ENGINEERING TECHNICAL INFORMATION SYSTEM

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Field



Notes

Automobile Fuel Economy in the Forest Service

Nomograph for Load Rating Log Stringer Bridges

Washington Office News



FOREST SERVICE

JUNE 1978

U.S. DEPARTMENT OF AGRICULTURE



ENGINEERING FIELD NOTES

Volume 10 Number 6

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FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE
Washington, D.C. 20013

AUTOMOBILE FUEL ECONOMY IN THE FOREST SERVICE

David Hatfield Equipment Management Engineer Ollie A Broadway, Jr. Equipment Management Engineer

Congress, in an effort to conserve gasoline and reduce air pollution, has enacted legislation which regulates the gasoline mileage of passenger automobiles sold in the United States starting with fiscal year 1978. These mileage requirements are averages for the entire production of each manufacturer. Each manufacturer is free to determine its product mix; producing some high-mileage cars and some low-mileage cars. However, the average gasoline mileage for the entire fleet produced in any one year must meet the Federal standards listed in table 1.

In order to set an example for the nation and to demonstrate the practicality of the Federal gasoline mileage standards, President Carter has issued an Executive order imposing additional gasoline mileage restrictions on all passenger automobiles purchased by government agencies. The Executive order requires government agency fleets to have an average fuel economy exceeding manufacturer fleet requirements for FY 1978 by 2 APG, for FY 1979 by 3 MPG, and for FY 1980 and thereafter by 4 MPG (see table 1). Such rules do not apply to automobiles designed to perform combat-related missions for the Armed Forces or designed to be used in law enforcement work or emergency rescue work. Beginning in FY 1979, mileage standards for pickup trucks and vans (shown in table 2) also will become effective.

What does this mean for the Forest Service? It means that any passenger automobile or station wagon purchased in FY 1978 must be rated at 18 MPG or greater. In addition, all purchases during the fiscal year must average 20 MPG or more. To buy an automobile rated at less than 18 MPG requires the approval of both General Services Administration (GSA) and the Department of Energy. The Government is restricted to purchasing compact or subcompact sedans and station wagons only. In the coming years, the trend will continue toward smaller automobiles.

The Environmental Protection Agency (EPA) mileage and fuel cost estimates for all 1978 automobiles are shown in table 3. Any readers interested in the 1978 Gas Mileage Guide may obtain a copy by writing: Fuel Economy, Pueblo, Colorado 81009; for bulk copies write: U.S. Department of Energy, Fuel Economy Distribution, Office of Administration Services, Washington, D.C. 20585.

Table 1.--Passenger automobiles

Fiscal year	Manufacturer ¹ fleet average (MPG)	U.S. Government fleet average (MPG)
1978	18.0	20.0
1979	19.0	22.0
1980	20.0	24.0
1981	22.0	26.0
1982	24.0	28.0
1983	26.0	30.0
1984	27.0	31.0
1985	27.5	31.5

¹ Combined city/highway mileage

Table 2.--Light trucks

Fiscal year	Gross vehicle weight on road (GVWR) (pounds)	Drive	Manufacturer ¹ fleet average (MPG)	U.S. Government fleet average
1979	6,000	2 wheel 4 wheel	17.2 15.8	To be determined by GSA
1980	8,500	2 wheel 4 wheel	16.0 14.0	
1981	8,500	2 wheel 4 wheel	18.0 15.5	

¹ Combined city/highway mileage

MINICOMPACT CARS

MINICOMPACT CARS

Manufacturers	F	uel E	conc	ту	Vehicle Descr	ption			Manufacturers	F	uel Ec	onoi	Пy	Vehicle Desc	ripti	ion	
Manufacturer Car Line	Combined MPG	Average Annual Fuel Costs	City MPG	Highway MPG	Engine Description CID/Cyl Type	Transmission Fuel System O	Body Type Interfor Space Passenger/ Trunk or Cergo(Cu. Ft.)		Manufacturer Car Line	Combined MPG	Average Annual Fuel Costs	City MPG	Highway MPG	Engine Description CID/Cyl Type	Transmission	Fuel System ©.	
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[†] Certified for use on leaded gasoline.

[•] Available in Puerto Rico only.

⁰ Number of barrels in the carburator.

SUBCOMPACT CARS

SUBCOMPACT CARS

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19 \$552 15 28 231/6		21	\$500	118				A I	2									A :	2	
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20 \$525 17 25 305/8 A 2 17 25 305/8 A 2 17 25 305/8 A 2 17 25 305/8 A 2 17 25 305/8 A 2 17 25 305/8 A 4 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25/20 A 2 17 25								A :	2											
DATSUN 14 \$750 12 16 \$400/8 M 4 17 17 17 17 17 18 19 19 10 19 10 10 10 10																	(GM-CHEV)	M		
F-10 33 \$318 28 40 85(1397CC)/4† M 2 HTBK-71/ SUNBIRD 28 \$375 24 34 151/4 M 2 20R-78/7		20	\$525	17	25	305/8	-	A	2	•										
F-10 33 \$318 28 40 85(1397CC)/4† M 2 HTBK-71/ SUNBIRD 28 \$375 24 34 151/4 M 2 2DR-78/7				1	1		ļ	- 1	-1										- 1	
	F-10	33	\$318	28	40	85(1397CC)/4†	· .	M s	2 je	TBK-71/	SUNBIRD									20R-78/7
		, [1	1	ı	1	1	13	14										

[†] Certified for use on leaded gasoline.

⁰ Number of barrels in the carburator.

Table 3.--Fuel cost estimates for all 1978 automobiles (continued)

