

# Read the Raven Manual for Detailed Instructions

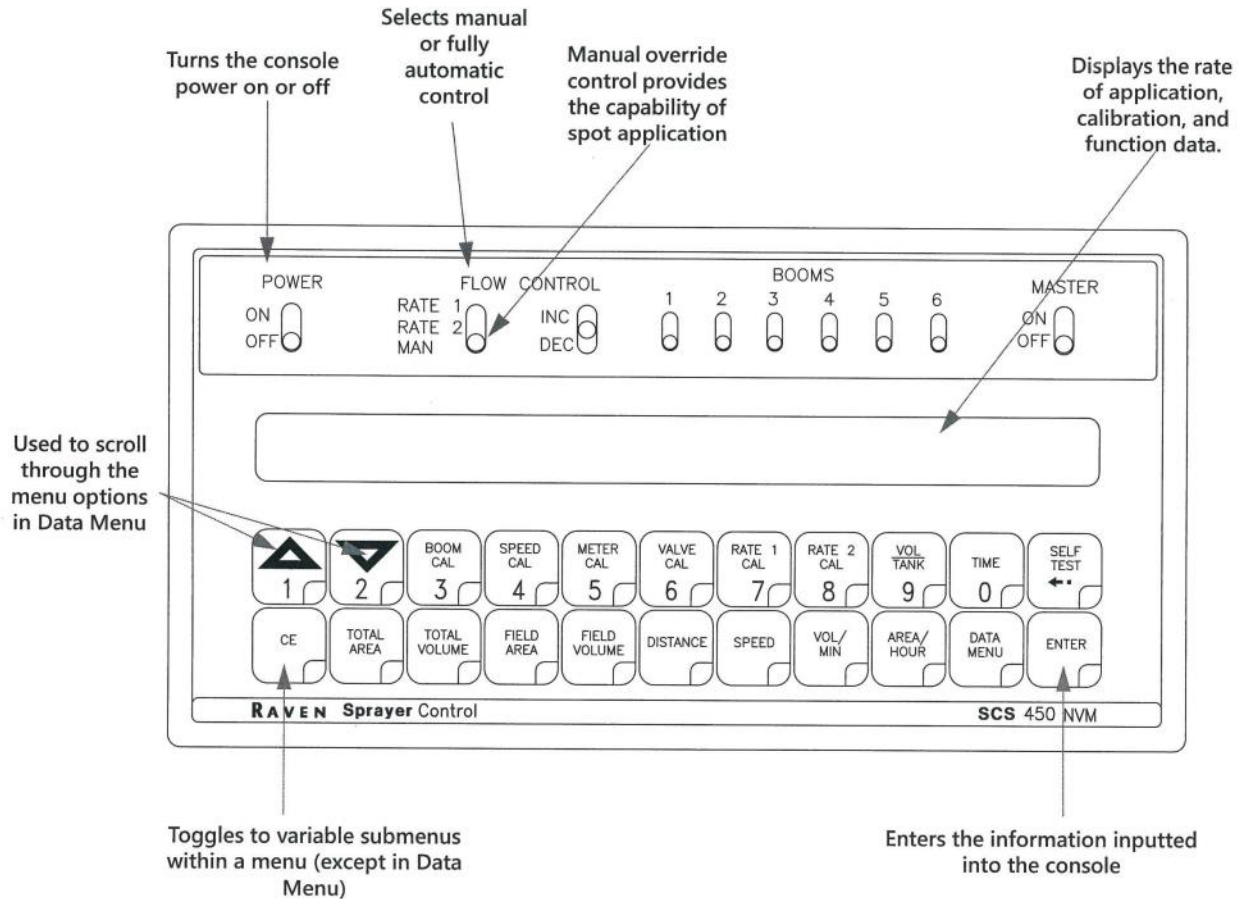
**The information contained in this instruction comes from Raven Manuals & Instructions. Realizing most people will not read a 60 page manual, NCI has condensed the instructions to the absolute minimum for proper set-up and operation. Raven manuals, replacement parts lists, software updates can be viewed or downloaded at [www.portal.ravenprecision.com](http://www.portal.ravenprecision.com)**

There is no substitute for understanding your equipment's specifications, instructions and capabilities.

