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SECTION 6

MOTOR SCRAPERS

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- **High operating efficiency:** High horsepower-to-weight ratio facilitates acceleration and movement on steep grades, thus shortening cycle time. The differential locking mechanism built into the front axle makes the going easy-even on soft ground.
- **High machine stability:** Hydropneumatic suspension on front axle drastically reduces pitching and bouncing- resulting in increased operator comfort and precise scraper operations. The tractor is connected to the scraper equipment through Komatsu's unique quadric linkage hitch to minimize tractor inclination over rough terrain.
- **Performance-proven Komatsu diesel engine:** Delivers an ample horsepower, to facilitate heavy-duty cutting operations. The direct-injection fuel system assures low-fuel consumption while effectively minimizing noise-related pollution.
- **Simple and smooth controls:** Once the shift lever is positioned, the full-automatic TORQFLOW transmission eliminates troublesome gearshifts because it automatically selects the optimum gear according to ground conditions, loads and travel speed. Therefore, all work cycle phases such as loading, hauling, spreading and return are accomplished efficiently and simply.
- **Wet-type multiple-disc brakes:** Adjustment-free and employed on all front and rear wheels. Maintenance is required only between overhauls.

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		WS16S-3	WS16-2	WS23S-2	*WS23S-2
WEIGHT:	kg(lb)				
Net weight		30800(67,900)	33600(74,070)	36500(80,470)	37100(81,790)
Max. payload		22400(49,380)	22000(48,500)	34500(76,060)	34500(76,060)
Weight distribution:					
Empty: Tractor		67%	50%	66%	66%
Scraper		33%	50%	34%	34%
Loaded: Tractor		56%	48%	55%	55%
Scraper		44%	52%	45%	45%
Fly wheel horsepower	HP(kW)/RPM	400(298)/2100	210(157)/2000x2	450(335)/2100	450(335)/2100
CAPACITY:	m^3(cu.yd)				
Struck		11 (14.4)	11 (14.4)	16.5 (21.6)	16.5 (21.6)
Heaped		16 (20.9)	16 (20.9)	24 (31.4)	24 (31.4)
PERFORMANCE:					
Max. travel speed	km/h(MPH)	53 (32.9)	60 (37.3)	53 (32.9)	57 (35.4)
Width required for180°turn	m(ft)	11.4 (37' 5")	11.5 (37' 8")	12.2 (40')	12.2 (40')
Width of cut	mm(ft.in)	3180 (10' 5")	3030 (9'11")	3480 (11' 5")	3480 (11' 5")
Max. depth of cut		880 (2'11")	650 (2' 2")	1050 (3' 5")	900 (2'11")
Max. depth of spread		520 (1' 8")	500 (1' 8")	430 (1' 5")	500 (1' 8")
ENGINE:		KOMATSU	CUMMINS	KOMATSU	KOMATSU
Model		S6D140	NTO-6 x 2	SA6D140	SA6D140
No. of cylinders-		6-140 x 165	6-130.2 x 152.4	6-140 x 165	6-140 x 165
Bore x Stroke	mm(in)	(5.51" x 6.50")	(5.125" x 6")	(5.51" x 6.50")	(5.51" x 6.50")
Piston displacement	ltr.(cu.in)	15.24 (930)	12.17 (743)	15.24 (930)	15.24 (930)
DIMENSIONS:	mm(ft.in)				
Overall length		12775 (41'11")	12900 (42' 4")	13800 (45' 3")	13800 (45' 3")
Overall width		3490 (11' 5")	3400 (11' 2")	3830 (12' 7")	3830 (12' 7")
Overall height		3520 (11' 7")	3670 (12')	3655 (12')	3725 (12' 3")
Wheelbase		7735 (25' 5")	7400 (24' 3")	8530 (28')	8530 (28')
Tractor tread		2400 (7'10")	2100 (6'11")	2470 (8' 1")	2470 (8' 1")
Scraper tread		2300 (7' 7")	2100 (6'11")	2470 (8' 1")	2470 (8' 1")
TIRES:					
Tractor		33.5-33-20PR	33.5-33-20PR	33.25-35-38PR	37.25-35-30PR
Scraper		33.5-33-20PR	33.5-33-20PR	33.25-35-38PR	37.25-35-30PR
CAPACITY:	ltr.(U.S.gal)				
Fuel tank: Tractor		810 (214.0)	330 (87.2)	810 (214.0)	810 (214.0)
Scraper		—	320 (84.5)	—	—

