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Final Report

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Cost Evaluation of Federal Motor Vehicle Safety Standard 105-83

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16. Abstract

For FMVSS 105-83, a representative sample of brake system components for the year prior to and following the implementation of the standard (i.e., 1983 and 1984). The consumer cost and weight change due to the implementation of the standard were estimated and weighted by sales volume to develop industry average costs.

Costs and weight increased generally after the implementation of the standard, with the exception of the G.M.C. 7 ton truck which decreased significantly.

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SYNOPSIS

Mobility Systems and Equipment Company, under contract to the National Highway Traffic Safety Administration, Department of Transportation, performed an investigation, "Cost Evaluation of Safety Standard 105 for Vehicles other than Passenger Cars." This project was part of an ongoing program to evaluate existing regulations to determine their effectiveness, benefits and cost. Data were acquired which were used to determine the difference in weight and consumer cost for motor vehicle equipment required to satisfy Federal Motor Vehicle Safety Standard (FMVSS) 105-83, and for corresponding equipment on pre-standard vehicles.

Industry sales and registration data were searched. A sampling of vehicles was selected that would represent approximately 85% of the domestically produced and 55% of the foreign produced vehicles sold in the United States. These samples were studied to identify the effect of the Standard on the vehicles sold.

Vehicle parts were purchased to represent the vehicles affected by the Standard. Parts were obtained through the manufacturers' supply channels, to the exclusion of "spurious" or re-manufactured parts.

The purchased parts were then disassembled to the lowest possible level, or torn down. The component parts were identified and photographed.

The manufacturer's variable cost was determined. To estimate the manufacturer's variable cost it was necessary to obtain pricing information on direct material and direct labor used to produce the part, and the variable burden. The variable burden (such

as material handling and set-up) in this assessment is the overhead directly associated with the production, and varies according to production volume. The variable burden rate was applied on machine occupancy time for the tasks performed during the production process. In this way the total variable cost was developed.

Financial reports from the automobile industry were studied and analyzed to develop a mark-up factor based on the company's business overhead; this is the manufacturer's wholesale mark-up factor. The method used to obtain this factor - "macro-analysis" - takes account of all costs associated with the company's automotive operations.

Similarly, the dealer's mark-up factor was developed for the distribution industry.

These factors were then applied to the manufacturer's (variable) cost of each part. The cost to the consumer of the implementation of the Standard was calculated by subtracting the cost of a corresponding unaffected vehicle from that of an altered one. A weighted average of the increase in cost was calculated, based on the sales volume of each model.

The results show a significant increase in cost to the consumer, at least in the case of domestic vehicles (apart from the effect on cost-of-ownership).

The effect of the Standard on vehicle weight was also studied. The changes were small, or even negative (suggesting that, in the absence of the Standard, savings in weight might have been observed).

SECTION 1

INTRODUCTION

The National Highway Traffic Safety Administration has a continuing program to evaluate existing regulations to determine their effect and cost. This report describes a research conducted by Mobility Systems and Equipment Company under Department of Transportation, National Highway Traffic Safety Administration, Contract Number DTHN22-84-R-06016, Cost Evaluation of Safety Standard 105 for Vehicles other than Passenger Cars.

FMVSS 105-83 became effective in September, 1983, for multi-purpose vehicles, trucks and buses, with hydraulic brakes. The Standard requires that the braking system exhibit various levels of performance, generally different depending upon the weight and application of the vehicle, and that it have numerous design characteristics, generally the same for all vehicles with split hydraulic systems and for all without split systems.

The research described in this report comprises a comparison of the cost and the weight of the brake systems of a sample of vehicles of the 1984 model year with earlier vehicles, in so far as the changes in the brake systems were attributable to the Standard.

The project required a sampling of the vehicles sold in the United States, in order to include 85% of those manufactured domestically and 55% of those imported. The sample was based upon published registration figures, by vehicle class and by manufacturer.

For each vehicle in the sample that was modified as a result of FMVSS 105-83, and a corresponding 1983 (or similar) vehicle,

examples of the affected parts and systems were purchased. The purchased parts were weighed and dismantled as far as possible. Automotive estimating techniques were used to establish their cost.

This was done by using industry figures for material cost, labor cost, machine rates, and variable burden. The estimates for each part were then factored to allow for the manufacturer's overhead and the distributor's mark-up, thus arriving at the cost to the user. The figures were then used to determine the change in cost from pre-Standard to post-Standard vehicle.

SECTION 2

PROCEDURE

2.1 SAMPLING SYSTEM

The sampling system was designed to include vehicles of all major U. S. manufacturers, and at least one foreign manufacturer. The system was designed to represent 85% of the vehicles produced in the United States, and 55% of those imported.

The vehicles were divided into classes on two bases, firstly function - multi-purpose vehicles, trucks, buses - and secondly origin - Chrysler, Ford, General Motors. In each class, the vehicles were scrutinized to discover whether or not changes had been occasioned by the adoption of FMVSS 105-83. Each vehicle included was weighted according to its portion of the total of vehicles sold, or registered, in the States; the statistics used were those compiled and published by Automotive News, R. L. Polk, and similar accepted sources. Examples where no change occurred were excluded from the sample, but not, of course, from the weighting procedure (discussed below).

The weighting procedure is based upon the concept that the cost incurred by a vehicle manufactured in low volume will be greater than that of one manufactured in high volume because of the fixed costs. Thus there can be assigned a "cost per vehicle" which will be representative of all vehicles. This cost is calculated by measuring the increase in cost of vehicle A, multiplying by the market share of vehicle A, and summing the products for vehicles A, B, C etc. Since only a partial sample of the vehicles on the market has been included, the sum of all market shares is not unity: therefore, the sum of the products must be divided by the sum of the shares. The figure thus derived can be used to estimate the cost incurred by any vehicle, if its production volume is known.

The method of computing the weighted average cost differential is shown in Table 1 (the figures show the share only of the truck, bus, and multi-purpose market, not of all vehicles). Since a vehicle may incorporate more than one of the changes, the sum of the samples is not equal to 100%.

2.2 SAFETY SYSTEM TEARDOWN

All parts purchased for the investigation, both pre- and post-Standard, were disassembled or torn down to identify the sub-assemblies and components. After teardown, each component was weighed, and its material composition and gauge, manufacturing method, and possible vendor identified. After disassembly, the component parts were laid out on a 1 in. x 1 in. grid peg-board and photographed.