SUBCOMPACT CA	ARS	COMPACT	CARS

PONTIAC SUNBIRD 19 22 18 ROLLS- ROYCE/ BENTLEY ROLLS- ROYCE/	18	\$478 \$584 \$525	19 16	28 27 22 25	231/8 231/8 231/8 305/8 305/8	Cincoli	M 2 A 2 M 2	7	Pinicios Space Passengal/ Trunk og/l/ Cargo(Cu. Fl.)	Wantheture Certine Concord	Combined MPG	Average Annual Fuel Costs	City MPG	Highway MPG	Engine Description CID/Cyl Type	Transmission Fuel System	1 8 2
SUNBIRD 19 22 23 18 20 ROLLS- ROYCE/ BENTLEY ROPICS- ROYCE/ BENTLEY 11 TOYOTA CELICA 25	18	\$478 \$584 \$525	19 16	27 22	231/6 305/8		M 2 A 2 M 2	2 2			T	1					T .
ROLLS-ROYCE/ BENTLEY ROULS-ROYCE/ BENTLEY 11 TOYOTA CELICA 25	18	\$478 \$584 \$525	19 16	27 22	231/6 305/8		M 2 A 2 M 2	2		CONCORD							1
ROLLS- ROYCE/ BENTLEY ROLLS- ROYCE/ BENTLEY 11 TOYOTA CELICA 25	18 80	\$584 \$525	16	22	305/8		M 2	2		CONCOND	25	\$420			121/4	M 2	2DR-90/11
ROLLS- ROYCE/ BENTLEY ROLLS- ROYCE/ BENTLEY 11 TOYOTA CELICA 25	80	\$525					M 2	. I			24	\$438			121/4	A 2	4DR-90/11 HTBK-83/
ROLLS- ROYCE/ BENTLEY ROLLS- ROYCE/ BENTLEY 11 TOYOTA CELICA 25							IA 12	2			22	\$478	19	26	232/6	 " '	16
ROYCE/ BENTLEY ROLLS- ROYCE/ BENTLEY 11 TOYOTA CELICA 25	11	\$954			1		П		!		20	\$525	18		232/6	A 1	
ROLLS- ROYCE/ BENTLEY 11 TOYOTA CELICA 25	,,	\$954		ł	1		1 [- 1			19	\$552			258/6	M 2	
ROYCE/ BENTLEY 11 TOYOTA CELICA 25	1	\$954	ı				1				18	\$584 \$656	16		258/6 304/8	A 2	1
TOYOTA CELICA 25	11	S954	l		1		١. ١.	. _		PACER	22	\$478			232/6	MI	HTBK-89
CELICA 25	ı	/	10	13	412/8		A 2		0R-79/11 0R-93/13			1	ļ ļ	- 1			11
CELICA 25			1				ŀΙ	*`	50/10		20	\$525			232/6	A 1 M 2	
		\$420	20	34	134/4		м 2	, 20	R-80/9		19	\$552 \$584	16 16		258/6 258/6	M 2	1
	4		22	27	134/4		A 2	2 H1	BK-80/		16		14		304/8	A 2	ļ·
[_	_		- 4	1	l		м 2	14)R-75/9	AUDI	1			-			Ì
COROLLA 39					71/4	!	M 2		R-78/9	5000	17	\$617	15	22	131/5 †	MFI	4DR-90/15
28			26		97/4		A 2	E HT	BK-75/			\$552			131/5†	AFI	İ
1	١				l		١١.	12		BUICK	ı			- 1			
CORONA 23			20 19		134/4		M 2		R-77/10 R-78/10	SKYLARK			16		231/6	M 2	20R-90/14
CRESSIDA 22	2				156/6		A 2		R-83/11		21	\$500	18		231/6	A 2	4DR-96/13
VOLKSWAGEN	٦ [19	\$552	16	22 :	305/8	A 2	HTBK-90/
DASHER 28	8	\$375	23	37	97/4†		MF		R-84/12	CADILLAC		İ					
23	3	\$457	20	29	97/4†		AF	7 HT 18	BK-83/	SEVILLE	16	\$656	14	20 :	350/8 (GM-CAD	A FI	4DR-95/13
RABBIT 31		2339	26	40	89/4		мз		BK-80/		24				350(5.7L)/8 (DIESEL		
	- 1	· [_	15		CHEVROLET	1	1		- [1	
29 26					89/4† 89/4†		MF			NOVA	21	\$500	19	26	250/6	M 1	2DR-90/13
45					90/4	(DIESEL)	MF		ļ		20	\$525			250/6	A 1	4DR-96/13
SCIROCCO 29					89/4†			TH F	BK-74/		17	\$617	15	21	305/8	M 2	HTBK-90/
_	ا ـ	2404	ا رو	32	89/4†		A F	16			19	\$552	16	22	305/8	A 2	1 -
26		\$404	22	عد				1	·			\$617			350/8 (GM-CHEV) A 4	1
										DODGE							
										ASPEN					225/6	M 1	2DR-87/15
															25/6	A 1	4DR-98/15
											21				225/6	M 2	
												\$500 \$584			225/6 318/8	A 2 M 2	
			•										15		318/8	A 2	
															360/8	A 2	
													10		360/8	A 4	HTBK-B.
										. OMNI	29	\$362	25	18		M 2	

[†] Certified for use on leaded gasoline.

O Number of barrels in the carburator.

COMPACT CARS

COMPACT CARS

Manufacturer	-	Fuel	_	TOIL	<u> </u>	Vehicle Desc	:ript	ᅋ			Manufacturer	3	Fuel E	_	omy	Vehicle De	escrip	otion	
Menutecturer Car Line	Combined MPG	Average Annual	Fuel Costs	City MPG	Highway MPG Engine Description	Type Type	Transmission	Fuel System . O	Body Type Interior Space Passenger/ Trunk or Cergo(Cu. Ft.)		Manufacturer Car Line	Combined MpG	Average Annual Fuel Costs	City MPG	Highway MPG	Engine Description CIO/Cyl Type		Transmission Fuel System	. ~
FORD	Т	Т	7				1	1	 			+	+-	十	+		-	+	
GRANADA	24	\$43	8 2	21	8 250(4.1L)/6		M	1	2DR-89/15		PLYMOUTH	1	ł	ł	1		- 1	ł	1
	21	\$50		8	6 250(4.1L)/6		A	1	4DR-93/15	1	VOLARE	17			22	360/8 360/8		A 2	
	19		2 1	6	5 302(5.0L)/8		М	2	1			13	\$807	ייון	177	360/8	۱,	A 4	i
	19	\$55	2 1	6	3 302(5.0L)/8		A	2	*	1	PONTIAC	l	1.		i		- 1	1	1
LINCOLN-	1	1	- 1	ı	İ		1	ı		1	PHOENIX	23		21		151/4		4 2	2DR-90/14
MERCURY	L.	İ	. !	1			1.	1		ľ		19		16		231/6		W 2	4DR-96/13
MONARCH	24						М		2DR-89/16	4		20	\$525	18	26	231/6.	- 14	1 2	HTBK-90/
	21	\$50		8			Α		4DR-93/16	1		17	\$617	15	21	305/8		1 2	1.~
	19	\$55 \$55	: [:	6 2	5 302(5.QL)/8		M	2	ļ	1		19	\$552			305/8		2	
VERSAILLES		\$58						2	4DR-92/15		ROLLS-	1 -	1		1		ľ	1	
	1.0	1000	۱'	'ا `	الماليون والماليون		1^	٢	4DU-92/13		ROYCE/	-	İ				l	1	1
MERCEDES- BENZ		1		- 1	I		1	l			BENTLEY CAMARGUE	l.,	l		١			1	-
MB 116(280)	18	\$65	в I 1	ءا 4	168(2.8L)/6		A	FI	4DR-92/15			111	\$954	10	13	412/8	Α	2	2DR-94/14
	26	\$34	5 2	4 2	183(3.0L)/5	(TURBO			10N-82 13		SAAB		İ						į.
	1	1		-1	1 ' '	DIESEL					99	25	\$420		30				2DR-91/13
MB 123(230)		\$552				•		1	2DR-84/13			122	\$478	20	27	122(2.0L)/4 (3WAYC/ TURBO)	AT-IM		HT8K-89/
	29	\$310) 2		147(2.4L)/4	(DIESEL			4DR-92/13			23	\$457	19	29	122(2.0L)/4† (NOC/	ATIM		i-
	27	\$333	3 20	8 3	147(2.4L)/4	(DIESEL				ł		23			26	122(2.0L)/4 (3WAYC			
	16 25	\$656 \$360						F		i		21	\$500		24	122(2:0L)/4† (NOC/			
	~	2301	"	" 2	183(3.0L)/5	(DIESEL	<u>'</u> ^	ы			VOLVO	1			l				ļ
OLDSMOBILE OMEGA		\$552	١.,	۱.			11	_		1	VOLVO SEDAN	24							2DR-89/14
OMEGA		\$500		3 2			M		2DR-90/14 4DR-96/14	ľ		23							4DR-89/14
		\$617					M		40K-90/ HTBK-90/	1		21					T) A		
			1	Т			l'''' [16	1		22 19				130/4 (3WAYCA 163/6 (CA	T) M		
	19	\$552	18	2	305/8		A	2		1						163/6 (3WAYC#			
PEUGEOT	į į			1	1		Н	-		1							T) A		
	20	\$525	17	2	120/4		M:		4DR-90/10	1			\$552			163/6 (3WAYCA	TA	FI	
		\$552			120/4		A			1		—		1	_				
		\$300 \$321		34	141/4	(DIESEL)				Î									
		\$321 \$584	125	22		(DIESEL)	M		4DR-91/14	1									
		\$617		19	163/6		A		-Un-31/14	1									
PLYMOUTH		•	1		1			1											
	29	\$362	25	38	105/4		M 2	, I <u>.</u>	TBK-85/										
		-~-	3	1	1	ļ	" 2		116K-85/ 5	1									
	26	\$404	23		105/4		A 2			1									
VOLARE		\$457	26		225/6		M 1		2DR-87/15										
	23	457	20		225/8		A 1	14	IDR-98/15	1									
				28	225/8		м 2												
		500 584	18		225/6 318/8	- 1	A 2												
		5584			318/8	1	M 2	1											
·	- 1			1	10.00		, =	- 1		1									

[†] Certified for use on leaded gasoline.