* With large tires

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		WS23-2	*WS23-2
WEIGHT:	kg(lb)		
Net weight		46800(103,180)	47400(104,500)
Max. payload		34500(76,060)	34500(76,060)
Weight distribution:			
Empty: Tractor		55%	55%
Scraper		45%	45%
Loaded: Tractor		50%	50%
Scraper		50%	50%
Fly wheel horsepower	HP(kW)/RPM	399(298)/2100	399(298)/2100
CAPACITY:	m^3(cu.yd)		
Struck		16.5 (21.6)	16.5 (21.6)
Heaped		24 (31.4)	24 (31.4)
PERFORMANCE:			
Max. travel speed	km/h(MPH)	53 (32.9)	57 (35.4)
Width required for 180°turn	m(ft)	13.3 (43' 8")	14.0 (45'11")
Width of cut	mm(ft.in)	3480 (11' 5")	3480 (11' 5")
Max. depth of cut		1070 (3' 6")	920 (3')
Max. depth of spread		465 (1' 6")	535 (1' 9")
ENGINE:		KOMATSU	KOMATSU
Model		S6D140 x 2	S6D140 x 2
No. of cylinders-		6-140 x 165	6-140 x 165
Bore x Stroke	mm(in)	(5.51" x 6.50")	(5.51" x 6.50")
Piston displacement	ltr.(cu.in)	15.24 (930)	15.24 (930)
DIMENSIONS:	mm(ft.in)		
Overall length		14800 (48' 7")	14800 (48' 7")
Overall width		3830 (12' 7")	3830 (12' 7")
Overall height		3655 (12')	3725 (12' 3")
Wheelbase		9000 (29' 6")	9000 (29' 6")
Tractor tread		2470 (8' 1")	2470 (8' 1")
Scraper tread		2470 (8' 1")	2470 (8' 1")
TIRES:			
Tractor		33.25-35-38PR	37.25-35-30PR
Scraper		33.25-35-38PR	37.25-35-30PR
CAPACITY:	ltr.(U.S.gal)		
Fuel tank: Tractor		810 (214.0)	810 (214.0)
Scraper		800 (211.4)	800 (211.4)

* With large tires

Tire Selection

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	Tires					Operating conditions						STD or OPT
						Haul distance and payload			Surface conditions			
	Size	Type	Code No.	Tread Type	Charac-teristics	Low TMPH	Middle TMPH	High TMPH	Hard	Normal	Soft**	
WS16 WS16S	33.5-33 -20PR	Tubeless	E2	Traction	GP		○				○	OPT
			E3	Rock	CR	○			○			OPT
					GP		○			○		STD
					HR			○		○		OPT
WS16 WS16S WS23S	33.5-33 -32PR	Tubeless	E2	Rock	GP		○				○	OPT
			E3	Rock	CR***	○			○			OPT
					GP		○			○		STD
					HR			○		○		OPT
WS23S	33.5-33 -38PR	Tubeless	E3	Rock	CR***	○			○			OPT
					GP		○			○		OPT
					HR			○		○		OPT
WS23	33.25-35 -38PR	Tubeless	E3	Rock	GP		○				○	OPT
					CR	○			○			OPT
					HR			○		○		OPT
	37.25-35 -30PR	Tubeless	E3	Rock	GP		○				○	OPT
					CR	○			○			OPT
					HR			○		○		OPT

Note: Komatsu recommends the user evaluate all job conditions in order to make proper tire selection. Consult tire manufacturer for specific data.

* "Hard" means such hard ground where tread is subject to cutting or bruising as hard soil, rock-bed, crushed stone, soil containing boulder, etc.

** "Soft" means such soft ground where traficability is required as heavy dirt and mud; soft and weak soil, etc.

*** Some tire makers produce the GP tire which has similar performance in cut resistance as the normal CR tire. Therefore, the GP tire of such maker will be supplied for the order to the CR tire.