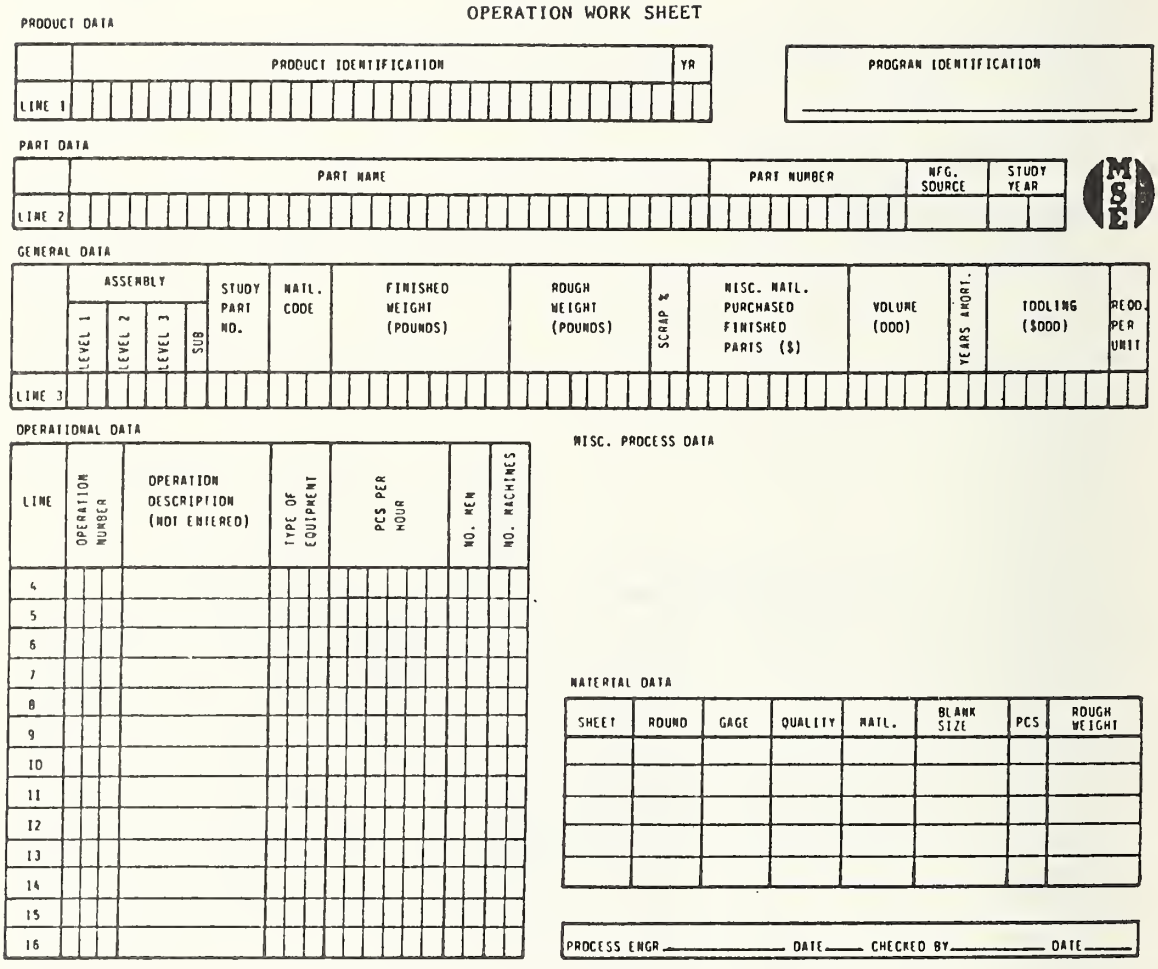
2.3 OPERATION WORK SHEETS

Operation work sheets, as shown in Figure 1, were used to record cost and weight data for each component part. These sheets are comprehensive, requiring a knowledge of material, processing and finishing methods, rough and finished weights, scrap percentages, production volumes, tooling costs, the machine operations and the types of machines used, the number of parts processed per hour, the number of persons required to operate each machine, and the production run in years.

TABLE 1 WEIGHTING COMPUTATION METHOD

	PRE-STANDARD YEAR 1983	POST-STANDARD YEAR 1984
COST	C_a	C_b
MARKET SHARE		S_1

$$\text{COST DIFFERENTIAL} = \frac{\sum_{n=1}^{n=n} (C_b - C_a).S_n}{\sum_{n=1}^{n=n} S_n}$$



OPERATION WORK SHEET

PRODUCT DATA

	PRODUCT IDENTIFICATION	YR
LINE 1		

PROGRAM IDENTIFICATION

PART DATA

	PART NAME	PART NUMBER	MFG. SOURCE	STUDY YEAR
LINE 2				

GENERAL DATA

	ASSEMBLY LEVEL 1	ASSEMBLY LEVEL 2	ASSEMBLY LEVEL 3	ASSEMBLY SUB	STUDY PART NO.	MATL. CODE	FINISHED WEIGHT (POUNDS)	ROUGH WEIGHT (POUNDS)	SCRAP %	MISC. MATL. PURCHASED FINISHED PARTS ($)	VOLUME (000)	YEARS AMORT.	TOOLING ($000)	REQD. PER UNIT
LINE 3														

OPERATIONAL DATA

LINE	OPERATION NUMBER	OPERATION DESCRIPTION (NOT ENTERED)	TYPE OF EQUIPMENT	PCS PER HOUR	NO. MEN	NO. MACHINES
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						

MISC. PROCESS DATA

MATERIAL DATA

SHEET	ROUND	GAGE	QUALITY	MATL.	BLANK SIZE	PCS	ROUGH WEIGHT

PROCESS ENGR. _____ DATE ____ CHECKED BY _____ DATE ____

FIGURE 1 SAMPLE OPERATION WORK SHEET

2.4 AUTOMOTIVE INDUSTRY COST FACTORS

The assessment of cost of the parts and components is based on automotive industry costing procedures and elements. These include material costs, labor costs, and manufacturing or non-manufacturing burden, depending upon whether the part is made or bought.

Material costs are determined from the contemporary market price for the appropriate material. Direct labor costs can be estimated, since such costs are usually agreed upon between a manufacturer and a labor union; they may well be included in Department of Labor statistics. Fringe benefits and overtime premium rates also can be determined for any manufacturer.

Variable burden rates are those which vary with the volume of production; such costs are the setting-up of machines, the handling of material, the cost of shipping. These charges are applied to any given part on the basis of the time taken to produce the part. This assumes that the manufacturer maintains all labor, and machines, fully occupied by exercise of the make-or-buy option.

The corporate overhead expenses, which do not vary with production volume, are assessed by macro-analysis. By using the financial reports published by automobile manufacturers, the proportions of direct and overhead expenditures can be estimated. The financial statements of the major U. S. manufacturers were consolidated, and a single macro factor determined for the industry (the same figure is also applied to foreign manufacturers).

Consumer cost is obtained by using the estimated direct cost, adding the variable burden, factoring in the overhead, and determining the mark-up from manufacturer to user. The latter factor is assumed to be the same for all models of the same manufacturer and the same market class (i.e. "incentives" are ignored).

2.5 INTERPRETATION

The evaluation of FMVSS 105-83 is summarized in this report. In using the summary data, the following should be considered:

1) Brake systems differ greatly according to the user's specification of his vehicle - weight, engine, wheels, etc. Thus the attempt to attain the same performance for many different models may result in the appearance of numerous different lining materials, proportioning valves, etc.; similar components on different vehicles in the same sample may in fact be different. Even if Lining A and Lining B are equally costly, it costs more to fit half the vehicles with one and half with other. This means that when such circumstances occur, the costs developed in the study will in fact be lower than the actual costs.

2) Brake systems very generally are not expected to last the life of the vehicle - the cost to the user is not only the cost at original purchase, but also the increased cost of the sinking fund to offset maintenance and repair.

3) The proposed Standard was published and discussed before adoption. Thus, the design of vehicles may have been affected by the Standard even before it was adopted: a comparison of 1983 and 1984 models may not reveal all of the effects of the Standard. In fact, numerous vehicles were redesigned at the time the Standard became effective. Examples are the American Motors Jeep Cherokee and Wagoneer, and the Toyota trucks. In the case of the Toyota, the 1983 models had front brakes of 264 mm diameter, with a total swept area of 2175 square centimeters, and the 1984 models 246 mm diameter, area 2020 square centimeters.

SECTION 3

DATA COLLECTION AND ANALYSIS

3.1 PARTS ACQUISITION

The cost of the Standard for each vehicle in the sample was estimated by obtaining examples of the parts of the braking systems which were affected, and of the corresponding parts of braking systems which were not affected, and comparing them. In some instances, the changes were of the nature that some device was added to the vehicle, so that no corresponding unaffected part exists.

The major elements of the braking system are susceptible to wear and replacement during the life of the vehicle, and may well be replaced by after-market parts. Consequently, all parts required for this investigation were acquired new through the manufacturer's parts system, rather than from scrapped vehicles.

3.2 TEARDOWN

The various parts were dismantled into components, even where welded or otherwise irreversibly attached. For each part, the weight and the material gauge were measured.

The components and sub-assemblies were laid out on a background exhibiting a 1 in. by 1 in. orthogonal matrix, and photographed; the photographs of dismantled parts are shown in Appendix B.

The individual parts were weighed, normally on a calibrated mass balance, and measured using conventional workshop instruments.

3.3 ANALYSIS

The cost comparison was performed in two stages, the first considering the elements of cost which vary from one part to another, and the second those which do not. These two studies may be distinguished as "micro" and "macro" analysis.

3.3.1 Micro-Analysis

The cost of affected parts was established by tearing down the parts into components, and then making an analysis of the manufacturing cost of each component. This assessment was made using automotive cost estimating technology; work sheets - as shown in Figure 1 - were filled in manually, and the cost computed using a computer program. The production volume was assumed, for purposes of analysis, to be 350,000 per annum.

The method of cost estimation accounted for three different elements of the cost.

The first is the material cost, estimated by judging the weight of the component in the rough state and multiplying by a factor appropriate to the material, gauge, grade, etc.

The second is the labor cost; this was estimated by judging the various steps in the manufacture of the part and its assembly on the vehicle, assigning a time (or rate, pieces/hour) to each, and multiplying the time by the appropriate rate for labor. These judgments, plainly, are based upon an estimate of the number of parts required per annum (i.e. whether the part is used on one or more models).

Both of these cost estimates involve a division of the components between those which are manufactured and those which are purchased from specialist suppliers.

The third element is the capital cost; a more elaborate procedure was used for estimating the capital cost. First, for parts bought in, the capital equipment used at each stage of the

manufacturing process was adjudged, and the appropriate allocation of time estimated; second, the special tooling for the component was estimated, and a further cost - based upon the estimated life of the tooling - calculated. For parts manufactured in-house, the capital cost is calculated on the assumption that, by exercise of the choice between make-or-buy, the capital equipment is fully utilized.

The calculations involved are straightforward, but very numerous. Consequently, the entire estimation - and summation for each vehicle - is performed on a computer. To avoid incorporating innumerable amendments in the computer program, the program is provided with material, labor and capital cost figures for a typical (recent) year, and the calculated figures are adjusted for the average variation in manufacturing costs from one year to another.

3.3.2 Macro-Analysis

The macro-analysis is intended to take account of the fixed costs involved in making the product available to the user. The fixed costs are, by their nature, incurred by one or another corporate entity; it is assumed that a corporation is equally efficient, or inefficient, in making or distributing all of its many products.

