

<b>TROTTER CONTROLS, INC.</b> <b>FORT WORTH, TEXAS</b>	<b>TECHNICAL PAPER</b>		NUMBER <b>1004</b>	REVISION
	<b>REPORT ORDER</b>		<input checked="" type="checkbox"/>	
TITLE Fire Dispersal Systems (FRDS) - Ground Pattern Performance Summary	BY	CHK'D	MODEL	
	V. Trotter	CG	SERIAL	
	DATE	04/25/2014	ALL FIREBOMBERS	
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### I. Abstract

A primary goal in aerial firefighting applications is to deliver fire retardant at a uniform coverage level on the ground.

The retardant coverage produced by AT802F aircraft fitted with Air Tractor FRDS systems is summarized in this paper.

### II. Overview

The FRDS systems utilized on AT802F aircraft vary the gatebox doors in a way to maintain constant flow rate during the delivery.

Aircraft acceleration and the amount of water remaining in the tanks during a delivery are automatically compensated for by the system controller during the delivery of retardant.

The length of the ground pattern produced is tabulated for typical pilot interface settings in this paper when the system is operated in it's normal automatic mode of operation.

### III. Definitions

- **Constant Flow Rate Delivery (CFR)** - The gate is opened and closed as required during the delivery to accurately control the flow rate yielding a consistent ground pattern.
- **Ground Line** - The linear distance of the retardant pattern present on the ground after the delivery has been completed.
- **Continuous Flow Systems** - A system that uses a single set of doors to control the amount of gallons delivered from a single tank or hopper during retardant delivery operations (as opposed to systems having multiple hoppers).
- **Coverage Level** - The number of retardant gallons contained in a 100 square foot area inside the delivered ground pattern.

### IV. Variables affecting actual coverage

The following factors have a dramatic effect on the actual ground pattern seen on the ground.

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1. Delivery Altitude - The best performance is obtained at lower delivery altitudes for the aircraft. For a delivery height of 100 Ft, the ground pattern width is approximately 65 ft wide. A drop height of 100 ft and a ground pattern width of 65 feet is used for the tabulated data presented. Higher altitudes will result in a wider ground pattern and lower effective coverage level than shown in the tables.
2. Aircraft Speed - Typical drop speed for the aircraft is 120 mph (176 feet/sec). Calculations are based on this aircraft ground speed.

**Ground Pattern and Length of Pattern**

The coverage of retardant in gallons/100 FT<sup>2</sup> and in liter/m<sup>2</sup> are shown along with the length of the pattern on the ground in the tables below.

The tables assume the following:

- Aircraft ground speed is 120 mph = 108 knots = 211 km/hr
- Aircraft altitude = 100 feet = 30.48 meters
- Swath Width of pattern on ground = 65 feet = 19.8 meters
- System is operated in "Auto" mode. System controls doors to maintain constant flow rate during the delivery.

**Table 1 ~ Ground Pattern Distance versus Coverage Level setting for 800 gallon deliveries.**

Pilot Coverage Level Setting	Pilot Gallons To Dump Setting	Distance on Ground (feet)	Distance on Ground (meters)	Gallons / 100 Square Feet	Liters / Square Meter
0.5	800	2440	743.8	0.5	0.20
1	800	1220	371.9	1	0.41
2	800	610	185.9	2	0.81
3	800	407	124.0	3	1.22
4	800	305	93.0	4	1.63
4.5	800	271	82.6	4.5	1.83

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**Table 2 ~ Ground Pattern Distance versus Coverage Level setting for typical Gallons to Dump settings.**

Pilot Coverage Level Setting	Pilot Gallons To Dump Setting	Distance on Ground (feet)	Distance on Ground (meters)	Gallons / 100 square Feet	Liters / Square Meter
0.5	200	610	185.9	0.5	0.20
0.5	300	915	278.9	0.5	0.20
0.5	400	1220	371.9	0.5	0.20
0.5	500	1525	464.9	0.5	0.20
0.5	600	1830	557.8	0.5	0.20
0.5	700	2135	650.8	0.5	0.20
0.5	800	2440	743.8	0.5	0.20
1	200	305	93.0	1	0.41
1	300	458	139.5	1	0.41
1	400	610	185.9	1	0.41
1	500	763	232.4	1	0.41
1	600	915	278.9	1	0.41
1	700	1068	325.4	1	0.41
1	800	1220	371.9	1	0.41
2	200	153	46.5	2	0.81
2	300	229	69.7	2	0.81
2	400	305	93.0	2	0.81
2	500	381	116.2	2	0.81
2	600	458	139.5	2	0.81
2	700	534	162.7	2	0.81
2	800	610	185.9	2	0.81
3	200	102	31.0	3	1.22
3	300	153	46.5	3	1.22
3	400	203	62.0	3	1.22
3	500	254	77.5	3	1.22
3	600	305	93.0	3	1.22
3	700	356	108.5	3	1.22
3	800	407	124.0	3	1.22
4	200	76	23.2	4	1.63
4	300	114	34.9	4	1.63
4	400	153	46.5	4	1.63
4	500	191	58.1	4	1.63
4	600	229	69.7	4	1.63
4	700	267	81.4	4	1.63
4	800	305	93.0	4	1.63
4.5	200	68	20.7	4.5	1.83
4.5	300	102	31.0	4.5	1.83
4.5	400	136	41.3	4.5	1.83
4.5	500	169	51.7	4.5	1.83
4.5	600	203	62.0	4.5	1.83
4.5	700	237	72.3	4.5	1.83
4.5	800	271	82.6	4.5	1.83