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TMPH RATING AT AMBIENT TEMPERATURE °C (°F)

Where the ambient temperature in an operating environment is high or where a long haul or high-speed drive is required, the standard tires cannot sometimes be suitable because of its small TMPH.
TMPH should vary depending on the stmospheric temperature. Thus, under the above operating conditions, it is recommended that the optimum tires to determined after obtaining TMPH by applying the previously stated formulas and referring to the table below.

NOTES: 1. The TMPH Rating varies depending on the tire manufacturer.
2. The TMPH Rating is based on U.S. ton. (not on metric ton)

$$<\Delta TMPH = 1.46 \times \Delta TKPH>$$

Model	Size	Code	Charac-teristics	TMPH at various ambient temperatures			
				16°C(60°F)	27°C(80°F)	38°C(100°F)	49°C(120°F)
WS16 WS16S	33.5-33 -20PR	E3	CR GP HR	– 224 263	– 209 252	– 195 235	– 181 218
WS16 WS16S WS23S	33.5-33 -32PR	E3	CR GP HR	– 224 263	– 209 252	– 195 235	– 181 218
WS23S	33.5-33 -38PR	E3	CR GP HR	– 224 263	– 209 252	– 195 235	– 181 218
WS23	37.25-33 -30PR	E3	CR GP HR	– 268 330	– 253 313	– 239 295	– 225 277
	33.25-35 -32PR -28PR	E3	CR GP HR	– 229 275	– 215 258	– 200 240	– 185 222

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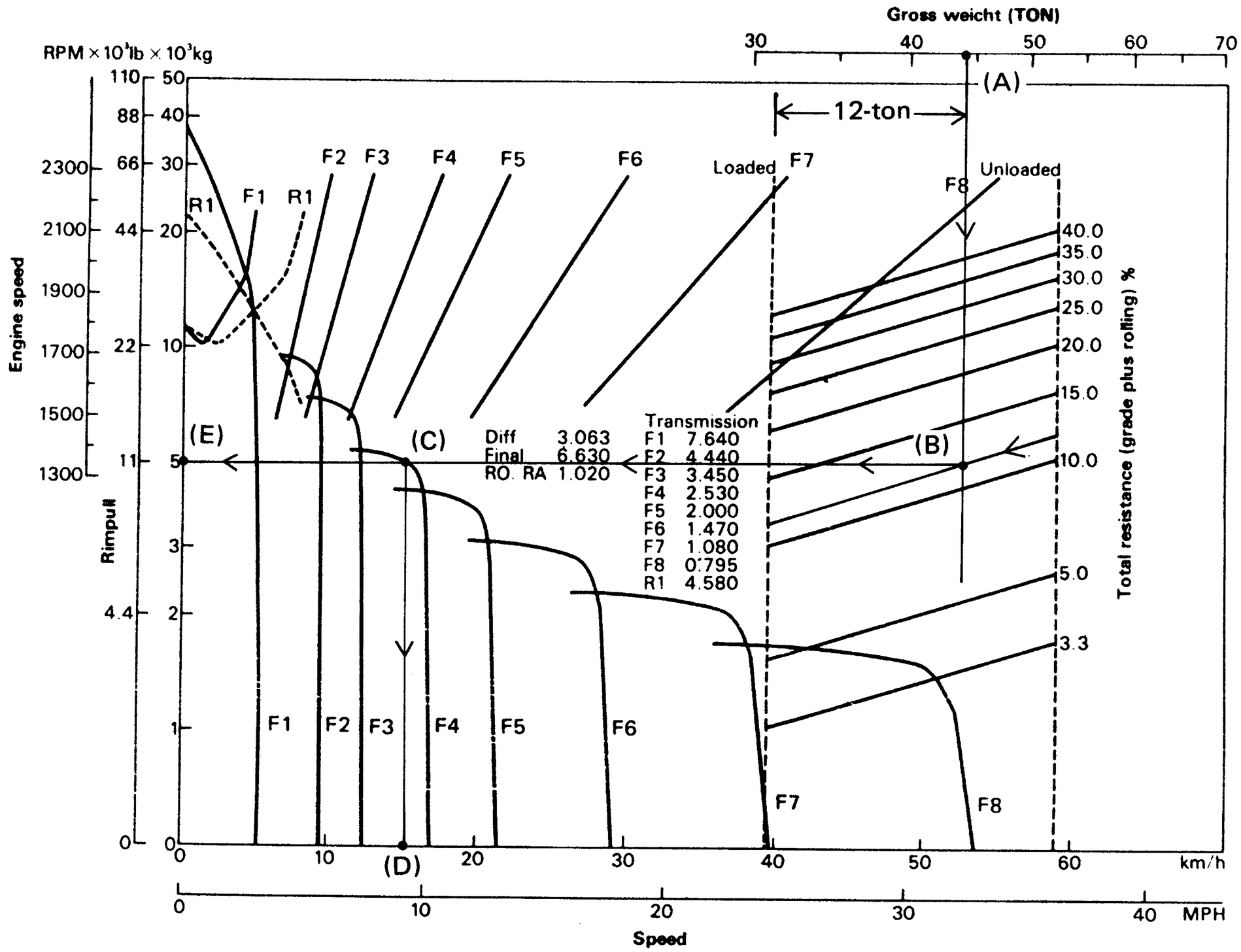
Use of Travel Performance