The fixed costs were therefore estimated, not from the character of the parts involved, but by reference to commercial and financial data such as the reports of R. L. Polk *et al.*, annual reports to stock-holders, and similar public sources.

Even as the cost of the standard can be calculated for a representative vehicle, by making an appropriate assumption as to the relationship between cost and volume, so also the fixed costs can be calculated for the entire manufacturing, or distributing, industry by making some assumption as to the variation of overhead with volume. The calculation was made by summing the product of the overhead factor and the volume for each manufacturer or wholesaler, and dividing by the volume of the industry.

The resulting figures for the fiscal year 1983 were as follows:

manufacturer to wholesaler - 1.337;
wholesaler to dealer, domestic - 1.136;
wholesaler to dealer, imported - 1.161.

3.4 RESULTS

Implementation of FMVSS 105-83 had no effect on the design of many vehicles, e.g. American Motors Jeep CJ and Jeep trucks. (As discussed above, Section 2.5, the Standard may have influenced the design of vehicles which were new in 1984.)

Such effects included the number of models becoming diminished - e.g. power-assisted braking systems became standard, instead of optional, on Dodge 1/2 ton trucks.

In numerous cases, the specification of brake friction elements was changed, typically from asbestos-based to non-asbestos material, or from inorganic to semi-metallic material. These changes could be introduced without changing any other components in the system, i.e. the new parts would be compatible with the earlier vehicles. Thus the improvement might well be enjoyed by earlier vehicles also, as the friction elements wore out and were renewed (if the replacement parts were not obtained from after-market sources.)

Since vehicle manufacturers characteristically seek economies of scale, such changes were typically made on an entire range; not all of the models necessarily required the change to satisfy the Standard. It is also possible that the changes were precipitated by factors outside the scope of this study.

Imported vehicles, particularly the most numerous ones (Toyota), were studied, and no changes attributable to the Standard were identified (it was not considered reasonable to attribute to the Standard reductions in weight and cost).

3.4.1 Cost and Weight Data

Component cost summaries are presented in Appendix A and photographs of the components are presented in Appendix B. Titles for the Chrysler 1/2 ton truck and the Dodge 1/2 ton truck are interchangeable (i.e., they are the same vehicle). The Chrysler MPV is applicable to both the Plymouth and Dodge vehicle of that class.

Table 2 shows the changes in weight and cost of domestic vehicles. The weighted average changes are shown in Table 3.

All of the weights and costs shown in Table 2 are based on measurements made on actual disassembled components with the exception of the pads for disc brakes and the linings for drum brakes, when there were no other changes in the brake system. The cost data shown for the pads and linings were obtained directly from brake material suppliers, those who supply pads and linings to brake system manufacturers. These costs were then multiplied by the variable cost factor, the wholesale cost factor, and the dealer markup factor.

Table 4 presents the weight and cost data for the pads and linings. The dimensions were taken from manufacturers and from the Friction Materials Standards Institute Automotive Data Book. It is noted that the material densities for asbestos and non-asbestos quoted from pad and lining manufacturers varies from 0.065 $lb/in.^3$ to 0.080 $lb/in.^3$. Thus an effort was made to identify the particular vehicles and model years of the study. The values shown in Table 4 were used for all calculations and are considered to be good estimates.

As is shown in the notes on Table 2, the total cost increase for the Dodge 1/2 ton truck includes only one-half of the value for the servo. The decision for this was based on the fact that the servo was available as an option on the 1983 vehicle and thus the 1983 population would include some trucks with servo valves. The value of one-half is an estimate. The same discussion applies to the variable valve for the Ford 3/4 ton truck, except that it was estimated that 3/4 of the 1983 population would have the valve installed. If the

TABLE 2 WEIGHT AND COST DIFFERENTIALS

Make/Model	Market Share (Percent)	Sub-System	WEIGHT (lb) 1983	1984	Increase	COST ($) 1983	1984	Increase
CHRYSLER (DODGE)								
150 (1/2 ton)	9.10	Front Pads	1.2121	2.0986	0.8865	8.4472	12.6707	4.2235
	9.10	Rear Brakes	50.2940	64.5102	14.2162	53.4115	60.7313	7.3198
	4.50	Servo	-	8.5384	8.5384	-	22.6461	22.6461
		Total	51.5061	75.1472	22.7546	61.8587	96.0481	34.1894*
350 (1 ton)	6.50	Front Pads	1.6257	2.8146	1.1889	11.3291	16.9936	5.6645
MPV	7.30	Variable Valve	-	1.5005	1.5005	-	17.0450	17.0450
FORD								
All Trucks	51.40	Warning Light	-	0.0290	0.0290	-	0.2480	0.2480
F-150 (1/2 ton)	2.60	Rear Shoes	1.4818	1.7694	0.2876	10.3268	11.3594	1.0326
F-250 (3/4 ton)	31.20	Front Pads	1.0330	1.2334	0.2004	7.1986	7.9185	0.7199
	31.20	Rear Shoes	1.7508	1.7997	0.0489	12.2006	12.5416	0.3410
	7.30	Variable Valve	-	2.9042	2.9042	-	7.0080	7.0080
		Total (F-250)	2.7838	5.9373	3.1535	19.3992	27.4681	8.0689**
F-350 (1 ton)	5.10	Front Pads	2.4371	2.9100	0.4729	17.1517	18.8670	1.7153
GMC (Incl. Chev.)								
1500 (1/2 ton)	16.00	Front Pads	1.1359	1.3562	0.2203	7.9153	11.8730	3.9577
2500 (3/4 ton)	3.90	Front Pads	1.1359	1.3562	0.2203	7.9153	11.8730	3.9577
	3.90	Variable Valve	-	3.0380	3.0380	-	9.5294	9.5294
		Total (2500)	1.1359	4.3942	3.2583	7.9153	21.4024	13.4871
3500 (1 ton)	2.20	Front Pads	1.3736	1.6401	0.2665	9.5719	14.3581	4.7862
	2.20	Variable Valve	-	3.0380	3.0380	-	7.8481	7.8481
		Total	1.3736	4.6781	3.3045	9.5719	22.2062	12.6343
700 (7 ton)	0.15	Front Brakes	247.1344	207.7712	-39.3632	188.9557	132.6873	-56.2684

NOTES: *-The value 34.1894 is equal to 1/2 of 22.6461 + 7.3198 + 4.2235.
**-The value 8.0689 is equal to 1/4 of 7.0080 + 0.3410 + 0.7199.

TABLE 3 WEIGHTED COST DIFFERENTIALS

Make/Model	Market Share (Percent)	Sub-System	COST ($) 1983	1984	Increase	Weighted Increase
CHRYSLER (DODGE)						
150 (1/2 ton)	9.10	Total	61.8587	96.0481	22.8664	2.080842
350 (1 ton)	6.50	Front Pads	11.3291	16.9936	5.6645	0.368193
MPV	7.30	Variable Valve	-	17.0450	17.0450	1.244285
FORD						
All Trucks	51.40	Warning Light	-	0.2480	0.2480	0.127472
F-150 (1/2 ton)	2.60	Rear Shoes	12.2006	12.5416	0.3410	0.008866
F-250 (3/4 ton)	31.20	Total	19.3992	27.4681	2.8129	0.877625
F-350 (1 ton)	5.10	Front Pads	17.1517	18.8670	1.7153	0.087480
GMC (Incl. Chev.)						
1500 (1/2 ton)	16.00	Front Pads	7.9153	11.8730	3.9577	0.633232
2500 (3/4 ton)	3.90	Total	7.9153	21.4024	13.4871	0.525997
3500 (1 ton)	2.20	Total	9.5719	22.2062	12.6343	0.277955
700 (7 ton)	0.15	Front Brakes	188.9557	132.6873	-56.2684	-0.084403
TOTALS	84.05		336.2975	377.3803	24.5038	6.147544
WEIGHTED AVERAGE						7.314153

values are not adjusted by some factor, then the weighted data in Table 3 would be misleading.

