Coordinated with Ventilation


Fire attack (hose line placement)

Through Command

Note To Command: "assign search teams"
In other words "command"

Command Fire Attack Ventilation Search

142

 **Search**


- ❑ One of the most dangerous tasks we perform on the fire ground
- ❑ The two main objectives are:
 - Finding victims
 - "Find the Fire" Get information on the extent of the fire

Command Fire Attack Ventilation Search

143



144

 **Tools**


Search Teams Must be equipped with Tools ?

- Irons (Flat Head Axe & Haligan)
- Six foot Hook (pike pole)
- Handlight
- Radio
- TIC

▪ Any thing else you might want to bring?

Command Fire Attack Ventilation Search

145


 **Tools**

Tools for Searching

- Extend reach
- Forcible entry into rooms
- Forcible "exit" if you get into trouble
- Makes search safer and More efficient
- Sound Floors
- Use caution when sweeping while searching

Command Fire Attack Ventilation Search

146


 **Search Safety**

Wear full PPE This means all PPE properly including SCBA on air and a Radio.

- Always search with a partner
- Remain in physical, visual or voice contact
- Your partner is **not your Prom date**
- You Don't have to hold hands!

Command Fire Attack Ventilation Search


147

 **Search**

Search Safety

Command Fire Attack Ventilation Search

148

 **Search Safety**

Be Part of the Plan (Vent - Fire Attack)
Not Part of the Problem

- Use Systematic Search procedure
- Crawl
- Always be aware of the extent & location of the fire
- Know Where you are at all times!!!!!!!!!!

Command Fire Attack Ventilation Search


149

 **Search Safety - Orientation**

- Always keep your bearings
- Keep wall contact
 - Hand, Foot, Tool
- Count Doors, Windows, Turns
 - Mentally Map The Room / House
- Look out window
- What Room am I in?

Command Fire Attack Ventilation Search


150

 **Search Safety - Orientation**

- Leave a man at the door
- Monitor conditions*
 - Beacon for Exit*
 - Show the way out*
 - Conserve air*
- Close door to fire area
 - No door.... Get One!*

Command Fire Attack Ventilation Search


151

 **Search Safety - Orientation**

- Preplans
- Medicals*
- New Construction*

Command Fire Attack Ventilation Search

152

 **Search Safety**

**Can we Isolate
The Fire Room
Or
The Search Room From Fire**

Command Fire Attack Ventilation Search

153

Search Safety

Venting as You Go?
OK
If room isolated from Fire
Should have
No Negative Impact on Fire.

Command Fire Attack Ventilation Search

154

Search Safety

Venting as You Go?

If Engine Operating
Leave Door Open
After Search

Command Fire Attack Ventilation Search

155

Search Size-Up

Is the structure occupied?
What Time is it?
Search Where?
Search What rooms
Who Searches?



Cars- Toys-Lights-How many?

Command Fire Attack Ventilation Search

156

 **Search Size-Up**

Which one first?

What Tools?

Do I have the resources?


Where is the Fire?

Command Fire Attack Ventilation Search

157

**Predictable
Is
Preventable**


158

 **Search Size- Up**

**To Search
Or
Not To Search
That is Not The Question!
If there is a Chance we Search!**

Command Fire Attack Ventilation Search

159

 **Where do we Begin ?**

In Private Dwelling Fires The Floor Above is Equally Dangerous Because:

Open Stairways

Open Bedroom Doors

Command Fire Attack Ventilation Search

160

 **Areas Victims Found**

Bedrooms

Hallways

Behind Doors

Under Windows

Areas of Egress

Command Fire Attack Ventilation Search

161

 **Bedrooms**



Command Fire Attack Ventilation Search

162

 **Team Search Technique**

**Do We Just Follow
Each Other Around in
The Dark
?
Room Sizes
Air Management**

Command Fire Attack Ventilation Search


163

 **Search Technique**

Talk To Yourself ?

Command Fire Attack Ventilation Search


164

 **Vent Enter | Search**

Is It Safe?


How Do we Do it?

Is It a Big City Tactic only?



Command Fire Attack Ventilation Search

165

 **Vent Enter Search**

What Window


How do we get to it ladder then Vent

Get mask on "Ventilation Limited"

Clear the Window
Make It a Door It's your way out if it goes bad

Command Fire Attack Ventilation Search

166

 **Vent Enter Isolate Search**

Sweep/Sound Floor


Enter Low If You Can

Get in Quickly

Close the Door!!!!!!
Simply closing door may buy the necessary time to complete a search and let the engine company attack the fire

Command Fire Attack Ventilation Search

167

 **Vent Enter Isolate Search**

If it's Closed -

Briefly Open Why?


Victims just outside door


Check Fire Conditions

Listen For Engine Operations

Command Fire Attack Ventilation Search

168


 **Closing the Door**



Has an Impact on the Entire Operation

Command Fire Attack Ventilation Search

169

 **VEIS Final Thoughts**

It's an "end run" around the fire instead Charging through it.

By doing this we are saving valuable time getting to area that "most likely" contains victims.

Command Fire Attack Ventilation Search

170

 **Vent Enter Search**

VES Good Idea

Ladder Placement Bad Idea

Really Bad Idea !




Command Fire Attack Ventilation Search

171

 **Search**

**A successful search
is their only hope**



THIS IS YOUR RESPONSIBILITY !

Command Fire Attack Ventilation Search

172

 **Search**

There Are No Do-Overs

We can Not Fail

You have to do it right the first time!

Command Fire Attack Ventilation Search

173

 **Search**

Must Be Coordinated With

**Ventilation
&
Fire Attack
&
Coordinated Through Command**

Command Fire Attack Ventilation Search

174



One More Time

Do Not Let Emotions take over


Command Fire Attack Ventilation Search

175

Where are the Occupants 4:30 AM



176



Remember

Its not what you don't know that will get you in trouble

Its Not What You Know That will Get You in Trouble

Its What You Think You Know that You Don't Know


177



Remember

Hope Is Not A Plan

178




Bottom Line

We Must Continue to Train on:

- SCBA Emergencies
- MAYDAYS & Self Rescue
- Rapid Intervention
- Bailouts & Wall Breaching

Command Fire Attack Ventilation Search

179



Bottom Line

But If We Train
Keep Alert
& Coordinate

Search-Ventilation-Fire-Attack-Command

There May Be Less of A Chance Of Needing It

Command Fire Attack Ventilation Search

180



181




182



183

My Soap Box

**Remember
When you have Choice
and you can
Please Try To
Buy American!**



184

**No one cares how much you know
Till they know How much you care !**
Teddy Roosevelt



185

860 558-7881
shift1commander@Comcast.net



186

186