Travel performance curve: For assessing a vehicle's gradeability, travel speed, rimpull, etc. To use first draw a vertical line according to the vehicle's weight (A) and mark the point (B) corresponding to total resistance (the sum of rolling resistance and grade resistance). Next, draw a horizontal line from (B), then mark (C) where the line intersects the rimpull curve and read (E) for the rimpull. For travel speed (D), draw a vertical line downward from (C). For instance, when traveling an 8% gradient and encountering a 4% rolling resistance, a vehicle with a 12-ton payload should have a rimpull of 5 tons and travel at a speed of 15 km/h (9.3 MPH) in forward 4th gear.



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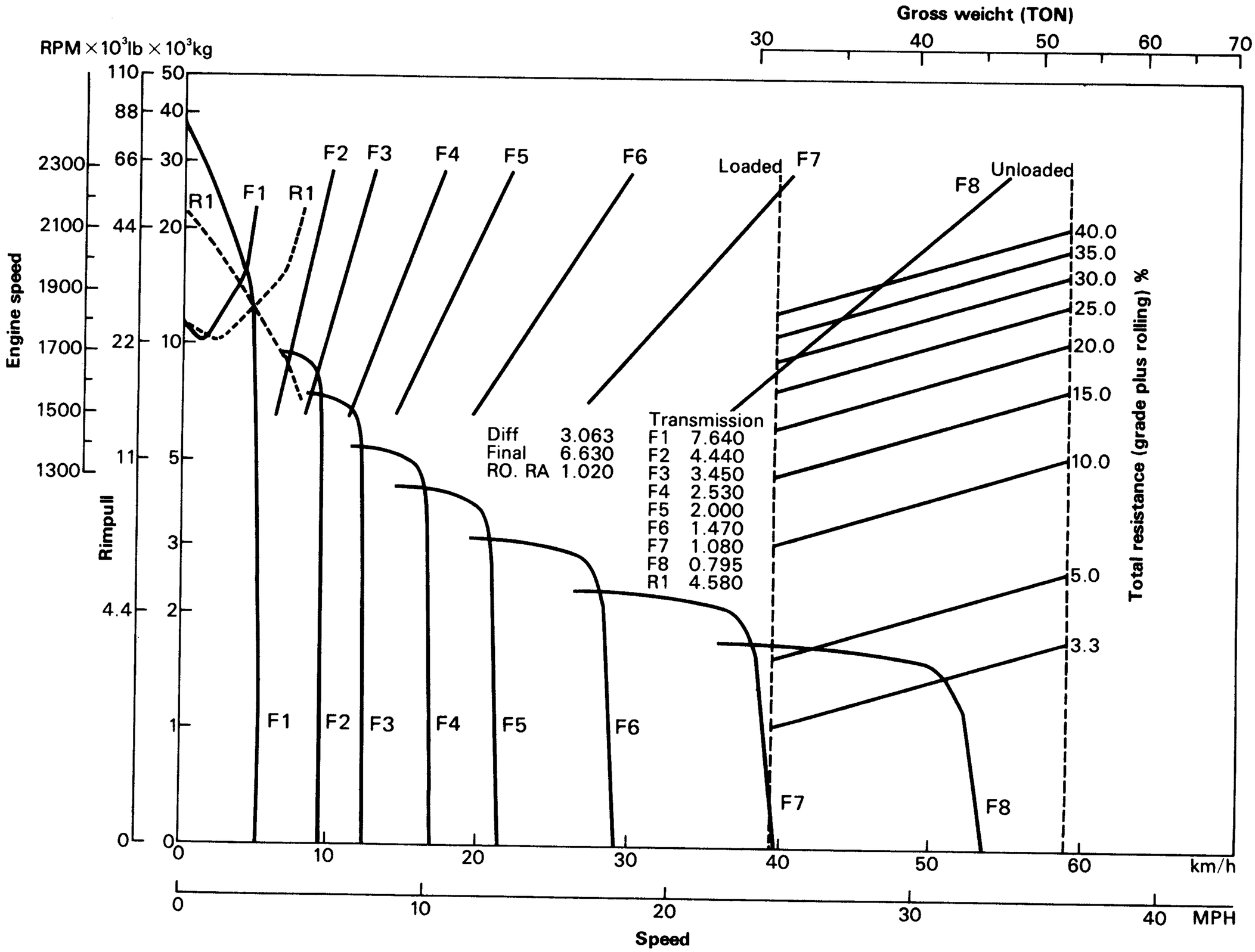