TABLE 4 PAD AND LINING VOLUME AND COST CALCULATIONS

DISK PADS

Vehicle Year/Make/Model	Pad Dimensions (in.) W	t	L	Qty	Volume ($In.^3$)	Material and Weight (lb) / Cost ($) Asbestos	Non-Asbestos	Semi-Metallic
1983/Chry/150	1.850	0.470	5.846	2	10.166	1.2121	-	-
	1.680	0.370	6.375	2	7.925			
					18.091	5.4275	-	-
1984/Chry/150	1.850	0.470	5.846	2	10.166	-	-	2.0986
	1.680	0.370	6.375	2	7.925			
					18.091	-	-	8.1412
1983/Chry/350	1.800	0.530	6.000	2	11.448	1.6257	-	-
	1.800	0.445	8.000	2	12.816			
					24.264	7.2792	-	-
1984/Chry/350	1.800	0.530	6.000	2	11.448	-	-	2.8146
	1.800	0.445	8.000	2	12.816			
					24.264	-	-	10.9188
1983/Ford/250	1.813	0.450	4.469	2	7.290	1.0330	-	-
	1.813	0.350	6.406	2	8.128			
					15.418	4.6253	-	-
1984/Ford/250	1.813	0.450	4.469	2	7.290	-	1.2334	-
	1.813	0.350	6.406	2	8.128			
					15.418	-	5.0878	-
1983/Ford/350	1.813	0.670	7.563	4	36.735	2.4371	-	-
						11.0205	-	-
1984/Ford/350	1.813	0.670	7.563	4	36.735	-	2.9100	-
						-	12.1225	-
1983/GMC/1500 and 2500	1.900	0.430	5.375	2	8.783	1.1359	-	-
	1.900	0.400	5.375	2	8.170			
					16.953	5.0858	-	-
1984/GMC/1500 and 2500	1.900	0.430	5.375	2	8.783	-	-	1.3562
	1.900	0.400	5.375	2	8.170			
					16.953	-	-	7.6287
1983/GMC/3500	1.930	0.465	6.140	2	11.021	1.3736	-	-
	1.930	0.400	6.140	2	9.480			
					20.501	6.1503	-	-
1984/GMC/3500	1.930	0.465	6.140	2	11.021	-	-	1.6401
	1.930	0.400	6.140	2	9.480			
					20.501	-	-	9.2254

TABLE 4 PAD AND LINING VOLUME AND COST CALCULATIONS (CONTINUED)

DRUM LININGS

Vehicle Year/Make/Model	Lining Dimensions (In.) D	W	t	L	Qty	Volume ($In.^3$)	Material and Weight (lb) / Cost ($) Asbestos	Non-Asbestos	Semi-Metallic
1983/Ford/150	11	2.250	0.203	10.625	2	9.366	1.4818	-	-
		2.250	0.281	10.625	2	12.751			
						22.117	6.6352	-	-
1984/Ford/150	11	2.250	0.203	10.625	2	9.366	-	1.7694	-
		2.250	0.281	10.625	2	12.751			
						22.117	-	7.2987	-
1983/Ford/250	12	2.500	0.188	11.625	2	10.558	1.7508	-	-
		2.500	0.250	13.000	2	15.573			
						26.131	7.8392	-	-
1984/Ford/250	12	2.500	0.203	11.060	2	10.846	1.7997	-	-
		2.500	0.266	12.600	2	16.015			
						26.861	8.0583		

NOTES: 1. Asbestos = 0.067 lb/in ; non-asbestos = 0.080 lb/in ; semi-metallic = 0.116 lb/in .
2. Costs to OEM, factored by 1.2048, 1.3370, and 1.1359 to give consumer costs shown in Table 2.

APPENDIX A

COMPONENT SUMMARY SHEETS

Component parts summaries are presented in this Appendix. The order of presentation follows the order of summary data presented in Table 2.

Component

1983 Dodge 150, Rear Brake
1984 Dodge 150, Rear Brake
1984 Dodge 150, Brake Servo
1984 Dodge Multi-Purpose, Variable Proportioning Valve and Linkage
1984 Ford, Emergency Brake Warning Switch
1984 Ford F-250, Binary Proportioning Valve and Linkage
1984 G.M.C. 2500, Binary Proportioning Valve and Linkage
1984 G.M.C. 3500, Binary Proportioning Valve and Linkage
1983 G.M.C. 7000, Front Brake
1984 G.M.C. 7000, Front Brake

MACRO % COSTING
DEALER DISCOUNT -- 11.970%
OUTSIDE VENDOR MARKUP -- 10.0%

VARIABLE COST FACTOR -- 1.6248
VOLUME -- 350,000
RUN ECONOMICS -- 1983

WHOLESALE COST FACTOR -- 1.3270

	REQ PER VEH	MATL	WEIGHT	TOOLING ($000)	COST PER UNIT ($) VARIABLE COST MATL	LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHOLESALE COST	DEALER MARKUP	CONSUMER COST
05 BRAKE SYSTEM												
05-01 SERVICE BRAKE												
05-01-011												
					0.7956	0.1578	0.6346	1.5880	0.1583	1.7468		
001 WEB BRAKE SHOE,REAR	2	CRS1	1.0000	61	1.7901	0.0000	0.0000	1.7901	0.6033	2.3934	0.3254	2.7188
					0.4772	0.1052	0.3206	0.9030	0.0703	0.9733		
002 FLANGE BRAKE SHOE,REAR	2	CRS1	1.2000	46	1.0179	0.0000	0.0000	1.0179	0.3430	1.3609	0.1851	1.5460
					2.3306	0.0000	0.0000	2.3806	0.2381	2.6187		
003 LINING BRAKE,REAR	2	BRLI	0.3000	0	2.6836	0.0000	0.0000	2.6836	0.9044	3.5880	0.4879	4.0759
					0.0104	0.1990	0.4522	0.6606	0.0661	0.7267		
000 ASM SHOE BRAKE,REAR	2	****	0.0000	205	0.7447	0.0000	0.0000	0.7447	0.2510	0.9957	0.1354	1.1311
*** SUBASSEMBLY TOTAL			2.5000	312	6.2363	0.0000	0.0000	6.2363	2.1017	8.3380	1.1338	9.4718
05-01-012												
					0.7956	0.1578	0.6346	1.5880	0.1583	1.7468		
001 WEB BRAKE SHOE,REAR	2	CRS1	1.0000	61	1.7901	0.0000	0.0000	1.7901	0.6033	2.3934	0.3254	2.7188
					0.4772	0.1052	0.3206	0.9030	0.0703	0.9733		
002 FLANGE BRAKE SHOE,REAR	2	CRS1	1.2000	46	1.0179	0.0000	0.0000	1.0179	0.3430	1.3609	0.1851	1.5460
					3.3038	0.0000	0.0000	3.3038	0.3009	4.1897		
003 LINING BRAKE,REAR	2	BRLI	0.5000	0	4.2936	0.0000	0.0000	4.2936	1.4469	5.7405	0.7806	6.5211
					0.0104	0.1990	0.4522	0.6606	0.0661	0.7267		
000 ASM SHOE BRAKE,REAR	2	****	0.0000	205	0.7447	0.0000	0.0000	0.7447	0.2510	0.9957	0.1354	1.1311
*** SUBASSEMBLY TOTAL			2.7000	312	7.8463	0.0000	0.0000	7.8463	2.6442	10.4905	1.4265	11.9170
05-01-013												
001 DRUM BRAKE,REAR,DIAPHRAGM	2	CRS1	5.0000	51	1.6306	0.1053	0.1390	1.8754	0.6320	2.5074	0.3409	2.8483
002 DRUM BRAKE,REAR,HEAT SINK	2	NCIR	30.0000	102	5.0174	3.1506	4.4334	12.6514	4.2635	16.9149	2.3000	19.2149
000 DRUM BRAKE,REAR ASM	2	****	0.0000	0	0.0644	0.2830	0.5469	0.8942	0.3013	1.1955	0.1626	1.3581
*** SUBASSEMBLY TOTAL			35.0000	153	6.7124	3.5394	5.1692	15.4210	5.1968	20.6178	2.8035	23.4213
05-01-010												
					1.0348	0.0000	0.0000	1.0348	0.1035	1.1383		
001 SPRING BRAKE SHOE,TENSION	4	SPWI	0.2200	0	1.1665	0.0000	0.0000	1.1665	0.3931	1.5596	0.2121	1.7717
05-01-014												
					2.2724	0.0946	0.2218	2.5888	0.2589	2.8477		
001 BACKPLATE BRAKE PLATE	2	CRS2	7.9000	77	2.9183	0.0000	0.0000	2.9183	0.9835	3.9018	0.5306	4.4324
					0.3220	0.0140	0.0278	0.3638	0.0364	0.4002		
002 BACKPLATE BRAKE PAD	2	CRS2	1.2760	10	0.4101	0.0000	0.0000	0.4101	0.1382	0.5483	0.0746	0.6229
					0.1766	0.1322	0.4596	0.7684	0.0768	0.8452		

MACRO % COSTING
DEALER DISCOUNT -- 11.970%
OUTSIDE VENDOR MARKUP -- 10.0%

VARIABLE COST FACTOR -- 1.0243
VOLUME -- 350,000
RUN ECONOMICS -- 1993

WHOLESALE COST FACTOR -- 1.3470

	REQ PER VEH	MATL	WEIGHT	TOOLING ($000)	COST PER UNIT ($) MATL	VARIABLE COST LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHSALE COST	DEALER MARKUP	CUSTOMER COST
003 BACKPLATE BRAKE POST	2	CRS2	0.6700	41	0.8662	0.0000	0.0000	0.8662	0.2919	1.1581	0.1575	1.3156
					0.0000	0.0950	0.1730	0.2680	0.0243	0.2348		
000 BACKPLATE BRAKE ASM	2	****	0.0000	10	0.3021	0.0000	0.0000	0.3021	0.1013	0.4033	0.0549	0.4583
*** SUBASSEMBLY TOTAL			10.0740	138	5.6632	0.0000	0.0000	5.6632	1.9085	7.5717	1.0297	8.6014
TOTAL: 01 SERVICE BRAKE			50.2940	915	26.4582	3.5394	5.1692	35.1668	11.8512	47.0180	6.3935	53.4115
TOTAL: 05 BRAKE SYSTEM			50.2940	915	26.4582	3.5394	5.1692	35.1668	11.8512	47.0180	6.3935	53.4115
*** GRAND TOTALS ***			50.2940	915	26.4582	3.5394	5.1692	35.1668	11.8512	47.0180	6.3935	53.4115

