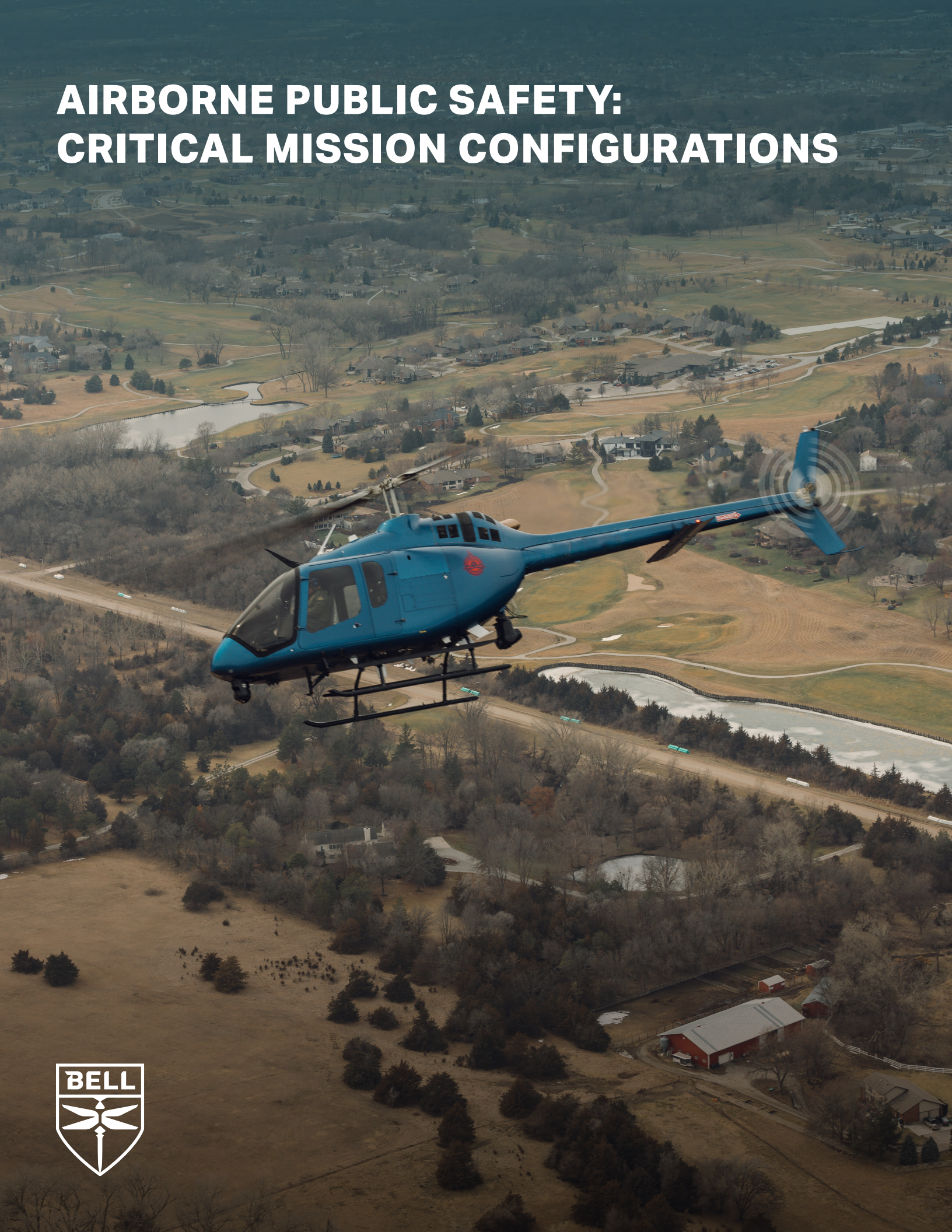
AIRBORNE PUBLIC SAFETY: CRITICAL MISSION CONFIGURATIONS



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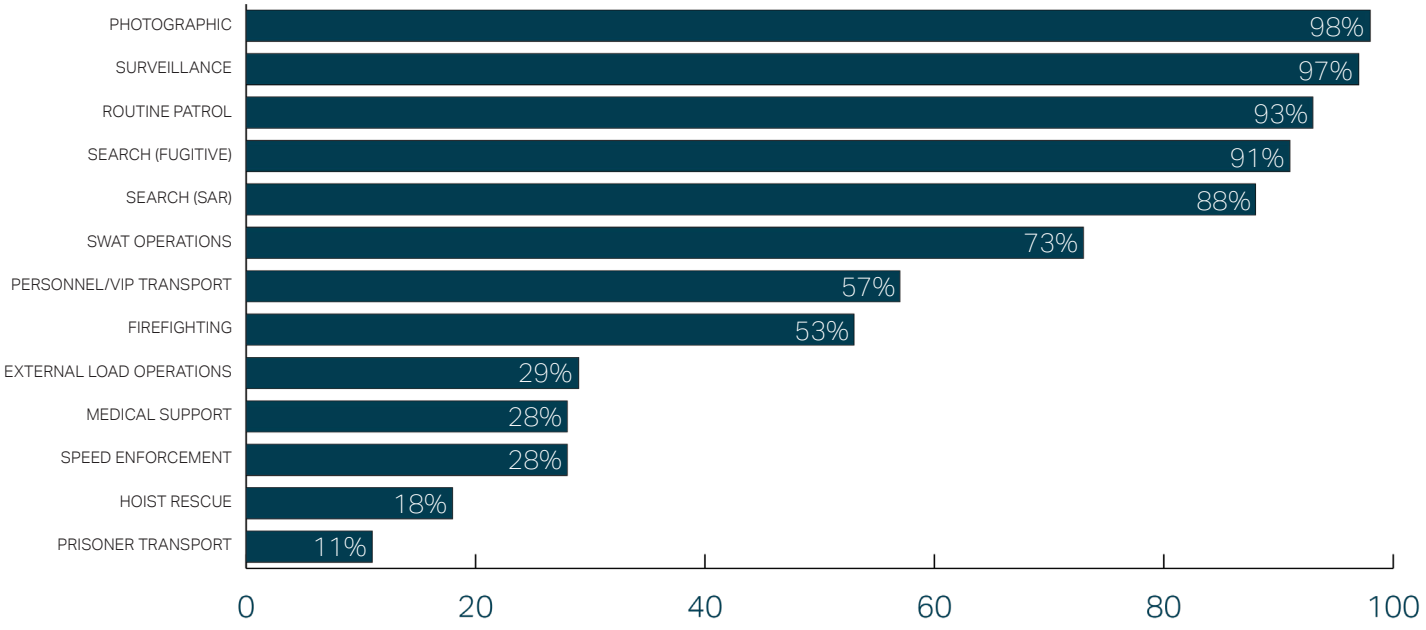
Airborne public safety effectiveness at its core is rooted in the unique aerial perspective where highly trained crews operate. When matched with specialty mission equipment, public safety helicopters stand-alone in that effectiveness. They are different than the mainline helicopter industry. From specialized training for crews to highly developed operational tactics to critical specialty equipment configurations, the mission and mission enablers are not only different—but critically important to get right. The protection of lives and property depends on getting it right. Although the various enablers are all important, it is the specialty mission equipment that is perhaps most daunting and complex.

The differences come from the diverse regions and demographics where the public safety providers operate and the complex mission itself. As a result, a "standard" configured police, fire, or SAR helicopter does not exist. Aircraft standardization happens within an operator's internal fleet, and rightfully so. As convenient as it would be to just replicate another's custom completion, this approach risks reduced mission ability. Because an operator's specifically defined mission is unique and different in its own regard.

How different? It depends on the specific mission flown, who's flying it and where it's flown. For example, if you are a municipal police operator in a metropolitan area, there is a high likelihood that you conduct routine patrol as a primary mission function. Accordingly, you as the operator would have a likely focus on specialty equipment like high-definition police cameras, aligned with an aircraft providing maximum station-time endurance. As a state or provincial operator, the scheduled patrol flight is likely less frequent and thus a different configuration focus and aircraft performance need. Instead of a patrol priority it might be SAR, initial attack fire suppression or any number of different mission types. Add in the reality of multiple mission types required, and the complexity of proper configuration grows.