⁰ Number of barrels in the carburator.

MID-SIZE CARS

MID-SIZE CARS

Manufacturers	F	uel Ed	cond	my	Vehicle De	scription	n		Manufacturers	ᅸ	uel Ec	ono	my_	Ve	hicle Descri	Puc		
Manufacturer Car Line	Combined MPG	Average Annual Fuel Costs	City MPG	Highway MPG	Engine Description CID/Cyl Type	1 = 1	Fuel System O	Body Type Martor Space Passengel/ Trunk of Cargo(Cu. Ft.)	Manufacturer	Combined MPG	Average Annual Fuel Costs	City MPG	Highway MPG	Engine Description CID/Cyl	9d.	Transmission	Fuel System O	Body Type Inferior Space Passenger/ Trunk or Cargo(Cu. Ft.)
AMC	\vdash	-	t	+-					DODGE				Γ					
MATADOR COUPE	14	\$750	12	17	360/8	A 2	2	2DR-97/14	CHARGER SE/ MAGNUM XE	16 17	\$656 \$617	14	21 22	318/8 360/8		A	2	2DR-97/16
BUICK		l	١	_				2DR-94/16			\$700	13	20	400/8			4	
CENTURY	23	\$457 \$500			196(3.2L)/6 196(3.2L)/6	M 2		4DR-101/	DIPLOMAT	20	\$525	17	25	225/6		M A	2	2DR-91/16 4DR-97/16
	-		1.0	1	130(0.22).0			16		19 18	\$552 \$584	17 15	22 25	225/6 318/8		M		4DN-97710
	19	\$552			231/6	M 2				18	\$584	15		318/8			2	
	22	\$478			231/6	A 2		· 1		17	\$617	14		360/8		A	2	
	20	\$525			305/8 305/8	A 2			MONACO	20	\$525	18	25	225/6		м		2DR-95/15
REGAL	21	\$500 \$457			196(3.2L)/6	M 2		2DR-96/16		20	\$525	17	24	225/6		 		4DR-101/ 20
NEGAC	21	\$500			196(3.2L)/6	A 2				19	\$552	17	22	225/6		A	2	20
	19	\$552			231/6	M 2	2	·		16	\$656			318/8			2	
	21	\$500	19	26	231(3.8L)/6 (TUR	BOXA 2		j			\$617	14		360/8			2	
	22	\$478			231/6	A 2		1		13	\$807	110		360/8		A	4	
	20	\$525				BO) A 4					\$700			400/8		Α	4	
	20	\$525 \$500			305/8 305/8	A 2				11	\$954	10	14	440/8		A	4	
	21	3500	' '"	20	303/6	רן רן	•	1	FORD		İ		1				- [
CADILLAC	ļ.,	ļ	1	1		A 4	.	2DR-102/	FAIRMONT		\$404	23		140(2.3L)/4		м		2DR-95/17
ELDORADO	113	\$954	10	15	425/8	^ *		17		26	\$404	22	33	140(2.3L)/4		AM		4DR-96/17
CHECKER	1	l	1	1						24 22	\$438 \$478			200(3.3L)/6 200(3.3L)/6		A		
CHECKER	18	\$584	16	22	250/6	A 1	ı	4DR-100/		19	\$552	16		302(5.0L)/8		A		
O'ILOILII	1		1	-				14	LTD II		\$617	15		302/8	ĺ	A	2	2DR-94/16
	13	\$807	12	14	350/8	A 4	١			16	\$656	14	20	351(5.8L)/8	(MENG)	A	2	4DR-102/
CHEVROLET	1	l			, .								.	254/5 01 \ /8	(WENG)	.	,	16
MALIBU	24	\$438			200(3.3L)/6	M 2		2DR-96/17			\$584 \$700	15 13		351(5,8L)/8 400(6,6L)/8		Â		
	21	\$500	19	25	200(3.3L)/6	A 2	2	4DR-102/	THUNDERBIRD			15		302(5.0L)/8		A		2DR-95/16
	18	\$584	16	22	305/8	M 2	2	*			\$656	14		351(5.8L)/8	(MENG)			
	20	\$525			305/8	A 2	2	*				15	22	351(5.8L)/8	(WENG)	A	2	
MONTE CARLO	19	\$552	16	28	231/6	M 2		2DR-96/16		15	\$700	13	17	400(6.6L)/8		A	2	
	22	\$478	19		231/6	A 2			LINCOLN-			l	i. i		i	i	Ė	
	18	\$584		22	305/8	M 2			MERCURY								ı	
	20	\$525	17	25	305/8	^ 2	-	.	CONTINENTAL MARK V	15	\$700	13	20	400(6.6L)/8		A	2	2DR-99/18
CHRYSLER	L					ا ا		000 05/16			\$750			460(7.5L)/8		A		
CORDOBA	16	\$656		21	318/8	A 2		2DR-95/16	COUGAR/			ļ					_	
	17	\$617			360/8 400/8	A 4			COUGAR XR-7		\$617			302(5.0L)/8		۸		2DR-93/16
LEBARON	15 20	\$700 \$525			225/6	M 2		2DR-91/16		16	\$656	14	20	351(5.8L)/8	(MENG)	^	۶. ا	4DR-101/ 16
LEBARON	19	\$552			225/6	A 2		4DR-97/16		18	\$584	15	22	351(5.8L)/8	(WENG)	A	ż	
	18	\$584			318/8	M 2						13		400(6.6L)/8	, 1		2	
	18	\$584	15	22	318/8	A 2		*	ZEPHYR			23		140(2.3L)/4				2UR-95/17
	17	\$617	14		360/8	A 2	2							140(2.3L)/4	i	Αİ	2	4DR-96/17

O Number of barrels in the carburator.

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Table 3.--Fuel cost estimates for all 1978 automobiles (continued)