COMPONENT COST SUMMARY OF 1984 DODGE 1/2 TON TRUCK P-404

MACRO % COSTING
DEALER DISCOUNT -- 11.970%
OUTSIDE VENDOR MARKUP -- 10.0%

VARIABLE COST FACTOR -- 1.0248
VOLUME -- 350,000
RUN ECONOMICS -- 1983

MIDDLEMAN COST FACTOR = 1.2370

	REQ PER VEH	MATL	WEIGHT	TOOLING ($000)	COST PER UNIT ($) MATL	VARIABLE COST LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHSALE COST	DEALER MARKUP	CONSUMER COST
05 BRAKE SYSTEM												
05-01 SERVICE BRAKE												
05-01-011												
					1.0608	0.1578	0.6346	1.8532	0.1853	2.0385		
001 WEB BRAKE SHOE,REAR	2	CRS1	1.6000	61	2.0891	0.0000	0.0000	2.0891	0.7040	2.7931	0.3798	3.1729
					0.5304	0.1052	0.3206	0.9562	0.0956	1.0518		
002 FLANGE BRAKE SHOE,REAR	2	CRS1	1.4000	46	1.0779	0.0000	0.0000	1.0779	0.3633	1.4412	0.1960	1.6372
					2.8566	0.0000	0.0000	2.8566	0.2857	3.1423		
003 LINING BRAKE,REAR	2	BRLI	0.5800	0	3.2202	0.0000	0.0000	3.2202	1.0852	4.3054	0.5854	4.8908
					0.0104	0.1980	0.4522	0.6606	0.0661	0.7267		
000 ASM SHOE BRAKE,REAR	2	****	0.0000	10	0.7447	0.0000	0.0000	0.7447	0.2510	0.9957	0.1354	1.1311
*** SUBASSEMBLY TOTAL			3.5800	117	7.1319	0.0000	0.0000	7.1319	2.4035	9.5354	1.2966	10.8320
05-01-012												
					1.0603	0.1578	0.6346	1.8532	0.1853	2.0385		
001 WEB BRAKE SHOE,REAR	2	CRS1	1.6000	61	2.0891	0.0000	0.0000	2.0891	0.7040	2.7931	0.3798	3.1729
					0.5304	0.1052	0.3206	0.9562	0.0956	1.0518		
002 FLANGE BRAKE SHOE,REAR	2	CRS1	1.4000	46	1.0779	0.0000	0.0000	1.0779	0.3633	1.4412	0.1960	1.6372
					4.5956	0.0000	0.0000	4.5956	0.4596	5.0552		
003 LINING BRAKE,REAR	2	BRLI	0.8600	0	5.1806	0.0000	0.0000	5.1806	1.7459	6.9265	0.9418	7.8683
					0.0104	0.1980	0.4522	0.6606	0.0661	0.7267		
000 SHOE BRAKE,REAR ASM	2	****	0.0000	0	0.7447	0.0000	0.0000	0.7447	0.2510	0.9957	0.1354	1.1311
*** SUBASSEMBLY TOTAL			3.8600	107	9.0923	0.0000	0.0000	9.0923	3.0642	12.1565	1.6530	13.8095
05-01-013												
001 DRUM BRAKE,REAR,DIAPHRAGM	2	CRS1	6.0000	51	1.9024	0.1053	0.1370	2.1472	0.7236	2.8708	0.3904	3.2612
002 DRUM BRAKE,REAR,HEAT SINK	2	NCIR	38.7500	102	6.2718	3.1506	4.4933	13.9057	4.6862	18.5919	2.5291	21.1209
000 DRUM BRAKE,REAR ASM	2	****	0.0000	0	0.0356	0.2330	0.5470	0.8156	0.2986	1.2242	0.1665	1.3907
*** SUBASSEMBLY TOTAL			44.7500	153	8.2598	3.5394	5.1693	16.9685	5.7184	22.6869	3.0859	25.7719
05-01-010												
					1.2420	0.0000	0.0000	1.2420	0.1242	1.3662		
002 SPRING BRAKE SHOE,TENSION	4	SPWI	0.2732	0	1.4001	0.0000	0.0000	1.4001	0.4718	1.8719	0.2545	2.1264
					0.0378	0.0000	0.0000	0.0378	0.0038	0.0416		
003 CABLE ADJUSTER,BRAKE	2	CRS1	0.0060	0	0.0426	0.0000	0.0000	0.0426	0.0144	0.0570	0.0078	0.0648
05-01-014												
					3.0300	0.0946	0.2218	3.3464	0.3346	3.6810		
001 BACKPLATE BRAKE PLATE	2	CRS2	10.0750	512	3.7723	0.0000	0.0000	3.7723	1.2713	5.0436	0.6858	5.7294
					0.3220	0.0140	0.0278	0.3638	0.0364	0.4002		

COMPONENT COST SUMMARY OF 1934 DODGE 1/2 TON TRUCK P-404

MACPO % COSTING
DEALER DISCOUNT -- 11.970%
OUTSIDE VENDOR MARKUP -- 10.0%

VARIABLE COST FACTOR -- 1.0240
VOLUME -- 350,000
RUN ECONOMICS -- 1983

WHOLESALE COST FACTOR -- 1.3370

	REQ PER VEH	MATL	WEIGHT	TOTAL TOOLING ($000)	COST PER UNIT ($) VARIABLE COST MATL	LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHSALE COST	DEALER MARKUP	CONSUMER COST
002 BACKPLATE BRAKE PAD	2	CR32	1.2760	10	0.4101	0.0000	0.0000	0.4101	0.1382	0.5483	0.0746	0.6229
					0.1766	0.1322	0.4596	0.7684	0.0768	0.8452		
003 BACKPLATE BRAKE POST	2	CRS2	0.6900	41	0.8662	0.0000	0.0000	0.8662	0.2919	1.1581	0.1575	1.3156
					0.0000	0.0950	0.1730	0.2680	0.0268	0.2948		
000 BACKPLATE BRAKE ASM	2	****	0.0000	1	0.3021	0.0000	0.0000	0.3021	0.1018	0.4037	0.0549	0.4586
*** SUBASSEMBLY TOTAL			12.3202	564	6.7934	0.0000	0.0000	6.7934	2.2874	9.0328	1.2351	10.3179
TOTAL: 01 SERVICE BRAKE			64.5102	941	31.2774	3.5394	5.1693	39.9861	13.4755	53.4616	7.2697	60.7313
TOTAL: 05 BRAKE SYSTEM			64.5102	941	31.2774	3.5394	5.1693	39.9861	13.4755	53.4616	7.2697	60.7313
*** GRAND TOTALS ***			64.5102	941	31.2774	3.5394	5.1693	39.9861	13.4755	53.4616	7.2697	60.7313

COMPONENT COST SUMMARY OF 1984 CHRYSLER 1/2 TON

MACRO % COSTING — VARIABLE COST FACTOR -- 1.0248 — WHOLESALE COST FACTOR -- 1.3370
DEALER DISCOUNT -- 11.970% — VOLUME -- 350,000
OUTSIDE VENDOR MARKUP -- 10.0% — RUN ECONOMICS -- 1983