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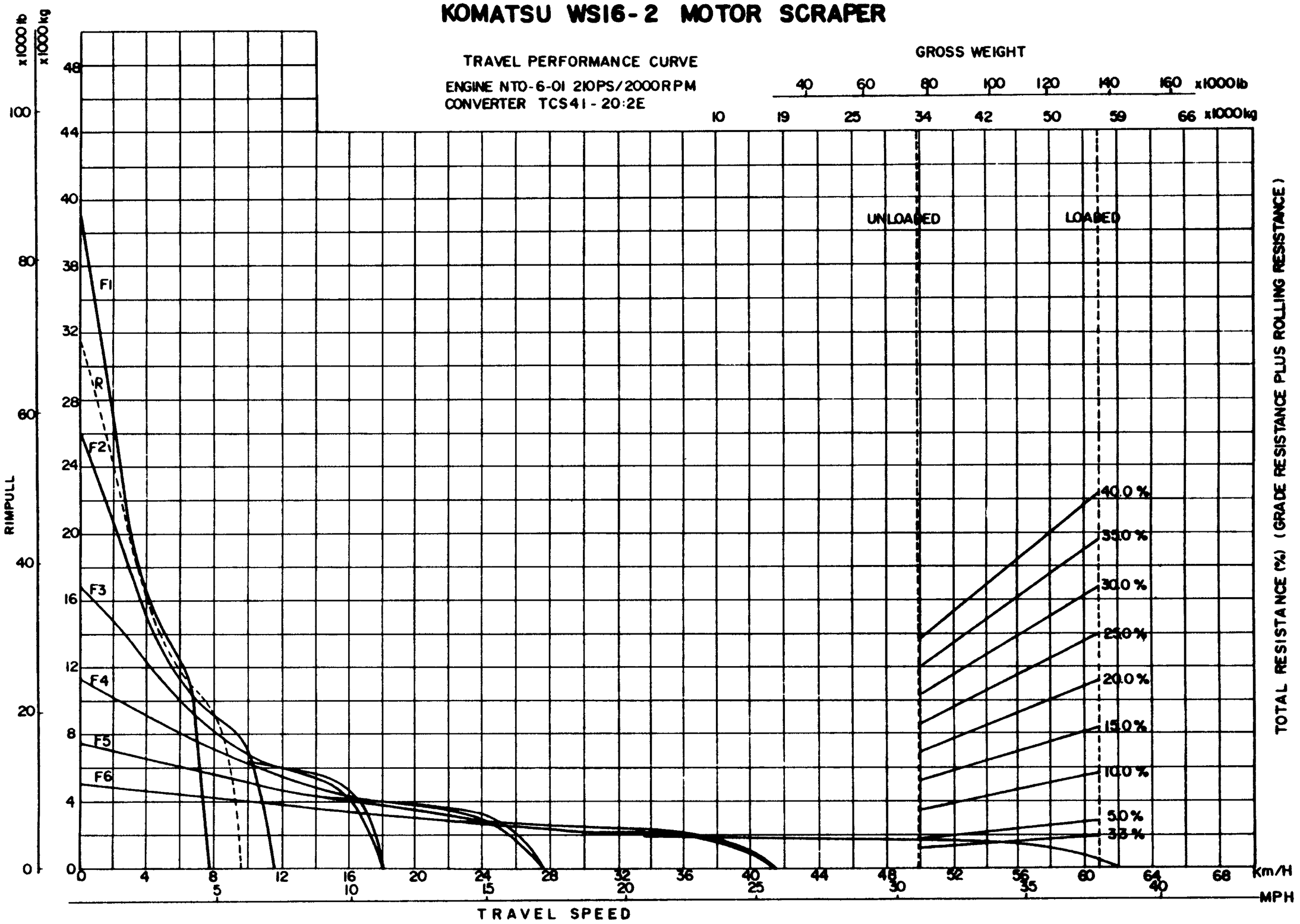
KOMATSU WS16-2 MOTOR SCRAPER