## Important Warnings!

- ★ Do NOT try to modify or lengthen any of the Speed Sensor or Encoder cables. Call Newton Crouch Inc. (800-241-1350) for extension cables.
- ★ ALWAYS disconnect battery from console prior to jump starting, welding, or charging battery.
- ★ Flush the entire system with water after use of suspension type chemicals. Failure to clean the system can result in crystallization of chemicals, causing plugs in flow meter, lines, or nozzles.
- ★ Flush and drain the sprayer thoroughly before storing the machine. Freezing temperatures may damage the flow meter if water is not drained.
- ★ Remove the console from the cab when not in use for extended periods of time.

# A Guide to the Raven SCS 450 Liquid Application



Calibration buttons are used to enter data into the console when calibrating the system.

Function buttons are used to display the data on a particular aspect of the application.

Button Name	(Data) Function
BOOM CAL 1-SECTION 1 (Use Up/Down Arrow 1-7, L to R)	Length of boom section 1
BOOM CAL 2-SECTION 2	Length of boom section 2
BOOM CAL 3-SECTION 3-7	Length of boom section 3-7
SPEED CAL	Determined by speed sensor
METER CAL	Meter calibration number
VALVE CAL	Valve response time
RATE 1 CAL	Target application rate 1-(GPA w/decimal) L to R, Applied Rate; Rate 1 Target
RATE 2 CAL	Target application rate 2-(GPA w/decimal) L to R, Applied Rate; Rate 2 Target
TIME	24 hour clock (military time)

Button Name	(Data) Function
TOTAL AREA	Displays total area applied. ★
TOTAL VOLUME	Displays total volume applied. ★
FIELD AREA	Displays field area applied. ★
FIELD VOLUME	Displays volume applied to the field. ★
DISTANCE	Displays distance traveled. ★
SPEED	Displays the vehicle's speed. L to R when applying rate—PSI—Speed
VOL / MIN	Displays the volume per minute applied.
AREA / HOUR	Calculates the total area covered per hour at the present speed (not average)
DATA MENU	Used for data logging and variable rate commands
SELF TEST	L to R (Produced) Self Test Spread—Displays constants after selecting volume measure, speed sensor type or valve type.

★ To zero out this figure, press ENTER, 0, ENTER in this menu.

# Getting Ready to Program the Raven SCS 450

Console calibration is a one-time procedure that, once it has been performed, does not have to be repeated. Turning the POWER ON/OFF switch does not affect the console's memory—all data is retained.

Your console *must be calibrated with these selections before using*. Programming is easiest if you mark the correct selection here and have this with you when you start the process. The most commonly used selections on NCI equipment are indicated by ★

## Constants Functions

### Area:

- US - per Acre ..... ★ \_\_\_\_\_
- SI - per Hectare \_\_\_\_\_
- TU - per 1000 Sq Ft (for turf primarily) \_\_\_\_\_

### Sensor:

- SP 1—Wheel drive \_\_\_\_\_
- SP 2—Radar..... ★ \_\_\_\_\_

### Valve Type:

- C-SD (Standard Valve) = 2123..... ★ \_\_\_\_\_
- C-F (Fast Valve) = 743 \_\_\_\_\_
- C-FC (Fast Close Valve) = 743 \_\_\_\_\_
- C-P (PWM Valve) = 43 \_\_\_\_\_
- C-PC (PWM Close Valve) = 43 \_\_\_\_\_

**SUBJECT TO VERIFICATION.  
CHECK THE TYPE OF VALVE.**

## Data Functions

The entries below are explained on pages 5—8. Understand your data **BEFORE** entering it into your console. The quality of your work depends on correct data!

3

### Boom Cal:

Width of swath in INCHES  
 Example: 60 ft Swath = 720 In  
 You must enter a # for each boom. If you have only 1 boom, enter 0 (zero) in All other booms.