	REQ PER VEH	MATL	WEIGHT	TOOLING ($000)	COST PER UNIT ($) VARIABLE COST MATL	LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHSALE COST	DEALER MARKUP	CONSUMER COST
05 BRAKE SYSTEM												
05-01 SERVICE BRAKE												
05-01-011												
					0.0053	0.0491	0.1091	0.1635	0.0164	0.1799		
001 SERVO, SCREW	1	STBC	0.0176	5	0.1844	0.0000	0.0000	0.1844	0.0621	0.2465	0.0335	0.2900
					0.0001	0.0020	0.0038	0.0059	0.0006	0.0065		
002 SERVO, SPRING CLIP	1	SSHR	0.0003	10	0.0067	0.0000	0.0000	0.0067	0.0023	0.0090	0.0012	0.0102
					0.1866	0.1673	0.4436	0.7975	0.0798	0.8773		
003 SERVO, PUSH ROD	1	STBA	0.1519	2	0.8991	0.0000	0.0000	0.8991	0.3030	1.2021	0.1635	1.3656
					0.0036	0.0234	0.0384	0.0654	0.0065	0.0719		
004 SERVO, PLUG	1	RUBB	0.0077	5	0.0737	0.0000	0.0000	0.0737	0.0248	0.0985	0.0134	0.1119
					0.9885	0.1171	0.2322	1.3378	0.1338	1.4716		
005 SERVO, PISTON	1	ACRY	1.1250	102	1.5081	0.0000	0.0000	1.5081	0.5082	2.0163	0.2742	2.2905
					0.0093	0.0195	0.0385	0.0673	0.0067	0.0740		
006 SERVO, CLIP	1	CRS2	0.0374	2	0.0758	0.0000	0.0000	0.0758	0.0255	0.1013	0.0138	0.1151
					0.0397	0.1190	0.3323	0.4910	0.0491	0.5401		
007 SERVO, COUPLING	1	STBC	0.0600	1	0.5535	0.0000	0.0000	0.5535	0.1865	0.7400	0.1006	0.8406
					0.0517	0.0000	0.0000	0.0517	0.0052	0.0569		
008 SERVO, SPRING, OUTER	1	SPWI	0.0220	0	0.0583	0.0000	0.0000	0.0583	0.0196	0.0779	0.0106	0.0885
					0.0310	0.0000	0.0000	0.0310	0.0031	0.0341		
009 SERVO, SPRING, INNER	1	SPWI	0.0055	0	0.0349	0.0000	0.0000	0.0349	0.0118	0.0467	0.0064	0.0531
					0.0031	0.0118	0.0229	0.0378	0.0038	0.0416		
010 SERVO, SLEEVE	1	CRS2	0.0110	10	0.0426	0.0000	0.0000	0.0426	0.0144	0.0570	0.0078	0.0648
					0.0147	0.0117	0.0224	0.0488	0.0049	0.0537		
011 SERVO, CAP	1	POLY	0.0176	12	0.0550	0.0000	0.0000	0.0550	0.0185	0.0735	0.0100	0.0835
					0.0018	0.0118	0.0229	0.0365	0.0037	0.0402		
012 SERVO, CUP	1	CRS2	0.0055	12	0.0412	0.0000	0.0000	0.0412	0.0139	0.0551	0.0075	0.0626
					0.0092	0.2237	0.6465	0.8794	0.0879	0.9673		
013 SERVO, SHAFT	1	STBC	0.0308	8	0.9913	0.0000	0.0000	0.9913	0.3341	1.3254	0.1802	1.5056
					0.0102	0.1407	0.1637	0.3146	0.0315	0.3461		
001 SERVO, SUB-ASSEMBLY	1	****	0.0000	15	0.3547	0.0000	0.0000	0.3547	0.1195	0.4742	0.0645	0.5387
*** SUBASSEMBLY TOTAL			1.4923	184	4.8793	0.0000	0.0000	4.8793	1.6442	6.5235	0.8872	7.4107
05-01-012												
					0.0887	0.1403	0.2685	0.4975	0.0498	0.5473		
001 SERVO, SHROUD	1	URET	0.0330	20	0.5689	0.0000	0.0000	0.5689	0.1890	0.7499	0.1020	0.8519
					0.0013	0.0070	0.0115	0.0198	0.0020	0.0218		
002 SERVO, FILTER OUTER	1	VPLA	0.0022	8	0.0223	0.0000	0.0000	0.0223	0.0075	0.0298	0.0041	0.0339
					0.0026	0.0070	0.0115	0.0211	0.0021	0.0232		
003 SERVO, FILTER INNER	1	VPLA	0.0044	8	0.0238	0.0000	0.0000	0.0238	0.0080	0.0318	0.0043	0.0361
					0.0027	0.0113	0.0229	0.0374	0.0037	0.0411		
004 SERVO, RETAINER	1	CRS2	0.0110	10	0.0421	0.0000	0.0000	0.0421	0.0142	0.0563	0.0077	0.0640
					0.4099	0.0000	0.0000	0.4099	0.0410	0.4509		
005 SERVO, GLAND	1	POLY	0.0330	0	0.4621	0.0000	0.0000	0.4621	0.1557	0.6178	0.0840	0.7018
					0.9736	0.2609	0.9037	2.1382	0.2138	2.3520		

COMPONENT COST SUMMARY OF 1984 CHRYSLER 1/2 TON

MACRO % COSTING
DEALER DISCOUNT -- 11.970%
OUTSIDE VENDOR MARKUP -- 10.0%

VARIABLE COST FACTOR -- 1.0240
VOLUME -- 350,000
RUN ECONOMICS -- 1983

WHOLESALE COST FACTOR 1.3330

	REQ PER VEH	MATL	WEIGHT	TOTAL TOOLING ($000)	COST PER UNIT ($) VARIABLE COST MATL	LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHSALE COST	DEALER MARKUP	CONSUMER COST
006 SERVO, BACKPLATE	1	CRS2	3.1250	29	2.4103	0.0000	0.0000	2.4103	0.8123	3.2226	0.4302	3.6608
					0.4657	0.0000	0.0000	0.4657	0.0466	0.5123		
007 SERVO, SPRING	1	SPWI	0.2577	0	0.5250	0.0000	0.0000	0.5250	0.1769	0.7019	0.0954	0.7973
					0.2734	0.0439	0.1230	0.4403	0.0440	0.4843		
008 SERVO, DIAPHRAGM	1	POLY	0.3238	41	0.4963	0.0000	0.0000	0.4963	0.1673	0.6636	0.0902	0.7538
					0.9665	0.2372	0.8324	2.0361	0.2036	2.2397		
009 SERVO, FACEPLATE	1	CRS2	2.8750	25	2.2952	0.0000	0.0000	2.2952	0.7735	3.0687	0.4173	3.4860
					0.0033	0.0189	0.0367	0.0589	0.0059	0.0648		
010 SERVO, DISC	1	GALV	0.0100	4	0.0664	0.0000	0.0000	0.0664	0.0224	0.0888	0.0121	0.1009
					0.1537	0.0000	0.0000	0.1537	0.0154	0.1691		
011 SERVO, SEAL	1	POLY	0.0110	0	0.1733	0.0000	0.0000	0.1733	0.0584	0.2317	0.0315	0.2632
					0.0205	0.6056	0.5306	1.1567	0.1157	1.2724		
002 SERVO, SUB-ASSEMBLY	1	****	0.0000	8	1.3040	0.0000	0.0000	1.3040	0.4394	1.7434	0.2371	1.9805
*** SUBASSEMBLY TOTAL			6.6861	153	8.3817	0.0000	0.0000	8.3817	2.8246	11.2063	1.5239	12.7302
05-01-013												
					0.0082	0.0234	0.0448	0.0764	0.0076	0.0840		
001 SERVO, GROMMET	1	POLY	0.0100	15	0.0361	0.0000	0.0000	0.0361	0.0290	0.1151	0.0157	0.1309
					0.5692	0.0000	0.0000	0.5692	0.0569	0.6261		
002 SERVO, REDUCING VALVE	1	DELR	0.0200	0	0.6416	0.0000	0.0000	0.6416	0.2162	0.8578	0.1166	0.9744
					0.0819	0.0000	0.0000	0.0819	0.0082	0.0901		
003 SERVO, HOSE	1	RUBB	0.3300	0	0.0923	0.0000	0.0000	0.0923	0.0311	0.1234	0.0168	0.1402
					0.0000	0.0473	0.0582	0.1055	0.0106	0.1161		
003 SERVO,SUB-ASSEMBLY	1	****	0.0000	0	0.1190	0.0000	0.0000	0.1190	0.0401	0.1591	0.0216	0.1807
*** SUBASSEMBLY TOTAL			0.3600	15	0.9390	0.0000	0.0000	0.9390	0.3164	1.2554	0.1707	1.4261
05-01-010												
					0.1230	0.2345	0.2728	0.6303	0.0630	0.6933		
000 SERVO, ASSEMBLE	1	****	0.0000	0	0.7105	0.0000	0.0000	0.7105	0.2394	0.9499	0.1292	1.0791
*** SUBTOTAL			0.0000	0	0.7105	0.0000	0.0000	0.7105	0.2394	0.9499	0.1292	1.0791
**** TOTAL ASSEMBLY			8.5384	352	14.9105	0.0000	0.0000	14.9105	5.0246	19.9351	2.7110	22.6461
TOTAL: 01 SERVICE BRAKE			8.5384	352	14.9105	0.0000	0.0000	14.9105	5.0246	19.9351	2.7110	22.6461
TOTAL: 05 BRAKE SYSTEM			8.5384	352	14.9105	0.0000	0.0000	14.9105	5.0246	19.9351	2.7110	22.6461
*** GRAND TOTALS ***			8.5384	352	14.9105	0.0000	0.0000	14.9105	5.0246	19.9351	2.7110	22.6461