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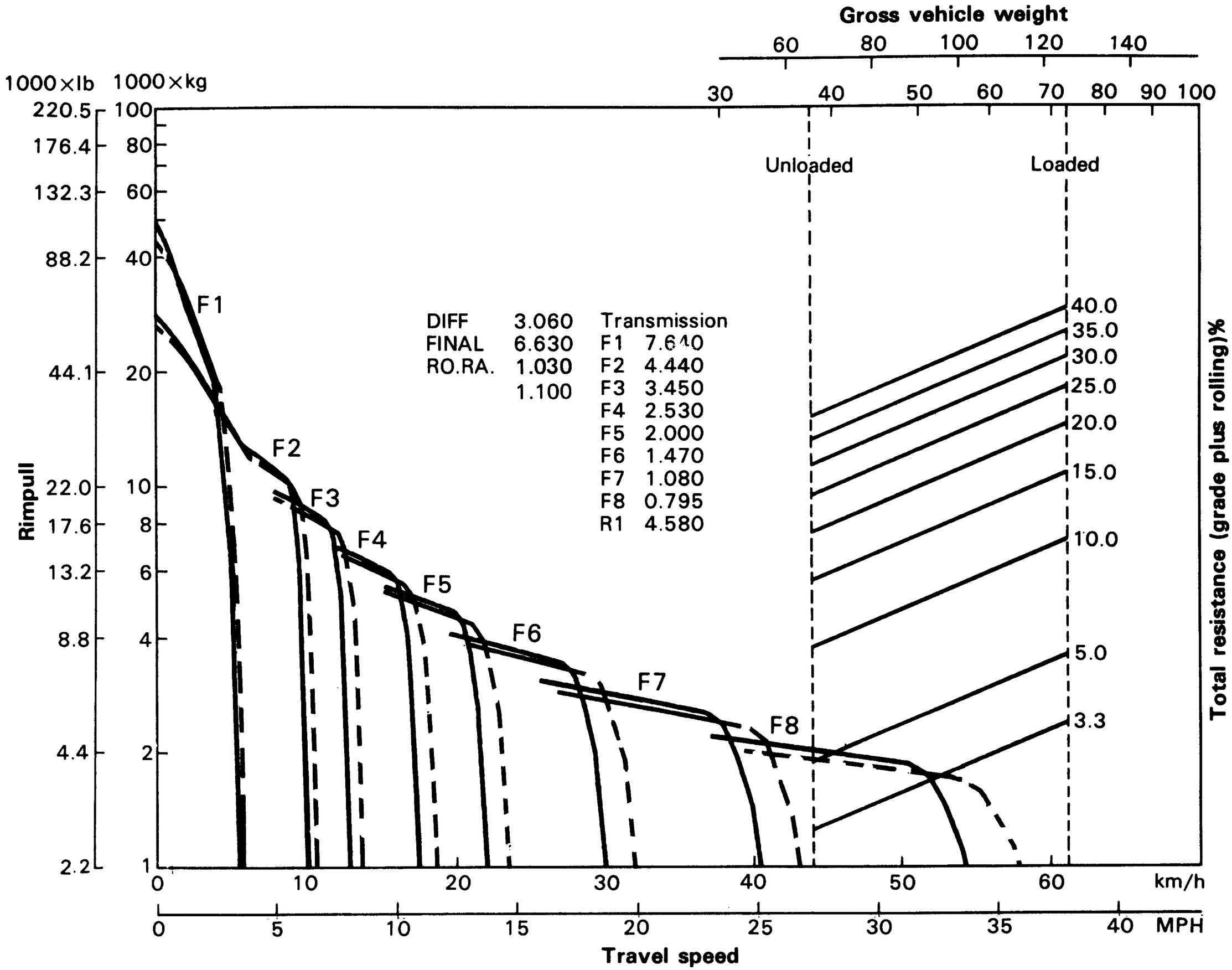
Travel Performance