Use Up / Down arrows 1 or 2 to go from boom to boom



- Boom 1 Cal** \_\_\_\_\_ **3 a**
- Boom 2 Cal** \_\_\_\_\_ **3 b**
- Boom 3 Cal** \_\_\_\_\_ **3 c**
- Boom 4 Cal** \_\_\_\_\_ **3 d**
- Boom 5 Cal** \_\_\_\_\_ **3 e**
- Boom 6 Cal** \_\_\_\_\_ **3 f**
- Boom 7 Cal** \_\_\_\_\_ **3 g**

4

### Speed Cal:

- Raven Radar
- Phoenix 10 Speed Sensor
- TeeJet GPS Speed Sensor



\_\_\_\_\_ **4**

- 5 Meter Cal:**  
Value is *stamped on a tag* attached to your flow meter. **Make a record of this #!**

METER CAL \_\_\_\_\_ **5**
- 6 Valve Cal:**  
Based on VALVE TYPE:  
Select value 2123 or 743 or 43

VALVE CAL \_\_\_\_\_ **6**
- 7 Rate Cal:**  
Desired Gallons per acre  
**MUST BE WITHIN LIMITS OF TIP VERIFY**

RATE 1 CAL \_\_\_\_\_ **7**
- 8**  
Desired Gallons per acre  
(If a different second rate is not being used, enter the same value as entered for rate 1)  
Rate 2 should be within + or 20% of rate 1

RATE 2 CAL \_\_\_\_\_ **8**

With these selections you are now ready to enter the data into your console.



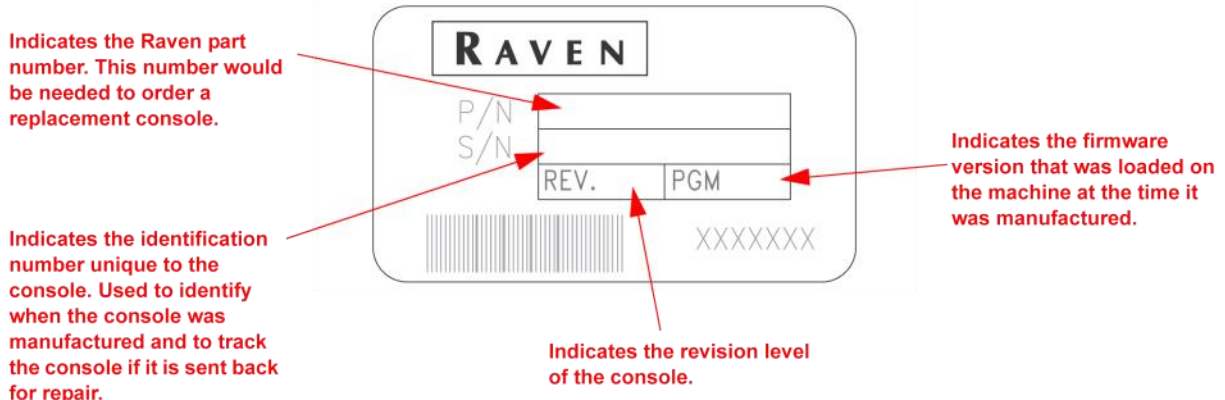
If you make an entry or selection error during the Constants (*first 3 steps*), turn the POWER ON/OFF switch to the OFF position, depress the CE button and hold it down while turning the POWER ON/OFF switch to the ON position.

***This will reset the console***

## Console Identification

There may be situations that arise during which it may be necessary to contact Raven Industries with questions about the SCS 450 system. The SCS 450 console has an identification label affixed that contains information useful to the Raven customer support team to identify potential issues with the console or system. Please refer to this information on the console when calling to request assistance.

**FIGURE 1. Identification Label**



# Determining YOUR Data

3

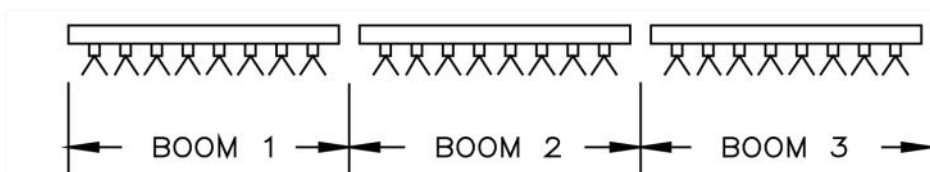
## Calculate the Boom Cal Value \_\_\_\_\_ 3 a, b, c, d, e, f, g

BOOM  
CAL  
3

### Broadcast Spraying

Calculate the Boom Cal value in inches [cm] by multiplying the number of tips by the spacing between the tips. Be sure to write down these figures for future reference when programming the console.

FIGURE 1. Boom Sections



### Band Spraying

Calculate the Boom Cal value in inches [cm] by multiplying the number of tips by the spacing between the tips. Calculate the Adjusted Applied Rate by multiplying the Broadcast Rate by the Band Width in inches [cm], then divide by the spacing in inches [cm].