The various public safety mission types are well known, but at times misunderstood and even misstated in priority need when it comes to aircraft configuration. According to a U.S. Department of Justice survey, 176 individual public safety helicopter operators collectively revealed the following, shown in the table below:

Percentage of Operators Performing Various Mission Types:



Source: U.S. Department of Justice

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It is important to note the previous graph shows the type of mission flown by operators, and not the frequency in which it is flown. For some of these mission types, there can be a significant difference. For example, although 73% of the operators report that they conduct SWAT insertions as a mission function, the frequency of that mission being performed is typically much less. In one case, the SWAT insertion was listed as a priority mission, yet the actual real-world deployment of such averaged out to less than one actual insertion a year. This is not to say that one deployment is not critically important but rather, needs to be taken into perspective in terms of configuration enablement.

Specific parameters to various mission types will also influence mission equipment configurations. For example, operators that require greater range in mission location are automatically more impacted with weight restrictions, since the required fuel loads and fuel burn rates are amplified. In another survey with 144 respondents, a significant difference in the length of the average mission was shown. For example, a state police helicopter average mission length is reported as 1.8 hours compared to the average municipal police mission length of 0.6 hours. The county jurisdiction average for the same mission was 0.8 hours. These variances can largely be attributed to differences in agency jurisdiction size. Criticalness of mission was assumed as equal, but each with a resultant different response time and need for specific defined aircraft and aircraft configuration parameters.

Average Length of Mission by Operator Jurisdiction Types:

Number of Survey Respondents	All Agencies Combined	State Agencies Only	County Agencies Only	Municipal Agencies Only
144	1.0 hours			
29		1.8 hours		
71			0.8 hours	
44				0.6 hours

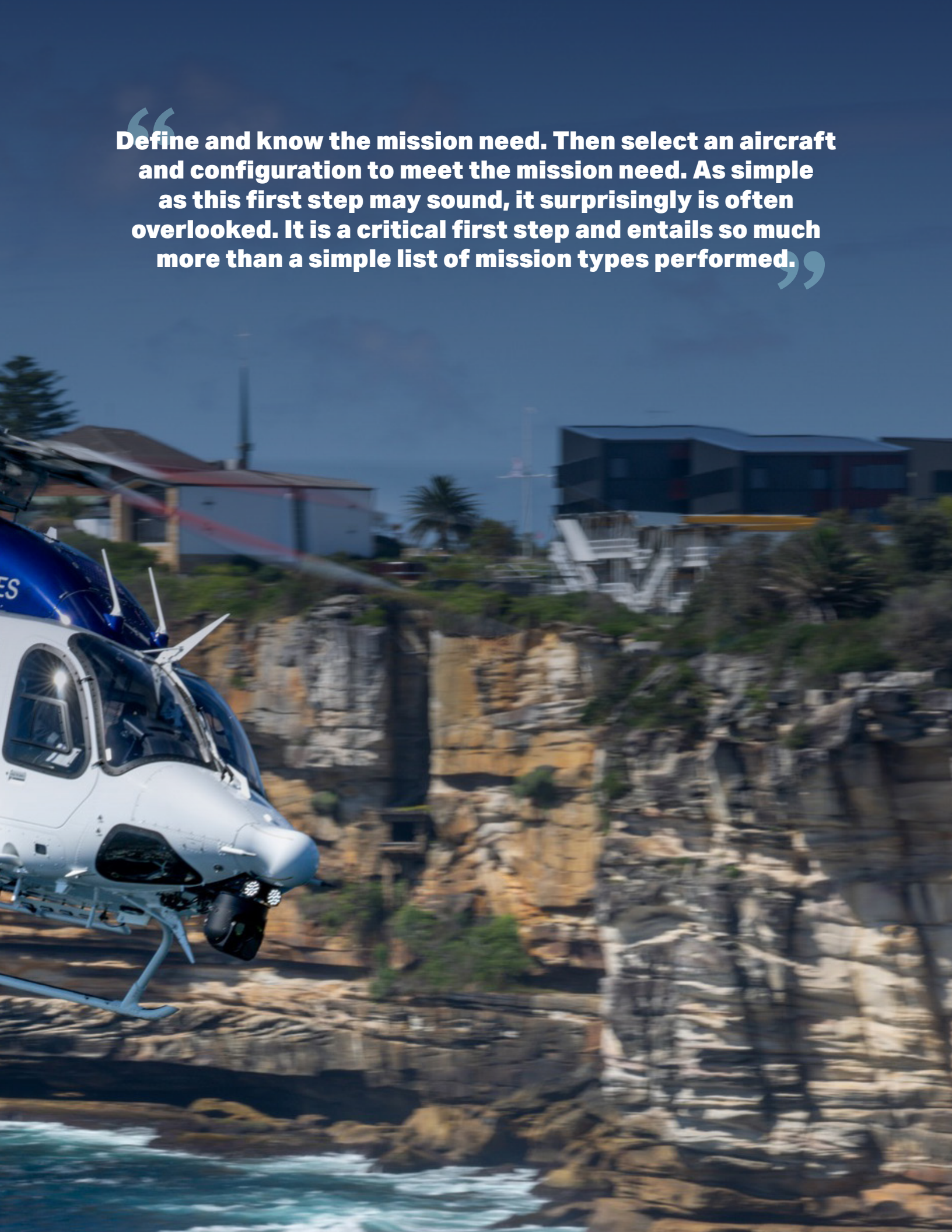
Although the types of agencies, the agency's demographics, and the agency's defined mission greatly influence the equipment configuration detail, there are no absolutes from one agency to the next. In another survey, 201 airborne public safety operators reported the following specific equipment type, by type of agency:

Actual Type of Equipment Utilization by Jurisdiction Type:

Type of Specialty Mission Equipment	All Agencies Combined	State Agencies Only	County Agencies Only	Municipal Agencies Only
Searchlight	88%	80%	92%	97%
IR/IO SENSOR	82%	82%	82%	84%
PA SYSTEM	59%	50%	62%	68%
NVG Compatibility	54%	73%	53%	32%
External Cargo Hook	41%	46%	32%	41%
Downlink	31%	30%	38%	31%
MDC	22%	5%	16%	34%
Hoist	21%	27%	23%	13%

Of note is the rate of agencies without FLIR cameras and specifically with municipal agencies. Although 97 percent of municipal police claim scheduled patrol as a priority mission, only 84 percent do so with an imaging system. This is not to say that a camera is not an effective technology force multiplier, but rather, not an absolute essential requirement. Again, there are no absolutes. In this regard, even a public safety helicopter as a simple aerial platform without an imager can still be utilized as a force multiplier.


VH-PHM
POLAIR 4
NEW SOUTH WALE
POLICE
FORCE



“Define and know the mission need. Then select an aircraft and configuration to meet the mission need. As simple as this first step may sound, it surprisingly is often overlooked. It is a critical first step and entails so much more than a simple list of mission types performed.”

Define the Mission First

Define and know the mission need. Then select an aircraft and configuration to meet the mission need. As simple as this first step may sound, it surprisingly is often overlooked. It is a critical first step and entails so much more than a simple list of mission types performed. What is the primary mission, as compared to each secondary mission? What is the frequency of each mission set? What is the impact to public safety if certain mission types (or methods) are excluded? Are there alternative solutions to mission completion? Does each aircraft need to perform the full mission set? What other parameters are unique to just this agency that need to be considered?