LARGE CARS

IID-SIZE	CARS			

Manufacture	+	Fuell	Т	<u> </u>	Vehicle D	escriptio	in-		Manufacturers	<u>.</u>	Fuel E	_	my	Vehicle D	scri	ptio	n
Manufacturer Car Line	Combined MPG	Average Annuel	Fuel Costs	Highway May	Engine Description CID/Cyl	Transmission	Fuel System 😄	Body Type Interior Space Passengar/ Trunk or Cargo(Cu Ft.)	Menufacturer Car Line	Combined MPG	Average Annual Fuel Costs	City MPC	Highway 3.8PG	Engine Description CID/Cyl			Fuel System O Body Type Interfor Space Passenger/ Trunk or Cargo(Cu. Ft.)
LINCOLN-	T	T	T	\top		\Box			AMC	十	十	+	+		\dashv	+	1
MERCURY	1.		ł	ı	1				MATADOR	1	1	1	1		J	-1	ł
ZEPHYR	24 22	\$47	8 19	26	200(3.3L)/6	M A			SEDAN	14	\$750	12	17	360/8	- -	A 2	4DR-110/
	19	\$55	2 16	23	302(5.0L)/8	A		ł	BUICK		1	1				-	
MERCEDES- BENZ									ELECTRA	18	\$584	15	22	350/8 (GM-BU	CK	A 4	2DR-108/
MB116V(450)	14	\$750	12	18	276(4.5L)/8	A	FI	4DR-96/15		16	\$656	14	20	403/8	- 1.	A 4	1
	12	\$87			417(6.9L)/8	A				ı	ł	1	l		ľ	٦,	20
OLDSMOBILE	1	1					- 1		LESABRE	20	\$525	17	25	231/6	- //	A 2	
CUTLASS	19					M	2	2DR-97/16		10	\$552	16	ا روا	231(3.8L)/6 (TUR	. ارده	٠١.	21
	22	\$478	19	27	231/6		2	4DR-101/		١.٠	~~~	1"	"	withorho (INK)	30//	14	40R-111/ 21
	23	\$457	20	29	260/8		- 1:	16		20	\$525			301/8	1	1 2	Γ.
	22	\$478			260/8	M				18	\$584			350/8 (GM-BUI	CK)	1 4	1
	18	\$584				A	5	1	RIVIERA		\$617			403/8	- 14	١ 4	
	21	\$500			305/8	A		i	HIVIEHA	18	\$584	15	22	350/8 (GM-BUI	CK) A	4	2DR-106/
CUTLASS	1		1				١.			16	\$656	14	20	103/8	A	. 4	20
SUPREME	19	\$552			231/6	M 2		2DR-98/16	CADILLAC	· ·			-	***************************************	J^	1	1.
	22	\$478 \$457			231/6	A 2				١,,	\$700	ا ۱۰۰		125/8	٦.	1.	J
	23 22	\$478			260/8 260/8	M 2			35.00		\$700	13	,a	143/6	٨	4	20R-107/ 20
	18	\$584			305/8	A 2				14	\$750	12	18	25/8	A	FI	4DR-109/
		\$500			305/8	A 4			LIMOUSINE			l I					20
PLYMOUTH	1		1	İ		- [1]			MOOSINE	11	\$954	10	15 /	25/8	A	4	4DR-116/ 18
FURY	20	\$525	18	25	225/6	M 1	1,	PDR-95/15	CHEVROLET			1	ı		- [-	'°
	20	\$525	17	24	225/6	A		IDR-101/		ا ۵۰	\$552	,,]	, I.	50/6	١.	١.	
			ļ					0			*~~	"	٠ [30/6	A	1	2DR-106/ 20
		\$552 \$656			225/6 318/8	A 2		İ	ŀ	19	\$552	16	22 3	05/8	A	2	4DR-111/
		\$617	14		360/8	A 2			Į.			[. -				20
		\$807	10		360/8	A 4				17	\$617	15	a 3	50/8 (GM-CHE	٧Ŋ٨	4	1
	15	\$700	13	20	400/8	A 4		1	CHRYSLER								ł
•	11	\$954	10	14	440/8	A 4			CHRYSLER	15	\$700	13	20 J3	60/8	A	2	2DR-106/
PONTIAC			1			11			f ₁	14	5750 F	11 J	8 4	00/8	A	اما	22 4DR-107/
GRAND PRIX		\$552			231/6	M 2	12	DR-94/16	j	- 1			1		~	"	4DH-10// 22
		\$478			231/6	A 2	1	ļ	· [1	12	875	10 1	6 4	40/8	A	4	
	20	\$525			301/8	A 2			FORD	- 1		- 1	-			H	
					301/8	A 4			FORD 1	17	617	15 2	2 3	02(5.0L)/8	A		2DR-100/
					231/6 231/6	M 2		DR-96/17	1	- !	- 1	- 1			1	17. 1	23 .
	-	~* 11 G	13	-	231/0	A 2	17	DR-102/	Į.	18	656	13 2	1 3	51(5.8L)/8 (MEN	3) A	2	4DR-106/
		478			260/8	A 2	1		· _t	8 5	584	15 2	2 3	51(5.8L)/8 (WENG	الماد		23
					301/8	A 2				5 3	700	13 2	0 41	00(6.6L)/8	Â		
					301/8	A 4	İ			4 3	750 1	12 1	7 4	60(7.5L)/8	A	4	•
	20 1	525	17	25	305/8	A 12	i		•	,		•	•		11.1		

0 Number of barrels in the carburator.

LARGE CARS

TWO SEATERS

Manufacturers	F	uel Ec	опо	my	Vehicle Descr	ioti	on			Manufacturers	F	uel Ec	ono	my	Vehicle Description	_	
Manufacturer Car Line	Combined MPG	Average Annual Fuel Costs	City MPG	Highway MPG	Engine Description CID/Cyl Type	Transmission	Fuel System O	Body Type Interior Space Passenger/ Trunk or Cargo(Cu. Ft.)	ſ	Manufacturer Car Line	Combined MPG	Average Annual Fuel Costs	City MPG	Highway MPG	Engine Description CID/Cyl Type	Transmission	Fuel System O
LINCOLN- MERCURY										ALFA ROMEO SPIDER 2000	21	\$500	18	26	120(1972CC)/4	м	FI
LINCOLN CONTINENTAL	15	\$700	13	20	400(6.6L)/8	A	2	2DR-111/		CHEVROLET CORVETTE	16	\$656	14	19	350/8 (GM-CHEV		
	13	\$807	11	17	460(7.5L)/8	A	4	4DR-114/ 22		DATSUN	17	\$617	15	21	350/8 (GM-CHEV	A	4
MERCURY		\$ 656		21	351(5.8L)/8 (MENG)	1	1	2DR-100/ 23		280Z		\$500 \$552			168/6† 168/6†		FI FI
	i	\$700 \$750	1		400(6.6L)/8 460(7.5L)/8	A	4	4DR-108/ 23		FIAT LANCIA BETA							
OLDSMOBILE]									SCORPION X1/9	23	\$525 \$457	20	31	107/4 79/4†	M M	2
DELTA 88	1	\$525 \$500	1	1	231/6 260/8	A	2	2DR-107/ 20 4DR-111/		124 SPORT MERCEDES-	22	\$478	19	28	107/4†	м	2
	21 19	\$552	ł	23	350/8 (GM-OLDS)		4	20		BENZ MB107(450SL/		-					
	24 16	\$375 \$656	21	30	350(5.7L)/8 (DIESEL) 403/8	A	FI 4			SLC)	14	\$750	12	19	276(4.5L)/8	^	H
OLDSMOBILE 98	17	\$617	15	22	350/8 (GM-OLDS)	A	4	2DR-108/			20 26	\$525 \$404			110/4 91/4	M	
	24	\$375	21	30	350(5.7L)/8 (DIESEL)	A	FI	4DR-111/ 20		PORSCHE 911	19	\$ 552	15	27	183/6	м	Fl
TORONADO	16 15	\$656 \$700	14 13	20 19	403/8 403/8	A A	4	2DR-105/		924	23	\$457		30	201/6† (TURBO) 121/4	м	FI.
PONTIAC	٠.							17		TRIUMPH	21	\$500	19	26	121/4	^	FI
PONTIAC		\$525		25	231/6	A		2DR-107/ 20 4DR-111/				\$404 \$457				M M	2
	1	\$525 \$584	17	24	301/8 350/8 (GM-BUICK)			20			19	\$552	16	26	215/8		2
		\$ 656			400/8		4				17	\$617	15	22	215/8	Α	2
									•								

[†] Certified for use on leaded gasoline.

⁰ Number of barrels in the carburator.