MACRO % COSTING
DEALER DISCOUNT -- 11.92%
OUTSIDE VENDOR MARKUP -- 10.0%

VARIABLE COST FACTOR 1.0240
VOLUME -- 350,000
RUN ECONOMICS -- 1983

WHOLESALE COST FACTOR 1.1250

	REQ PER VEH	MATL	WEIGHT	TOTAL TOOLING ($000)	COST PER UNIT ($) VARIABLE COST MATL	LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHOLESALE COST	DEALER MARKUP	CONSUMER COST
05 BRAKE SYSTEM												
05-01 SERVICE BRAKE												
05-01-011												
					0.0580	0.0000	0.0000	0.0580	0.0059	0.0639		
001 VALVE, PROPORTIONING, SPRING	1	SPWI	0.0242	0	0.0654	0.0000	0.0000	0.0654	0.0220	0.0874	0.0112	0.0993
					0.0043	0.0470	0.1158	0.1670	0.0168	0.1844		
002 VALVE, PROPORTIONING, SCREW	1	STBA	0.0165	31	0.1890	0.0000	0.0000	0.1950	0.0637	0.2587	0.0344	0.2871
					0.0590	0.0378	0.0721	0.1679	0.0168	0.1847		
003 VALVE, PROPORTIONING, LEVER	1	CRS2	0.1420	51	0.1893	0.0000	0.0000	0.1893	0.0638	0.2531	0.0344	0.2875
					0.0022	0.0235	0.0430	0.0687	0.0069	0.0756		
004 VALVE, PROPORTIONING, GUIDE	1	HRST	0.0091	10	0.0775	0.0000	0.0000	0.0775	0.0261	0.1036	0.0141	0.1177
					0.0484	0.1690	0.5274	0.7448	0.0745	0.8193		
005 VALVE, PROPORTIONING, SPINDL	2	STST	0.0440	5	0.8396	0.0000	0.0000	0.8396	0.2829	1.1225	0.1526	1.2751
					0.0013	0.0280	0.0460	0.0753	0.0076	0.0824		
006 VALVE, PROPORTIONING, CAP	2	RUBB	0.0040	20	0.0855	0.0000	0.0000	0.0855	0.0288	0.1143	0.0155	0.1298
					0.0150	0.1603	0.2382	0.4140	0.0414	0.4554		
007 VALVE, PROPORTIONING, SEAT	2	PHET	0.0220	102	0.4667	0.0000	0.0000	0.4667	0.1573	0.6240	0.0849	0.7089
					0.0040	0.0094	0.0154	0.0288	0.0029	0.0317		
008 VALVE, PROPORTIONING, RING	2	POLY	0.0040	10	0.0325	0.0000	0.0000	0.0325	0.0110	0.0435	0.0059	0.0494
					0.0074	0.1150	0.1836	0.3060	0.0306	0.3366		
009 VALVE, PROPORTIONING, CUP	2	PMET	0.0110	82	0.3449	0.0000	0.0000	0.3449	0.1162	0.4611	0.0627	0.5239
					0.0018	0.0046	0.0076	0.0140	0.0014	0.0154		
010 VALVE, PROPORTIONING, SEAL	2	POLY	0.0022	10	0.0158	0.0000	0.0000	0.0158	0.0053	0.0211	0.0029	0.0240
					0.0218	0.0140	0.0230	0.0588	0.0059	0.0647		
011 VALVE, PROPORTIONING, PACKIN	2	POLY	0.0264	20	0.0663	0.0000	0.0000	0.0663	0.0223	0.0886	0.0120	0.1006
					0.0000	0.0744	0.2664	0.3408	0.0341	0.3749		
012 VALVE, PROPOPTIONING, GLAND	2	ABAR	0.0396	8	0.4067	0.0000	0.0000	0.4067	0.1371	0.5438	0.0739	0.6177
					0.0056	0.0140	0.0230	0.0426	0.0043	0.0469		
013 VALVE, PROPORTIONING, GASKET	2	POLY	0.0060	10	0.0481	0.0000	0.0000	0.0481	0.0162	0.0643	0.0087	0.0730
					0.3035	0.3605	0.6078	1.2783	0.1279	1.4062		
014 VALVE, PROPORTIONING, BODY	1	AEXT	0.2500	10	1.4416	0.0000	0.0000	1.4416	0.4958	1.9374	0.2621	2.1995
					0.0051	0.0014	0.0422	1.2437	0.1249	1.3736		
001 VALVE, PROPORTIONING, ASSEMB	1	****	0.0000	10	1.4077	0.0000	0.0000	1.4077	0.4744	1.8821	0.2559	2.1380
*** SUBASSEMBLY TOTAL			0.6010	379	5.6766	0.0000	0.0000	5.6766	1.9129	7.5895	1.0318	8.6213
05-01-012												
					0.6003	0.0000	0.0000	0.6003	0.0680	0.6683		
001 VALVE, PROPORTIONING, SPRING	1	SPWI	0.3799	0	0.6767	0.0000	0.0000	0.6767	0.2280	0.9047	0.1230	1.0277
					0.0306	0.0053	0.0076	0.0960	0.0096	0.1056		
002 VALVE, PROPORTIONING, RET	1	NYLN	0.0441	12	0.1082	0.0000	0.0000	0.1082	0.0365	0.1447	0.0197	0.1644
					0.1087	0.0070	0.0115	0.1272	0.0127	0.1399		
003 VALVE, PROPORTIONING, BUSH	1	NYLN	0.0595	15	0.1434	0.0000	0.0000	0.1434	0.0483	0.1917	0.0261	0.2178
05-01-013												

COMPONENT COST SUMMARY OF 1984 DODGE/CHRY. MPV

MACRO % COSTING
DEALER DISCOUNT -- 11.970%
OUTSIDE VENDOR MARKUP -- 10.0%

VARIABLE COST FACTOR -- 1.0248
VOLUME -- 350,000
RUN ECONOMICS -- 1983

WHOLESALE COST FACTOR -- 1.3430

	PEQ PER VEH	MATL	WEIGHT	TOTAL TOOLING ($000)	COST PER UNIT ($) VARIABLE COST MATL	LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHSALE COST	DEALER MARKUP	CONSUMER COST
					0.0320	0.0142	0.0275	0.1237	0.0124	0.1361		
001 VALVE, PROPORTIONING, ADJUST	1	GALV	0.1800	15	0.1395	0.0000	0.0000	0.1395	0.0470	0.1865	0.0254	0.2119
					0.0424	0.0118	0.0229	0.0771	0.0077	0.0848		
002 VALVE, PROPORTIONING, CRANK	1	GALV	0.1250	12	0.0869	0.0000	0.0000	0.0869	0.0293	0.1162	0.0158	0.1320
					0.0818	0.0000	0.0000	0.0818	0.0082	0.0900		
003 VALVE, PROP. SCREW PAIR	2	STBC	0.1120	0	0.0922	0.0000	0.0000	0.0922	0.0311	0.1233	0.0168	0.1401
					0.0052	0.1930	0.3423	0.5455	0.0546	0.6001		
002 VALVE, PROP. ASM	1	XXXX	0.0000	0	0.6150	0.0000	0.0000	0.6150	0.2073	0.8223	0.1118	0.9341
XXX SUBASSEMBLY TOTAL			0.8995	54	1.8619	0.0000	0.0000	1.8619	0.6275	2.4894	0.3386	2.8280
05-01-010												
000 VALVE, PROP. ASM FINAL	1	XXXX	0.0000	1	0.0420	0.7055	2.9368	3.6843	1.2416	4.9259	0.6698	5.5957
XXX SUBTOTAL			0.0000	1	0.0420	0.7055	2.9368	3.6843	1.2416	4.9259	0.6698	5.5957
XXXX TOTAL ASSEMBLY			1.5005	434	7.5305	0.7055	2.9368	11.2228	3.7820	15.0048	2.0402	17.0450
TOTAL: 01 SERVICE BRAKE			1.5005	434	7.5805	0.7055	2.9368	11.2228	3.7820	15.0048	2.0402	17.0450
TOTAL: 05 BRAKE SYSTEM			1.5005	434	7.5805	0.7055	2.9368	11.2228	3.7820	15.0048	2.0402	17.0450
XXX GRAND TOTALS XXX			1.5005	434	7.5305	0.7055	2.9368	11.2228	3.7820	15.0048	2.0402	17.0450