A detailed look at multiple parameters can simplify the complex. For example, if the primary mission is determined to be patrol and entails 90 percent of the flight hours, then this clearly needs to be the primary focus in the custom configuration. While a high performing infrared imager with specific features is assumed, so is the need to now define the complex detail. Is the patrol mission routine and proactive, or will greater standoff ranges be needed as with surveillance? This aspect alone might lead to a realization that a 15" optic is needed for the imager, to read license plates a mile out, versus a lesser, but still very capable 10" imaging optic. In this same example, the remaining 10 percent mission can likely be considered as the secondary. This does not mean we neglect the secondary mission; we just need to ensure prioritization to the primary. For example, if a secondary mission for that same patrol operator is medical casualty evac but rarely performed, a full medical kit is likely not warranted. At the same time, limiting the sensor operator station to the cockpit versus the rear cabin might be necessary to have adequate cabin space to load the casualty evac victims. Detail matters.

Just the opposite could be said for an operator whose primary mission might be patient transport 90 percent of the time but has a secondary mission to assist with "searches" 10 percent of the time. In this case a much lower capacity imager could potentially be utilized, if not all together eliminated. In both examples, operators are still performing a type of medical and a method of search, but both uniquely configured in a different way.

This detail should include the demographic where the now-prioritized mission set is performed. In the above primary patrol example, what is the average endurance and station time needed? Can a relief aircraft be planned or is it a single ship operation that impacts the station time? How many crew members will be utilized and what is the total payload capacity needed? As much detail as possible here can help steer the primary and secondary defined mission needs. The same detail is also applied to endurance, range, hover performance levels, Category A requirements and several other parameters.

Again, defining the detail of the primary and secondary mission is a critical first step. Do not under-define it and at the same time don't over-estimate it as a priority.

Weight Matters

We need to be ready for every mission scenario. This can be claimed by many operators. When it comes to custom aircraft completions, it can carry an unintended consequence of primary mission neglect. It can be well intended when every mission kit option available is added, but the result is typically a very heavy aircraft that can reduce mission ability. The effort to "fully" cover every secondary mission type leads to a reduced ability for the primary mission. It all comes down to weight.

In the above patrol/casualty evac example, a decision to forego the full medical kit for the secondary mission might be obvious, but the smaller points can be just as critical and need to also be evaluated. For example, the mentioned 15" optic camera might be well justified but it also adds more weight. The resultant aircraft performance will be impacted and so the defined mission when looking at endurance and station time may or may not still be met. Every piece of mission equipment added to an aircraft, regardless of weight, impacts performance—for every mission. It impacts range, endurance, hover performance, fuel burn rates, and more—on every mission. This is not to say that we should under-configure for the primary or don't properly configure for the secondary mission. Rather, weight needs to be responsibly factored into "defined mission" decisions.

Determine Budget Sourcing and Political Landscape

Determining the budget source is a critical part of defining the mission. We may want the biggest and most expensive aircraft and mission equipment available, but is it realistic from a financial or political perspective? Does it fit the business case? For the government operators, does it fit the political landscape? We may have convinced the command staff on the advantage of reading license plates a mile out, but did we advise the price difference between a 15" versus 10" optic? We may be able to operationally justify it, but are they willing to fund it? Is there an actual expectation to read license plates a mile out and what are the repercussions if you can't deliver that aspect—or any of the aspects?

What are the potential future mission needs? Helicopters are typically only replaced every 10 years or more. As such, the time to consider future mission needs is when the current custom configured aircraft is being selected and funding pursued. Realization of future needs after delivery can cause a critical loss of credibility on the political front. Can the current selections meet the defined mission needs for the next 10 years? If not, what mission kits need to be added, enhanced or even subtracted? Is there an option of adding provisional equipment as a solution?

Defining the budget sourcing should include a look at OEM options that provide specific financial programs. This helps overcome government political hurdles, like municipal bond lease finance structuring.

Essential Options

When the mission and budget sourcing is properly defined, the proper selection of the helicopter platform and the specific configuration needs become more obvious. Options are needed on both fronts. It's essential at this point. If the helicopter OEM is not providing various equipment options, then the OEM is in effect, defining the mission for the operator, even if not intended. Helicopter OEMs handle this differently.

For example, in the hypothetical IR imager need above, one OEM provides options through a unique imager mount certification. Specifically, a mount that is certified to generic imager weight and not imager type. This leads to the operator defining their exact imager need and thus selection—and not the OEM indirectly defining the need. In another OEM example, the option is limited to only one imager type. This in effect is now the OEM defining the camera type and that camera type defining the mission potential for the operator. Full mission solutions can come from an agnostic OEM approach that focuses on multi-mission helicopters as platforms first but complemented with customer options to match "their" defined mission needs.