SMALL STATION WAGONS

Manufacture	rs	Fuel	Ec	ono	my	Vehicle Description					
Manufacturàr Car Line		Combined MPG	Fuel Costs	City MPG	Highway MPG	Engine Description Clorical	Туре	,	renemission	Fuel System © Body Type Interlor Space Passenger/ Trunk or Cargo(Cu. Ft.)	
AMC	\top	1-			T			+	+		
CONCORD	2	\$52	25	19 18 16	26 23 21	232/6 232/6 258/6		2.4	۱	1	
PACER WAGO	N 2	\$65 2 \$47	8	14 19	19 26	304/8 232/6		A	. 2	2	
	19 18	\$55	2	18 16 16	23 25 21	232/6 258/6 258/6		A	1 2	·	
AUDI	16	\$65	6	14	19	304/8		^	2	:	
FOX WAGON	28 23		- 1	1	37 29	97/4† 97/4†		M	F		
CHEVROLET MONZA WAGON											
WAGON	26 19	\$37 \$40 \$55	1 2	3	34 31 28	151/4 151/4 231/6		M A M	2 2	2DR-83/25	
	21	\$500	1	8	26	231/6		A	2		
DATSUN F-10 WAGON	33	\$318	1 2	8	40	85(1397CC)/4†	(NOCAT)	1.	2	2DR-73/29	
510 WAGON	27 25	\$388 \$420	1 2	4	32	119/4† 119/4†	(NOOAT)	M	2	4DR-79/29	
810 WAGON	18 19	\$584 \$552	1.	- 1-		146/6† 146/6†		M	FI	4DR-81/30	
COLT WAGON	32	\$328	1		- 1	98/4			2	4DR-82/34	
	30 28 24	\$350 \$375 \$438	24	1 3	5	98/4 56/4 56/4		м	2 2 2		
FIAT 128 WAGON	23	\$457	20			9/4†			2	2DR 75/25	
131 ESTATE WAGON	21	\$500	17	2	7 1	07/4†		м	2	2DR-76/28 4DR-85/33	
FORD	20	\$525	18	2	3 1	07/4†		^	2		
PINTO WAGON	26 25 20	\$404 \$420 \$525	23 22 18	3	1 1	40(2.3L)/4 40(2.3L)/4	Į,		2 .	2DR-78/31	
HONDA	20	→ 3∠5	18	2	` ا	71(2.8L)/6		^	2		
CIVIC WAGON		\$318 \$362	31	36		1/4 † 1/4†	(CVCC)			4DR-65/22	

SMALL STATION WAGONS

Manufacture	ers	F	uel E	cor	om	_	Vehick	e Desc	rípi	tion	
Manufacturer Car Line		Combined MPG	Average Annual Fuel Costs		City Mr G	Highway MPG	Engine Description CID/Cyl Type		Trecomination	Final System	1 2 3
LINCOLN- MERCURY			_	Ì		1			T	†	
BOBCAT WAGON				١		1			L		1
WAGON			\$404	1			40(2.3L)/4		М		2DR-78/31
			1420 1525	1-		- 1	40(2.3L)/4		٨	2	1
	ľ	ء اء)JZ5	18	22	ľ	71(2.8L)/6		٨	2	ŀ
MAZDA	L	_ _		ĺ.,	1	Т				l	!
FIX-4 WAGON	2	- 1	478	19	1	- 1		TARY)		ı	4DR-82/32
	11	a 2	5552	17	23	ᄩ	0/2 (RO	TARY)	Α	4	I
PLYMOUTH	1	- [1	1	1			ŀ	1	1
LANCER WAGON *	3:	٠,	328	28	38	1	8/4		١	١.	
······································	30		350	27	35	1-	8/4 9/4		М	2	4DR-82/34
	28	•		24	35		56/ 4		A M	2	1
	24	. 1-	438	22	28	1.	56/4			2	1
PONTIAC	1	1		1~	100	ľ	~~~		^	-	
SUNBIRD SAFARI		1			-						
WAGON	28			24	34	11	1/4	- !	м	2	2DR-83/25
	26			23	31		1/4			2	
	21	177	500	17	29	1	1/8	- 1	м	2	
	21	\$5	:00	18	26	23	1/6	Į.	Αį	2	
SUBARU SUBARU		1							-	ı	
WAGON	31	\$3	39	27	37	97	/4†	- 1	u l	2	4DR-74/24
	28	\$3	75	25	33	97	/4 †			2	
TOYOTA	1.	1	- 1	j		١.			1	- 1	
COROLLA	L_	l.,						- 1	ł	- 1	
WAGON	32	\$3		28	38	97		10	4 3	2	4DR-74/31
CORONA	28	\$3	/5 2	26	32	97.	4	-	۱ a	≥	
WAGON	23	54	57 2	0	29	13.	1/4		ا.	. 1	400 77.00
	21	\$50			23	13		١	. 1-		4DR-77/35
RESSIDA		1	_ [-	-		• •	ľ	١,	٠	
VAGON	22	\$47	78 2	ю	27	156	i/8	A	. 2	: 1.	4DR-84/38
OLKSWAGEN ASHER			1		I				ĺ	1	
NAGON	28	\$37	75 Z	3	37	97/	4 †	١,	ıle	٠l.	OR-83/40
	23	\$45				97/		ĺÃ	F		

[†] Certified for use on leaded gasoline.

[●] Available in Puerto Rico only.

⁰ Number of barrels in the carburator.

Table 3.--Fuel cost estimates for all 1978 automobiles (continued)

MID-SIZE STATION WAGONS

MID-SIZE STATION WAGONS

Manufacturers	LF	uel Ec	опог	ny	Vehicle Des			Manufacturers	+-	uel Ec	uno	, K ii	Vehicle Desc	i T	
Manufacturer Gar Line	Combined MPG	Average Annual Fuel Costs	City MPG	Highway MPG	Engine Description Cib/Cyl Type	Transmission Fuel System O	Body Type Interior Space Passenger/ Trunk of Gargo(Cu. Ft.)	Manufacturer Car Line	Combined MPG	Average Annual Fuel Costs	City MPG	Highway MPG	Engine Description CID/Cyl Type	1 _ 1	Body Type Interior Space Passenger/ Trunk or Cargo(Cu. Ft.)
BUICK	Н		\vdash	\vdash		+		LINCOLN-	П			Π			
CENTURY	i		ł	ļ				MERCURY	1	Ι.	1				1
WAGON	22	\$478	19	27	231/6	A 2	4DR-100/ 40	ZEPHYR WAGON	20	\$525	18	24	200(3.3L)/6	A 1	i
	19	\$552	16	22	305/8	A 2	40	WAGON	19	\$552	16		302(5.0L)/8	A 2	: [
	18	\$584	16	23	305/8	A 4		OLDSMOBILE	''] "	_			
CHEVROLET			``	-		1 1		CUTLASS			l				1
MALIBU		ŀ	ŀ	i		l i		CRUISER	1	l				1	
WAGON	24	\$438	21	29	200(3.3L)/6	M 2	4DR-101/ 40	WAGON	22	\$478	19	27	231/6	A 2	40R-100/
	21	\$500	19	25	200(3.3L)/6	A 2	~		21	\$500	18	25	260/8	A 2	: I `
	17	\$617	15	21	305/8	M 2			18	\$584			305/8	A 4	.
	19	\$552	16	22	305/8	A 2	1	PEUGEOT		i	l				
CHRYSLER		[1					504 WAGON	20	\$525			120/4	M 2	
LEBARON	l					11			19	\$552		22	120/4	A 2	
WAGON	20	\$525	17	25	225/6	M 2	4DR-98/39		30			34	141/4 (DIESEL 141/4 (DIESEL		
	19	\$552	17	22	225/6	A 2			28	\$321	25	31	141/4 (DIESEL	1^[٠١
	16 17	\$656 \$617	14	21 22	318/8 360/8	A 2		PLYMOUTH	1	ł					1 .
	17	3617	14	122	300/6	ا `ا		FURY WAGON	15	\$700	13	20	360/8	A 2	4DR-104/
DODGE	_				005 (6	MI	4DR-99/39		14	\$750	11	18	400/8	A 4	
ASPEN WAGON	20	\$525 \$525	18	25 25	225/6 225/6	M 2	4511-33733	VOLARE	1			1		L.L	
	19	\$552		22	225/6	A 2		WAGON	20	\$525		25	225/6 225/6	M 1	4DR-99/39
	18	\$584	15	25	318/8	M 2			20 19	\$525 \$552		25 22	225/6	A 2	
	18	\$584	15	22	318/8	A 2			18	\$584			318/8	M 2	
	17	\$617	14	22	360/8	A 2			18	\$584	15	22	318/8	A 2	1
DIPLOMAT WAGON	20	\$525	17	25	225/6	M 2	4DR-98/39		17	\$617	14	22	360/8	A 2	-
indon	19	\$552	17	22	225/6	A 2		PONTIAC	1	ļ				11	1
	16	\$656	14		318/8	A 2		LEMANS SAFARI			ľ				
	17	\$617	14	22	360/8	A 2		WAGON	22	\$478	19	27	231/6	A 2	4DR-101/
MONACO MAGON	15	\$700	13	20	360/8	A 2	4DR-104/		l.,			ا ہما	205 (8	A 2	40
ITAGOIT	١,٠	,,,,,	١.٠	1		l i	50		19	\$552	16	22	305/8	^ 2	
	14	\$750	11	18	400/8	A 4		VOLVO			i .			11	
FORD								STATION	l					.ll	
FAIRMONT	ندا	\$404	23	33.	140(2.3L)/4	M 2	4DR-98/43	WAGON	23	\$457		31	130/4 (3WAYCAT		
WAGON	26 23	\$404	19	29	200(3.3L)/6	M 1			22	\$478		29	130/4 (CAT 130/4 (3WAYCAT	M F	
	20	\$525	18	24	200(3.3L)/6	A 1			21 20	\$500 \$525		24 24		A F	
	19	\$552		23	302(5.0L)/8	A 2			19	\$552		27		MF	
LINCOLN-	1	1					1		19	\$552		27	163/6 (3WAYCAT	MF	ı
MERCURY				l					19	\$552		23	163/6 (3WAYCAT		
ZEPHYR	_		22	33	140(2.3L)/4	M 2	4DR-98/43		18	\$584	16	22	163/6 (CAT)AF	<u> </u>
WAGON	26 23	\$404	19		200(3.3L)/6	MI									
	,	,	,					I							