### For Example:

Broadcast Rate = 20 GPA [200 lit/ha]  
 Spacing = 40 inches [100 cm]  
 Band Width = 14 inches [40 cm]

$$\frac{\text{GPA} \times \text{Band Width}}{\text{Spacing}} = \text{Adjusted Applied Rate}$$

$$\frac{20 \times 14}{40} = 7 \text{ GPA}$$

### NCI TIP: Boom Cal Spread Width in INCHES

30 ft = 360 in
36 ft = 432 in or 12—36" rows
38 ft = 456 in or 12—38" rows
40 ft = 480 in
45 ft = 540 in
48 ft = 576 in or 16—36" rows
50 ft = 600 in
50.67 ft = 608 in or 16—38" rows

54 ft = 648 in or 18—36" rows
57 ft = 684 in or 18—38" rows
60 ft = 720 in
72 ft = 864 in or 24—36" rows
76 ft = 912 in or 24—38" rows
80 ft = 960 in

# Determining YOUR Data



## Calculate the Speed Cal Value



### Raven Radar Only

The initial Speed Cal value for Raven radar is 598. After the initial console programming has been performed, this value may be adjusted to optimize the system's performance.

### Phoenix 10 Speed Sensors Only

The initial Speed Cal value for Phoenix 10 speed sensors is 785. After the initial console programming has been performed, this value may be adjusted to optimize the system's performance.

### TeeJet GPS Speed Sensor for Raven Controls

The initial Speed Cal value for TeeJet Kit (Part # 90-02404) is 607. After the initial console programming has been performed, this value may be adjusted to optimize the system's performance.



## Meter Cal Value



Meter cal value is not calculated. The flow meter calibration value is stamped on the tag attached to each flow meter. Locate this number and **write it down for future reference when programming your console.**

# Determining YOUR Data

## 6 Calculate the Valve Cal Value

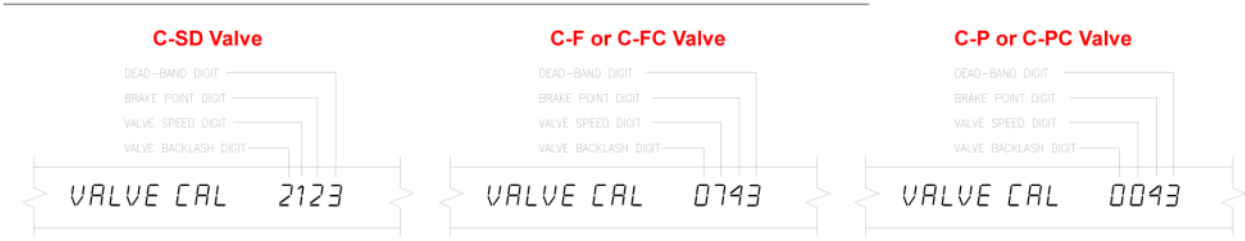
6



The Valve Cal figure is used to control the response time of the control valve motor to the change in the vehicle's speed. After operating the system, this number may be refined. The initial recommended control valve values are:

- C-SD (standard valve) = 2123
- C-FC (fast-close valve) = 743
- C-F (fast valve) = 743
- C-P (PWM valve) = 43
- C-PC (PWM close valve) = 43

FIGURE 3. Valve Calibration Definitions



Digit	Description	Range	Range Definition
Valve Backlash	Controls the time of the first correction pulse after a change in correction direction is detected (INC to DEC, or DEC to INC)	1 - 9	1 = Short Pulse 9 = Long Pulse
Valve Speed	Controls the response time of the control valve motor. <b>Caution: Running the control valve too fast will cause the system to oscillate.</b>	Refer to specific valve	Refer to specific valve
	C-SD Valve	1 - 9	1 = Slow 9 = Fast
	C-F and C-FC Valve	0 - 9	0 = Fast 9 = Slow
	C-P and C-PC Valve	0 - 9	0 = Slow 9 = Fast
Brake Point	Sets the percentage away from target rate at which the control valve motor begins turning at a lower rate.	0 - 9	0 = 5% 1 = 10% 9 = 90%
Dead Band	Allowable difference between the target and actual application rate, where rate correction is not performed.	1 - 9	1 = 1% 9 = 9%