Common Configuration Considerations

In researching the various equipment options, it remains critical to not lose sight of the defined mission. Stick to it and avoid unneeded mission creep. Categorize by priority as dictated to the defined mission. Some areas will be essentially integrated across all mission types. Others will be highly mission dependent.

Public Safety Communications - Tactical radios are the essential core for any public safety aircraft. Without the means to directly communicate with ground forces, command and control, dispatchers and others, the effectiveness of airborne ops is greatly diminished, if not altogether eliminated. Details are needed. A good starting point is determining what specific radio bands are required for the jurisdiction. Common selections might be VHF, VHF-FM, UHF-FM, 700 and 800mgz bands. There is a good chance that two or three and even all will be needed. What are the neighboring agencies radio bands that you may be called to support? Is encryption needed for tactical operations? Is there a need for simultaneous monitoring of emergency channels associated with fire-fighting? Define, define. Next, look beyond the radio itself. Which aircraft seats need direct access to the communications systems and by what method? Does the dismounted crew member still need communications when he or she exits the aircraft? What about the hoist rescue specialist on the line and their ability to communicate with the hoist operator? How about cell phone integration or satellite phone systems as a backup? CAD system? Mission detail is critical in determining the full communications package needed.

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Electro-Optical and Infrared Imaging - Most common will be the 10" and 15" optics, but with it a large price and weight delta. What level of resolution is needed? At what range or slant range? Under what atmospheric conditions? Keep in mind that public safety cameras typically include a combination of several imagers. Most common are the day, night, lowlight, infrared and blended imagers. Is a laser pointer needed? Is ITAR of concern? Is a center mount of the camera with aircraft an option so as to utilize critical rear-looking tactics? Can the camera chosen be certified to the aircraft chosen?

Just as important as camera options is the critical integration with the operator and where he or she will utilize it. Front seat station? Rear cabin station? Combination of both? Mission computers, moving map overlays, display screens, keyboards and more must be considered. Will the imaging require broadcasting to ground elements? Microwave downlink, cell transmission, satellite uplink or a combination of all? A well-defined mission will likely dictate the need and logical decisions.

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Lights - Today's public safety search lights are much more sophisticated in the past. Geo-synchronization, camera slaving, lighter weights and auto-filtering abilities are now options. At the forefront is the need to determine the minimum candlepower need for your jurisdiction. Whereas "brighter" might seem to be the "better" choice, keep in mind that size will impact aircraft performance. A brighter light equates to a bigger light (more aircraft parasitic drag) and heavier light (less mission payload). Remember, weight matters.

Simpler decisions will include peripheral lights like a down-facing hoist light or a cabin loading light. A customer-focused OEM will be able to offer custom options here. Will the operation include night vision goggles? If so, this will impact all internal and external lighting in terms of NVG compliance compatibilities. It even determines detail on radio parameters (radios need NVG compatible backlighting).

Additional Options - The list is by no means endless, but when properly defined it might seem like it. The above is a starting point. Add to this other considerations such as: hoist, cargo-hook, short haul provisions, rappel points, crew member securement points, water suppression tank, bucket suppression provisions, fast rope systems, ALS medical equipment, loose equipment mounting and storage, aerial use of force provisions—and more.

Although today's police, fire, medical and SAR helicopters and configurations are significantly different than the historical solutions, the common goal of protecting human life and preserving property remains constant. At the same time, every operator is uniquely different in how to customize their helicopters to provide this public safety. It starts with a well thought-out and detail-defined mission and includes budget considerations as a priority. It focuses on weight and can end with an OEM approach that focuses on the customer's defined mission, and not their own.

This white paper is intended to serve as an introductory recommendation only. It is not all inclusive. A direct and free-of-charge consult with Bell's Public Safety Segment Managers and Configuration Managers is available to any airborne public safety operator.

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