O Number of barrels in the carburator.

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N	٠,

† Certified for use on leaded gasoline. O Number of barrels in the carburator.

LARGE STATION WAGONS **SMALL PICKUP TRUCKS** Manufacturers Fuel Economy Vehicle Description Manufa-turers Fuel Economy Vehicle Description Average Annual Fuel Costs City MPG Highway M Average Ann Fuel Coats Combined CHEVROLET MATADOR LUV PICKUP \$388 24 34 111/4 M 2 WAGON 14 \$750 12 17 360/8 A 2 4DR-112/ 26 \$404 23 29 111/4 DATSUN BUICK PICKUP 27 \$388 24 31 119/41 ESTATE WAGON 24 \$438 23 26 119/41 18 \$584 15 22 350/8 (GM-BUICK) A 4 4DR-111/ FORD 16 \$656 14 20 403/8 COURIER 33 5318 29 38 110(1.8L)/4 CHEVROLET 29 \$362 25 35 140(2.3L)/4 25 \$420 22 29 140(2.3L)/4 CHEVROLET WAGON 16 \$656 14 20 305/8 4DR-111/ MAZDA 16 \$656 14 19 350/8 (GM-CHEVYA 4 B1800 PICKUP 33 \$318 29 38 110/4 FORD TOYOTA FORD WAGON 16 \$656 13 21 351(5.BL)/8 (MENG) A 2 4DR-108/ HILUX 26 \$404 23 31 134/4 24 \$438 22 27 134/4 15 \$700 13 20 400(6.6L)/8 13 \$807 11 17 460(7.5L)/8 STANDARD PICKUP TRUCKS LINCOLN-Manufacturers Fuel Economy MERCURY Vehicle Description MERCURY Average Annual Fuel Costs Cambined MPG WAGON 16 \$656 13 21 351(5.8L)/8 (MENG) A 2 4DR-108/ City MPG 15 \$700 13 20 400(6.6L)/8 13 \$807 11 17 460(7.5L)/8 OLDSMOBILE CUSTOM CHEVROLET CRUISER WAGON 17 \$617 15 22 350/8 **EL CAMINO** 24 \$438 21 29 200(3.3L)/6 (GM-OLDS) A 4 21 \$500 19 25 200(3.3L)/6 22 \$410 19 27 350(5.7L)/8 (DIESEL) A 18 \$584 16 22 305/8 16 \$656 14 20 403/8 19 \$552 16 23 305/8 PONTIAC 16 \$656 14 19 350/8 (GM-CHEV) M 4 17 \$617 15 21 350/8 PONTIAC (GM-CHEV) A 4 SAFARI PICKUP 19 \$552 17 24 250/6 17 \$617 15 21 301/8 18 \$584 16 22 250/6 17 \$617 15 21 305/8 16 \$656 15 19 305/8 A 2 4DR-111/ 18 \$584 15 22 350/8 (GM-BUICK) A 16 \$656 14 19 400/8 15 \$700 14 18 350/8 (GM-CHEV) M 4 15 \$700 13 17 350/8 (GM-CHEV) A 4 23 \$392 20 27 350(5.7L)/8

(DIESEL) A FI

13 \$807 12 16 454/8

STANDARD PICKUP TRUCKS

VANS

		_	,	my		scription			,		1	1	1	Ť		Т
Manufacturer Car Line	Combined MPG	Average Annual Fuel Costs	City MPG	Highway MPG	Engine Description CID/Cyl Type		Transmission	Fwel By stem O		Manufacturer Car Line	Combined MPG	Average Annual Fuel Costs	City MPG	Highway MPG	Engine Daecription CID/Cyl Type	Transmission
DODGE	1		T	T				_		CHEVROLET			T			T
PICKUP	19	\$552	17	23	225/6		M	2		VAN	20	\$525	17	24	250/6	N
	19	\$552	17	22	225/6		A	2			19	\$552		22	250/6	A
	19	\$552	16	24	318/8		м	2			17	\$617	15	21	305/8	M
	16	\$656	15	18	318/8		A	2			16	\$656	15	19	305/8	A
	14	\$750	12	19	360/8	1	A	2			15	\$700		18	350/8 (GM-CHEV	
FORD	1	ł	ı	1	1						15	\$700	13	17	350/8 (GM-CHEV	'nΑ
PICKUP	22	\$478	19	28	300(4.9L)/6	i	м	1		DODGE	Į	l			į	!
	20	\$525	17	23	300(4.9L)/6		۸	1		VAN	19	\$552	17	23	225/6	M
	20	\$525			302(5.0L)/8	Ī	M	2			19	\$552	17	22	225/6	A
,	19	\$552	16	23	302(5.0L)/8	i	A	2			19	\$552		25	318/8	М
	16	\$656	14	20	351(5.8L)/8	(MENG)	M	2 .			16	\$656		19	318/8	A
	16	\$656	14	22	351(5.8L)/8	(MENG)					14	\$750	12	19	360/8	^
	15	\$700	13		400(6.6L)/8		٨	2		FORD	1			l		
RANCHERO	17	\$617			302(5.0L)/8		^	2		VAN	ŀ			l		1
	18	\$584	15		351(5.8L)/8	(WENG)	A	2		(ECONOLINE/	_	eror	١.,	-	200(4.01.) (6	١.,
	16	\$656			351(5.8L)/8	(MENG)		2		CLUB WAGON)	20 18	\$525 \$584	18 16		300(4 9L)/6	M
	15	\$700	13	17	400(6.6L)/8	[^	2				\$617		22	300(4.9L)/6 351(5.8L)/8 (WENG	ľ
GMC	-1	1	ı	1		į					16		13		351(5.8L)/8 (WENG	
CABALLERO	24	\$438	21		200(3.3L)/6	i	м				١.٠	3000	,,,	,,,	(442.40	1^
	21	\$500	19	25	200(3.3L)/6	ŀ		2		GMC						l.,
	18	\$584	16	22 23	305/8			2		VAN			17		250/6	М
	19	\$552			305/8			2			19	\$552			250/6	A
	16	\$656				M-CHEV)		4					15		305/8	М
	17	\$617	15			M-CHEV)		4			16 15	\$656	15 14	18	305/8 350/8 (GM-CHEV	1
PICKUP	19	\$552			250/6		м	1				\$700 \$700	13		350/8 (GM-CHEV	
	18	\$584		22	250/6		۸.	1			13	3/00	13	''	33078 (GMI-CHEV	1^
	17	\$617			305/8			2 2		PLYMOUTH						ĺ.,
	16	\$656			305/8	M-CHEV)		4		VAN		\$552	17		225/6	M
	15	\$700	14			M-CHEV)		4			19	\$552		22	225/6	A
	15	\$700	13			(DIESEL)					18	\$584			318/8	М
	23	\$392	20 12	27	350(5.7L)/8 454/8			4			16	\$656		18	318/8	A
	13	\$807	12	1,0	454/0			- -			14	\$750	12	19	360/8	^
										VOLKSWAGEN BUS (WAGON,		٠.				
										KOMBI,		esse	17	25	120/4†	м
									·			\$525 \$552	17	23		A

[†] Certified for use on leaded gasoline.