# Determining YOUR Data

7

## Calculate the Rate 1 and Rate 2 Cal Values

8

Determine the application rate at which the chemical is to be sprayed, and then consult with your Raven dealer to verify that the spray nozzles are capable of applying at that rate. To determine which spray nozzles to use with the sprayer, the following information must be known:

Nominal Application Pressure \_\_\_\_\_ PSI (kpa) \_\_\_\_\_ **7**  
 Target Application Rate \_\_\_\_\_ GPA (lit/ha) \_\_\_\_\_  
 Target Speed \_\_\_\_\_ MPH (km/h) \_\_\_\_\_ **8**  
 Nozzle Spacing \_\_\_\_\_ inches (cm) \_\_\_\_\_



With this information, calculate the volume per minute, per nozzle using the following formula:

$$\frac{\text{GPA (lit/ha)} \times \text{MPH (km/h)} \times \text{inches (cm)}}{5,940 [60,000]} = \text{GPM (lit/min)}$$

Refer to the following chart to determine which nozzle to use based on the desired output.

TIP COLOR	TIP NO.		LIQUID PRESSURE IN PSI	CAPACITY 1 NOZZLE IN GPM	CAPACITY 1 NOZZLE IN OZ/MIN	GALLONS PER ACRE 20" SPACING			
	80 DEG.	110 DEG.				5 MPH	6 MPH	7 MPH	8 MPH
YELLOW	XR8002	XR11002	15	.12	15	7.3	6.1	5.2	4.5
			20	.14	18	8.4	7.0	6.0	5.3
			30	.17	22	10.3	8.6	7.4	6.4
			40	.20	26	11.9	9.9	8.5	7.4
			60	.25	32	14.6	12.1	10.4	9.1
BLUE	XR8003	XR11003	15	.18	23	10.9	9.1	7.8	6.8
			20	.21	27	12.6	10.5	9.0	7.9
			30	.26	33	15.4	12.9	11.0	9.7
			40	.30	38	17.8	14.9	12.7	11.1
			60	.37	47	22.0	18.2	15.6	13.6
RED	XR8004	XR11004	15	.24	31	14.5	12.1	10.4	9.1
			20	.28	36	16.8	14.0	12.0	10.5
			30	.35	45	21.0	17.2	14.7	12.9
			40	.40	51	24.0	19.8	17.0	14.9
			60	.49	63	29.0	24.0	21.0	18.2
BROWN	XR8005	XR11005	15	.31	40	18.2	15.2	13.0	11.4
			20	.35	45	21.0	17.5	15.0	13.1
			30	.43	55	26.0	21.0	18.4	16.1
			40	.50	64	30.0	25.0	21.0	18.6
			60	.61	78	36.0	30.0	26.0	23.0

### For Example:

Nominal Application Pressure 30 PSI (kpa)  
 Target Application Rate 20 GPA (lit/ha)  
 Target Speed 5.2 MPH (km/h)  
 Nozzle Spacing 20 inches (cm)

$$\frac{20 \text{ GPA} \times 5.2 \text{ MPH} \times 20 \text{ inches}}{5,940} = .35 \text{ GPM}$$





Based on these calculations and a PSI of 30, tip XR8004 should be selected since it comes closest to providing the desired output.



# Other Information

## Changing Initial Console Data Programming


Occasionally it is necessary to make changes to your console's programming. To make changes to the initial setup:

1. Press SELF TEST  and hold for 30 seconds. The console's display will flash the current program setting.
2. Press CE  to advance to the setting that needs to be changed.
3. Press ENTER  The name of the variable being changed will appear in the console display.
4. Change the variable to your new desired setting.
5. Complete the data entry by pressing ENTER. 
6. Repeat steps as necessary for each variable that needs to be changed.

## Self Test Feature

The self test feature simulates speed so that the system may be tested without moving. The self test feature will clear itself when vehicular motion is detected by the speed sensor.

- ◆ A speed cal value of 900 or greater is recommended when operating in this mode.
- ◆ To prevent the self test speed from clearing itself out automatically, disconnect the speed connector on the back of the console when radar speed sensors are used.

1. Press SELF TEST 
2. Enter the desired simulated speed value.
3. Verify the vehicle's speed by pressing the SPEED button. 