Broken lines indicate performance with a machine equipped with 37.25-35-30PR large-diameter tires.

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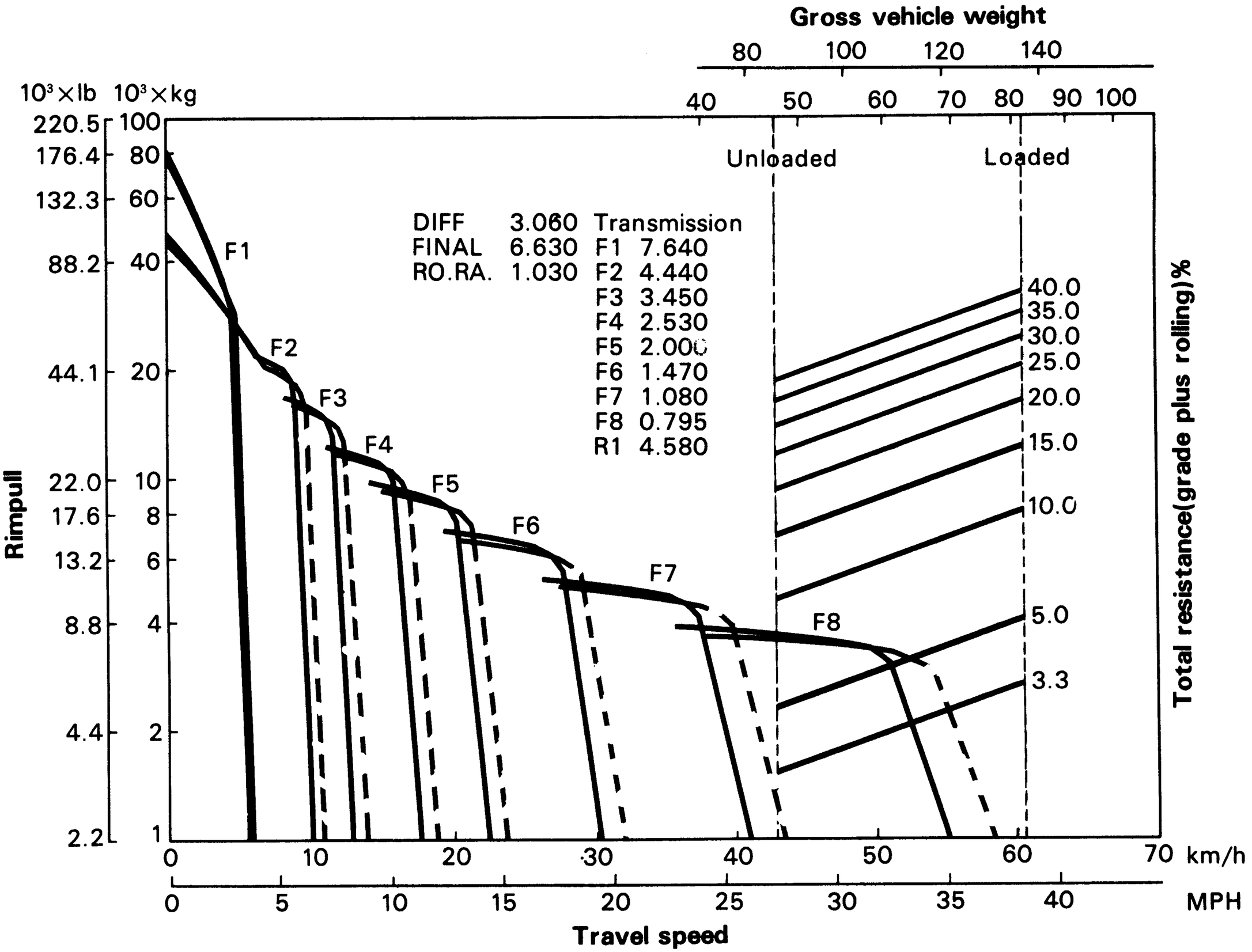
Travel Performance