⁰ Number of barrels in the carburator.

SPECIAL PURPOSE TRUCKS

Manufacturers	F	uel Ed	ono	ту	I	tion		
Manufacturer	Combined MPG	Average Annual Fuel Costs	City MPG	Highway MPG		Engine Description CiD/Cyt Type	Transmission.	Fuel System O
AM GENERAL POST OFFICE VEHICLE	20	\$525	19	22	232/6		A	1
CADILLAC COMMERCIAL CHASSIS	11	\$954	10	15	425/8		A	4
	26 25	\$404 \$420	23 23	32 28	111/4		MA	2
DATSUN DATSUN CAB	_	\$ 478	19	27	119/4†		M	2
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[†] Certified for use on leaded gasoline.

O Number of barrels in the carburator.

NOMOGRAPH FOR LOAD RATING LOG STRINGER BRIDGES

E.W. Larsen Structural Engineer B. Rankenburg Structural Engineer

Region 5

The nomograph presented herein (figure 1) is intended to enable the engineer in the field to load rate log stringer bridges quickly and accurately.

CRITERIA

The rating loads conform to Types 3, 3S2, and 3-3 as defined in "Manual for Maintenance Inspection of Bridges," 1974, American Association of State Highway Transportation Officals (AASHTO).

Distribution of wheel loads to stringers conforms to "Standard Specifications for Highway Bridges," 1973, AASHTO.

FEATURES

This nomograph may be used for load rating single lane log stringer bridges that are constructed similar to R-5 Standard Log Stringer, Timber Deck Bridge (dwg. #R5-SD-B1-1), using an allowable bending stress of $^{\text{F}}\text{b}$ = 1,200 psi (8,273.6 kilopascals). Other configurations may also be rated, as provisions are included for adjusting:

- --Decking dead load;
- --Girder distribution factors; and
- --Allowable fiber stresses.

With the flexibility of having different allowable fiber stress comes the added responsibility of engineering judgment in selecting an economical but safe stress. In selecting a stress value for logs, consideration must be given to the wood species, age, and state of deterioration. Suggested values are:

		A	ge fact	or	Conditi	on factor		
Species	Basic Stress		(Years		Little	Wea	thered	and
	psi	1-5 6-10 10		10-0ver	weathering	Checked	Split	Decayed
Douglas Fir	1,500 (10,342.1 kilopascals)							
Fir-Hemlock	1,300 (8,963.1 kilopascals)	1.15	1.10	.9	1.15	1.0	.9	.8
Pine	1,200 (8,273.6 kilopascals)							

The rating stress is obtained by combining the basic stress with the age and condition factor as shown in the following equation:

[Rating Stress = (Basic Stress) x (Age Factor) x (Condition Factor)]

The simple conversion that permits the use of any other allowable bending stress is shown in the example on the nomograph.

New Moment (Live Load Available) =
$$\frac{\text{Fb(new)}}{1,200 \text{ psi } (8,273.6 \text{ kilopascals})}$$

This new available live load bending moment is the new pivot point for computing ratings for the three types of loads in the usual manner.

Horizontal shear and bearing stresses are not usually limiting factors in log stringer designs, and will not normally require checking in load rating of log stringer bridges 16 feet (4.88 meters) or longer. However, when substantial decay and loss of section occurs at the bearing area of the log, first mode failure can occur in a form of vertical shear at this location. If this needs checking, a rating stress of 75 psi (517.1 kilopascals) applied to the net area will provide conservative results.

The nomograph is flexible enough to allow the user to enter at various points, as required, to adjust to field conditions. If a four-stringer bridge were to be rated, for example, or a ten-stringer bridge with a rock deck, the engineer could simply compute the dead load bending moment, assume a distribution factor, and quickly arrive at a rating. The nomograph readily indicates if a bridge needs to be posted.

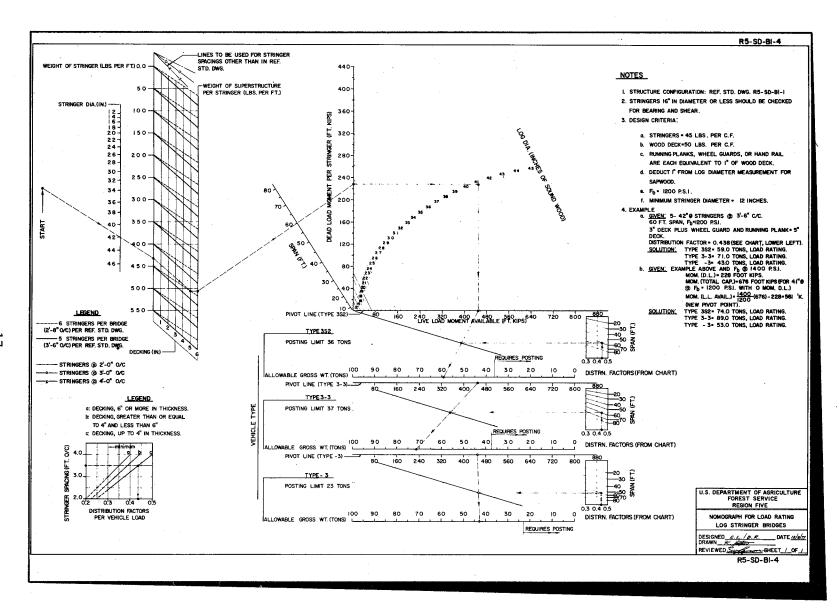


Figure 1. Nomograph for load rating log stringer bridges.

APPLICABILITY

This nomograph is only a tool which, if used with understanding, can eliminate many tedious calculations. It cannot compensate for lack of judgment or experience in dealing with complex and variable problems.

Major defects, splits, or rot in the stringers, for example, may require some investigation as to the extent of remaining sound wood. This can be allowed for by using different diameters for computing the available live load moment. Some error probably results from assuming the remaining sound wood is circular. The effect of this can best be judged by the person in the field. Defects in the deck or worn decks may have some influence on distribution factors for the wheel loads. Engineers may be required to make educated guesses about the actual distribution mechanism operating in the field.

ACCURACY

The ratings are accurate to approximately 2 percent on the average. This is less than the error inherent in the assumptions made about a structure. Estimates of sapwood, distribution factors, and the changes normally found in organic materials all contribute to rating variance.

WASHINGTON OFFICE NEWS

OPERATIONS

Harold L. Strickland Assistant Director

TECHNOLOGY TRANSFER

Since 1968, formal recognition has been given to the need for improving our engineering technology transfer efforts. This was and continues to be based on our need to use the "latest state-of-the-art" in carrying out our missions and the need to eliminate costly duplications of effort and trial and error procedures.

Most of us have overlooked the fact that our internally held technology is one of our most valuable resources. Without question, our collective knowledge concerning low volume road issues exceeds that of any other engineering group in the world, and this is probably true for most resource management engineering activities. The problem is how to make this internally held resource available to all engineers and paraprofessionals on a Service-wide basis.

Up until this year our efforts have focused on internally generated engineering publications and especially *Engineering Field Notes*. These are designed to give specialists a vehicle for sharing their knowledge with their counterparts. Although much valuable knowledge has been transferred through this effort, most specialists, engineering managers, and line officers have not recognized that technology transfer is an inherent part of their jobs.

