AIM Command or Capstan Sharpshooter – Tom Wolf, AAFC Saskatoon, (306) 956-7635

The Aim Command and Capstan Sharpshooter are the same technology and both are made by the same manufacturer (Capstan Ag Systems, www.capstanag.com). The Aim Command is more integrated with the sprayer controller and is available only on Case IH sprayers. The Capstan Sharpshooter is available as a retrofit with all other sprayers.

The system allows for more precise rate- and droplet size control than conventional rate-control systems, and offers other advantages as well. Basically, the traditional use of spray pressure to control nozzle output is replaced by the duty cycle of a pulsing solenoid. Pressure (and droplet size) stays fairly constant throughout the duty cycle range. Pressure can still be changed if necessary, to control droplet size.

To select the right nozzle type and size, use the Tip Wizard (www.wilger.net). Select "Canada", and "US gal/acre". Select "Tip Wizard" on the left side of the screen, and choose "Blended Pulse System, Search for Tips".

Enter your information in the boxes. For example, 10 (gpa), 350 (µm, VMD), 15 (mph, max speed), 20 (inches nozzle spacing), 110 (degrees, fan angle). Always select 110 for use with Aim Command or Capstan.

Click "Search for Spray Tips". The pressure that matches your droplet size criteria will be highlighted for each nozzle. In this case, the SR11006 nozzle is highlighted at 52 psi, giving about 349 µm VMD. If you choose the SR11008, the pressure goes up to 73 psi to get the same droplet size, and your minimum and maximum speeds increase as a result. Note that the numbers are calculated and do not always agree exactly with published nozzle charts. Allow for some leeway, and double check with manufacturer flow charts to be sure you're in the ballpark.

Your expected average speed should be 60 - 80% of the maximum speed that the nozzle is capable of in these charts (100% duty cycle). For example, if you expect to travel 12 mph, select a solution whose maximum speed is 20 mph. This way, the system will be averaging 60% duty cycle at 12 mph, allowing you to nearly double your application rate (or speed) where necessary (system moves to 100% duty cycle), or halve your travel speed (system moves to 30% duty cycle). Slowing down further is an option, but a very coarse spray at low duty cycle may introduce skips under some conditions (low booms, fast speeds). This option also gives you maximum flexibility to change pressure to manage droplet size in both directions. Using a higher average duty cycle (say 80%) increases your flexibility to slow down, but limits your top speed more.

The right nozzle pressure depends on the choice of nozzle. For low-drift tips such as the Wilger SR and MR, higher pressures (>40) are recommended to ensure the spray pattern develops fully. Drift remains acceptably low. The %<200 columns in the Tip Wizard is a drift index. It identifies the proportion of the total spray volume in droplets <200 µm. Use the number to compare drift potential of various nozzles and pressures, making sure you also pay attention to the %<600 µm column. When values in that column are subtracted from 100, the result is an indication of the volume in droplets that are possibly too large to contribute much to coverage or efficacy.

It's not easy to pick the best droplet size for each application because various pesticides and pests each have their own response. Typically, a Volume Median Diameter (VMD) ranging from 350 to 450 µm is ideal for most pesticides. Choose smaller VMDs for low water volumes, grassy weeds, and contact products, but use these only when drift is manageable. Choose larger VMDs for systemic products, broadleaf weeds, and higher water volumes, or when drift must be avoided. If you aim for 375 µm to start, that will be relatively low-drift and work well for most products.

Advantages:

- Constant pressure (and droplet size) over a wide range of travel speeds.
- Ability to change droplet size with pressure adjustments on-the-go, without changing travel speed (depends on where you are in the duty-cycle range).
- Ability to change application volume on-the-go, without changing travel speed or pressure (again, depends on where you are in the duty cycle range).
- Instant response to shut-off, turn-on. Sprays at full pressure immediately. Does not drip.
- Ability to change boom section number and size without any change in plumbing.
- Technology is mature and field proven.

Disadvantages:

- More complicated. If something goes wrong, may take time to trouble-shoot. But conventional system will still operate.
- Must keep water clean to avoid malfunctioning of solenoid seal.
- Operator needs to understand system to take advantage. For example, at max travel speed (100% duty cycle), one cannot increase application volume or reduce drift by lowering pressure. Most flexibility is available at 60% duty cycle, and nozzles should be selected so that at average travel speed, system is near 60% duty cycle.
- Must use wider fan angle nozzles or higher boom height to get 100% overlap.
- Use of a combination of very coarse sprays, low booms, fast travel speeds, and low duty cycle may result in spray skips. Pretty rare in practice, though.
- The system's primary purpose is to increase the consistency and accuracy of spraying. It does not have a unique ability to reduce drift or water volume over a conventional system.

A conventional nozzle system can still do a very good job. However, using a conventional system with low-drift nozzles often reduces the available pressure range by raising the effective minimum pressure, usually to about 30 psi, sometimes higher depending on the tip. Since many sprayers cannot producer pressures over 100 psi, this reduces the travel speed range. The Aim Command system removes this limitation by using duty cycle, not pressure, to control flow.