Broken lines indicate performance with a machine equipped with 37.25-35-30PR large-diameter tires.

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Travel Time

Travel Time (One way)

UNIT : MIN.

DISTANCE ONE WAY		AVERAGE TRAVEL SPEED KM/HR (MPH)										
		5	10	15	20	25	30	35	40	45	50	55
METERS	FEET	(3.1)	(6.2)	(9.3)	(12.4)	(15.5)	(18.6)	(21.7)	(24.9)	(28.0)	(31.1)	(34.2)
50	160	0.60	0.30	0.20	0115	0.12	0.10	0.09	0.08	0.07	0.06	0.05
100	330	1.20	0.60	0.40	0.30	0.24	0.20	0.17	0.15	0.13	0.12	0.11
200	660	2.40	1.20	0.80	0.60	0.48	0.40	0.34	0.30	0.27	0.24	0.22
300	980	3.60	1.80	1.20	0.90	0.72	0.60	0.51	0.45	0.40	0.36	0.33
500	1640	6.00	3.00	2.00	1.50	1.20	1.00	0.86	0.75	0.67	0.60	0.55
1000	3280	12.00	6.00	4.00	3.00	2.40	2.00	1.71	1.50	1.33	1.20	1.09
1500	4920	18.00	9.00	6.00	4.50	3.60	3.00	2.57	2.25	2.00	1.80	1.64
2000	6560	24.00	12.00	8.00	6.00	4.80	4.00	3.43	3.00	2.67	2.40	2.18
2500	8200	30.00	15.00	10.00	7.50	6.00	5.00	4.29	3.75	3.33	3.00	2.73

Cycle time = Loading time + Hauling time + Spreading & turning time + Return time + Spot & delay time.

- ○ Determine hauling and return time from the above table respectively.
- ○ For fixed time (loading, spreading & turning, spot & delay)
  See the table below.

Average fixed time	Unit: min.
Loading time *	0.6
Spreading & turning time	0.6
Spot & delay time	0.5
Total	1.7

* The loading operation is assisted by a pusher.

Scrapper	Pusher
WS16	D155A
WS16S	D155A
WS23	D355A, D375A
WS23S	D355A, D375A

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Estimated Production (m^3/hr) or (cu.yd/hr)

ESTIMATED CYCLE TIME (MIN).	PAYLOAD**			
	16.0 CU. M.	20.9 CU. YD	24.0 CU. M	31.4 CY. YD
3	320	418	480	628
6	160	209	240	314
9	107	139	160	209
12	80	105	120	157
15	64	84	96	126
18	53	70	80	105
21	46	60	69	90
24	40	52	60	79
27	36	46	53	70
30	32	42	48	63
35	27	36	41	54
40	24	31	36	47
45	21	28	32	42
50	19	25	29	38
55	17	23	26	34
60	16	21	24	31

* Actual production = (Estimated production) x (Payload factor) x (Job efficiency)

** Payload = Heaped capacity

Payload factor (K)

Type of materials	K
Sand	0.90
Sandy clay	0.80
Clay	0.70
Dense, heavy clay or sand mixed with boulder	0.65

Job efficiency (E)

Operating conditions	E
Good	0.83
Average	0.80
Rather poor	0.75
Poor	0.70