On January 16, 1978, the Chief, Forest Service, sent a 1250 letter to the Regional Foresters on the subject of technology transfer and requested implementation of eight specific actions which were designed to improve the process. Some of the key issues were:

- 1. The Deputy Chief for State and Private Forestry (S&PF) will provide Service-wide leadership for technology transfer.
- 2. Subject matter specialists are to communicate with and provide feedback to their counterparts and use available information systems.

3. Line officers are to identify within their staffs and program areas key persons whose jobs should include the responsibility for keeping up-to-date and transferring knowledge and technology. This will permit management to assign specific responsibility and include it in job descriptions.

State and Private Forestry is in the process of establishing a technology transfer staff unit for the Washington Office. As soon as this unit is fully staffed and has an opportunity to develop detailed Service-wide direction, we can expect some significant advancements and major emphasis on your responsibilities for technology transfer.

FSM 7113 establishes your initial responsibilities in support of our Engineering Technical Information Systems, and you are encouraged to review this section as soon as possible.

In support of the Chief's direction on use of available information systems and the development and implementation of new ones, we are conducting an evaluation of the Fort Collins Computer Conferencing System. Each Regional Technical Information Coordinator (see listing of coordinators on last page) has been asked to collect brief, informal information statements and questions to feed into the system and to access the system for information. The objective is to demonstrate the effectiveness of using a computer for communication purposes, and to determine if something of this nature should be established for use by all engineering units.

If you have a message you think would be of Regional or Service-wide value or if you have a problem and would like some help on it, please call your respective coordinator, and arrange for the message to be entered into the system.

In summary, there are several developments in the area of technology transfer, and we can expect a lot more. The key to the success of our existing and future engineering information systems is you. If you recognize, accept, and act on the fact that technology transfer is an important part of your function, we can all be assured of having answers when we need them.

TECHNOLOGICAL IMPROVEMENTS

Heyward T. Taylor Assistant Director

ED&T BOARD MEETS IN MISSOULA

The Equipment Development and Test Board's National meeting was held at the Missoula Equipment Development Center (MEDC) on April 11-13. The Board meets annually to discuss the ED&T Program. More than 50 people from the various Washington Office staffs, the Regions, the Stations, the Equipment Development Centers, the Bureau of Land Management, and the Montana State Forester's office participated in the 3-day session.

The meeting also gives Board members and others involved in equipment development the opportunity to review the latest activities and accomplishments of the Missoula and San Dimas Equipment Development Centers.

One day of the session was devoted to field demonstrations. In the morning, the attendees visited the University of Montana Human Performance Laboratory and listened to a discussion of the methods developed to evaluate the human factors in work and equipment design.

At the MEDC shops, the group saw revegetation equipment demonstrated and the roles of the gouger, tree spade, and hay spreader in reclaiming stripmined land. This revegetation equipment was built for the Bureau of Land Management (see figure 1).

The rest of the day was spent on the Ninemile Ranger District, located 30 miles west of Missoula. The group saw the following variety of equipment related to ED&T project work under way at Missoula and San Dimas:

- --Ford Ditch Master--a commercial machine designed to clean silt, rocks, and other debris from ditches along secondary and logging roads;
- --New plastic toilet vault riser that is stronger and cheaper than stainless steel models;
- -- Crosscut saw filing techniques;
- -- Smokejumper aircraft evaluation and smokejumping.

- -- Lightweight camp gear that lessens impact on wilderness.
- -- New solid-state instrument to measure degree of seedling dormancy and determine the best time to lift seedlings for planting.
- --Ignition systems for igniting brush and other fuels from the air.
- --Lightweight yarder designed to remove slash from steep slopes.
- --Yarder Guyline Anchor failure detection device.
- --Self-powered yarding carriage that bunches logs along a skyline corridor (see figure 2).
- --Water gel explosives for building a fireline around prescribed burns.

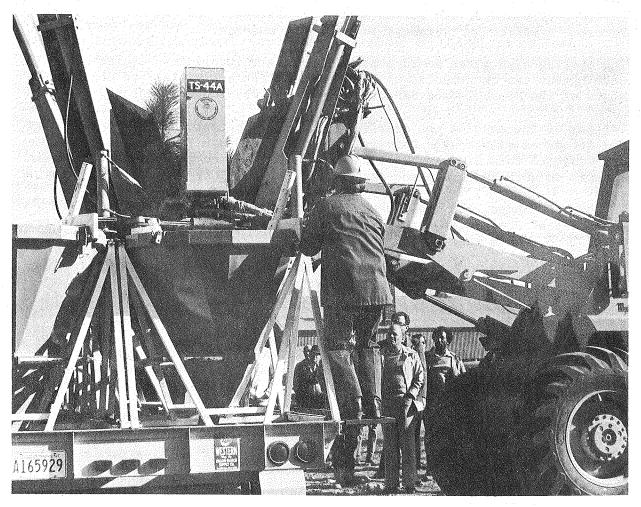


Figure 1. A Vermeer Tree Spade, for revegetating disturbed land, demonstrated to ED&T Board attendees.

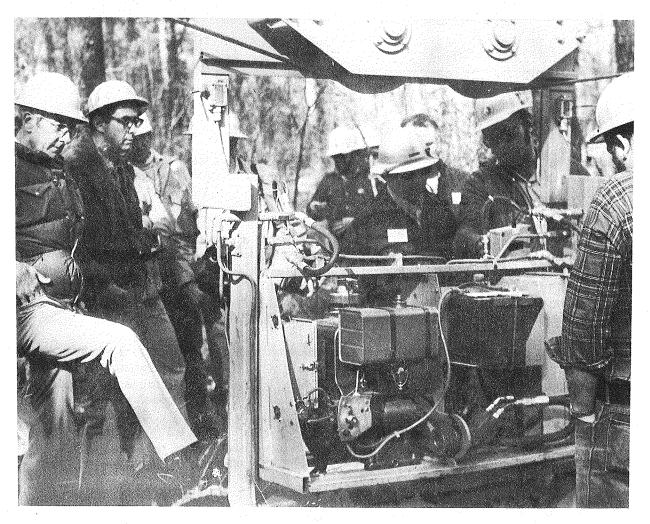


Figure 2. Prototype self-powered yarding carriage was demonstrated to those attending the ED&T Board meeting. The machine "bunches" logs or slash along a skyline corridor.

INVITATION TO READERS OF FIELD NOTES

Every reader is a potential author of an article for *Field Notes*. If you have a news item or short article you would like to share with Service engineers, we invite you to send it for publication in *Field Notes*.

Material submitted to the Washington Office for publication should be reviewed by the respective Regional Office to see that the information is current, timely, technically accurate, informative, and of interest to engineers Service-wide (FSM 7113). The length of material submitted may vary from several short sentences to several typewritten pages; however, short articles or news items are preferred. All material submitted to the Washington Office should be typed double-spaced; all illustrations should be original drawings or glossy black and white photos.

Field Notes is distributed from the Washington Office directly to all Regional, Station, and Area Headquarters, Forests, and Forest Service retirees. If you are not currently on the mailing list ask your Office Manager or the Regional Information Coordinator to increase the number of copies sent to your office. Copies of back issues are also available from the Washington Office.

Each Region has an Information Coordinator to whom field personnel should submit both questions and material for publication. The Coordinators are:

R-1	Melvin Dittmer	R-4	Ted Wood	R-9	Fred Hintsala
R-2	Royal M. Ryser	R-5	Jim McCoy	R-10	F. W. Baxandall
	Juan Gomez	R-6	Kjell Bakke	WO	Al Colley
		D_Ω	Rob Rowers		•

Coordinators should direct questions concerning format, editing, publishing dates, and other problems to:

USDA Forest Service Engineering Staff, Rm. 1108 RP-E Attn: Gordon L. Rome or Rita E. Wright P.O. Box 2417 Washington, D.C. 20013

Telephone: Area Code 703-235-8198