MACRO % COSTING
DEALER DISCOUNT -- 11.970%
OUTSIDE VENDOR MARKUP -- 10.0%

VARIABLE COST FACTOR -- 1.0248
VOLUME -- 350,000
RUN ECONOMICS -- 1983

WHOLESALE COST FACTOR -- 1.3370

	REQ PER VEH	MATL	WEIGHT	TOTAL TOOLING ($000)	COST PER UNIT ($) VARIABLE COST MATL	LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHSALE COST	DEALER MARKUP	CONSUMER COST
05 BRAKE SYSTEM												
05-01 SERVICE BRAKE												
05-01-011												
					0.0067	0.0014	0.0034	0.0115	0.0012	0.0127		
001 SWITCH, WARNING LIGHT, BASE	1	HRST	0.0200	41	0.0130	0.0000	0.0000	0.0130	0.0044	0.0174	0.0024	0.0198
					0.0010	0.0014	0.0034	0.0058	0.0006	0.0064		
002 SWITCH, WARNING LIGHT, TRMNL	1	HRST	0.0030	20	0.0066	0.0000	0.0000	0.0066	0.0022	0.0088	0.0012	0.0100
					0.0074	0.0014	0.0028	0.0116	0.0012	0.0128		
003 SWITCH, WARNING LIGHT, PLNGR	1	NYLN	0.0030	1	0.0131	0.0000	0.0000	0.0131	0.0044	0.0175	0.0024	0.0199
					0.0103	0.0000	0.0000	0.0103	0.0010	0.0113		
004 SWITCH, WARNING LIGHT, SPRIN	1	SPWI	0.0030	0	0.0116	0.0000	0.0000	0.0116	0.0039	0.0155	0.0021	0.0176
					0.0000	0.0473	0.0582	0.1055	0.0106	0.1161		
000 SWITCH,WARNING LIGHT ASM	1	****	0.0000	0	0.1190	0.0000	0.0000	0.1190	0.0401	0.1591	0.0216	0.1807
*** SUBASSEMBLY TOTAL			0.0290	62	0.1633	0.0000	0.0000	0.1633	0.0550	0.2183	0.0297	0.2480
TOTAL: 01 SERVICE BRAKE			0.0290	62	0.1633	0.0000	0.0000	0.1633	0.0550	0.2183	0.0297	0.2480
TOTAL: 05 BRAKE SYSTEM			0.0290	62	0.1633	0.0000	0.0000	0.1633	0.0550	0.2183	0.0297	0.2480
*** GRAND TOTALS ***			0.0290	62	0.1633	0.0000	0.0000	0.1633	0.0550	0.2183	0.0297	0.2480

MACRO % COSTING
DEALER DISCOUNT -- 11.970%
OUTSIDE VENDOR MARKUP -- 10.0%

VARIABLE COST FACTOR -- 1.0240
VOLUME -- 350,000
RUN ECONOMICS -- 1983

WHOLESALE COST FACTOR -- 1.2370

	REQ PER VEH	MATL	WEIGHT	TOOLING ($000)	COST PER UNIT ($) VARIABLE COST MATL	LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHOLESALE COST	DEALER MARKUP	CONSUMER COST
05 BRAKE SYSTEM												
05-01 SERVICE BRAKE												
05-01-010												
					0.0525	0.0946	0.2218	0.3689	0.0369	0.4058		
001 BRACKET, VARIABLE PROPORTION	1	CRS1	1.1674	36	0.4159	0.0000	0.0000	0.4159	0.1402	0.5561	0.0756	0.6317
					0.0787	0.0195	0.0335	0.1367	0.0137	0.1504		
002 LINK, VARIABLE PROPORTIONING	1	CRS1	0.2850	10	0.1541	0.0000	0.0000	0.1541	0.0519	0.2060	0.0280	0.2340
					0.1262	0.0234	0.0462	0.1958	0.0196	0.2154		
003 LEVER, VARIABLE PROPORTIONIN	1	CRS2	0.4758	10	0.2207	0.0000	0.0000	0.2207	0.0744	0.2951	0.0401	0.3352
					0.0262	0.0036	0.0110	0.0409	0.0041	0.0449		
004 RIVET, VARIABLE PROPORTIONIN	2	STBC	0.1000	1	0.0460	0.0000	0.0000	0.0460	0.0155	0.0615	0.0084	0.0699
					0.0262	0.0094	0.0154	0.0510	0.0051	0.0561		
005 BUSHING, PROPORTIONING	2	URET	0.0100	41	0.0575	0.0000	0.0000	0.0575	0.0194	0.0769	0.0105	0.0874
					0.0047	0.0018	0.0043	0.0108	0.0011	0.0119		
006 CLIP, VARIABLE PROPORTIONING	1	SSHR	0.0080	31	0.0122	0.0000	0.0000	0.0122	0.0041	0.0163	0.0022	0.0185
					0.0146	0.0039	0.0064	0.0249	0.0025	0.0274		
007 INSERT, VARIABLE PROPORTIONI	1	NYLN	0.0080	46	0.0281	0.0000	0.0000	0.0281	0.0095	0.0376	0.0051	0.0427
					0.0205	0.0000	0.0000	0.0205	0.0021	0.0226		
000 LINKAGE, VARIABLE PROP.ASM	1	****	0.0000	0	0.0232	0.0000	0.0000	0.0232	0.0078	0.0310	0.0042	0.0352
*** SUBTOTAL			2.0542	175	0.9577	0.0000	0.0000	0.9577	0.3228	1.2805	0.1741	1.4546
**** TOTAL ASSEMBLY			2.0542	175	0.9577	0.0000	0.0000	0.9577	0.3228	1.2805	0.1741	1.4546
05-01-020												
					3.0744	0.0000	0.0000	3.0744	0.3074	3.3818		
001 VALVE, VARIABLE PROPORTIONIN	1	****	0.3500	0	3.4657	0.0000	0.0000	3.4657	1.1679	4.6336	0.6301	5.2637
*** SUBTOTAL			0.8500	0	3.4657	0.0000	0.0000	3.4657	1.1679	4.6336	0.6301	5.2637
**** TOTAL ASSEMBLY			0.3500	0	3.4657	0.0000	0.0000	3.4657	1.1679	4.6336	0.6301	5.2637
05-01-000												
000 VALVE, VARIABLE PROPORTION A	1	****	0.0000	0	0.0262	0.0176	0.1469	0.1907	0.0643	0.2550	0.0347	0.2897
TOTAL: 01 SERVICE BRAKE			2.9042	175	4.4496	0.0176	0.1469	4.6141	1.5550	6.1691	0.8389	7.0080
TOTAL: 05 BRAKE SYSTEM			2.9042	175	4.4496	0.0176	0.1469	4.6141	1.5550	6.1691	0.8389	7.0080
*** GRAND TOTALS ***			2.9042	175	4.4496	0.0176	0.1469	4.6141	1.5550	6.1691	0.8389	7.0080

COMPONENT COST SUMMARY OF 1990 G. M. C. 3/4 TON TRUCK

MACRO % COSTING
DEALER DISCOUNT -- 11.970%
OUTSIDE VENDOR MARKUP -- 10.0%

VARIABLE COST FACTOR -- 1.0248
VOLUME -- 350,000
RUN ECONOMICS -- 1983

WHOLESALE COST FACTOR -- 1.3000

	REQ PER VEH	MATL	WEIGHT	TOOLING ($000)	COST PER UNIT ($) VARIABLE COST MATL	LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHOLESALE COST	DEALER MARKUP	CONSUMER COST
05 BRAKE SYSTEM												
05-01 SERVICE BRAKE												
05-01-011												
					0.3711	0.1535	0.3376	0.8622	0.0862	0.9483		
001 BRACKET, VARIABLE PROPORTION	1	CRS2	1.2000	41	0.9719	0.0000	0.0000	0.9719	0.3275	1.2994	0.1767	1.4761
					0.0252	0.0140	0.0263	0.0650	0.0066	0.0726		
002 BOSS, BRACKET, PROPORTIONING	2	CRS2	0.1000	1	0.0744	0.0000	0.0000	0.0744	0.0251	0.0995	0.0135	0.1130
					0.0052	0.0574	0.1920	0.2566	0.0257	0.2823		
001 ASSY, BRACKET, PROPORTIONING	1	****	0.0000	0	0.2373	0.0000	0.0000	0.2373	0.0975	0.3348	0.0526	0.4394
*** SUBASSEMBLY TOTAL			1.3000	42	1.3356	0.0000	0.0000	1.3356	0.4501	1.7857	0.2428	2.0285
05-01-010												
					0.1489	0.0474	0.1253	0.3136	0.0314	0.3450		
001 LINK, VARIABLE PROPORTIONING	1	CRS2	0.5000	10	0.3536	0.0000	0.0000	0.3536	0.1192	0.4728	0.0643	0.5371
					0.0682	0.0474	0.1253	0.2409	0.0241	0.2650		
002 LEVER, VARIABLE PROPORTIONIN	1	CRS2	0.2600	359	0.2716	0.0000	0.0000	0.2716	0.0915	0.3631	0.0494	0.4125
					0.0216	0.0156	0.0256	0.0628	0.0063	0.0691		
003 BUSHING, PROPORTIONING	4	NYLN	0.0120	10	0.0709	0.0000	0.0000	0.0709	0.0239	0.0947	0.0129	0.1076
					0.0262	0.0036	0.0110	0.0408	0.0041	0.0449		
004 RIVET, VARIABLE PROPORTIONIN	2	STBC	0.1000	1	0.0460	0.0000	0.0000	0.0460	0.0155	0.0615	0.0084	0.0699
					0.0040	0.0013	0.0043	0.0101	0.0010	0.0111		
005 CLIP, VARIABLE PROPORTIONING	1	SSHR	0.0080	31	0.0114	0.0000	0.0000	0.0114	0.0038	0.0152	0.0021	0.0173
					0.0146	0.0039	0.0064	0.0249	0.0025	0.0274		
006 INSERT, VARIABLE PROPORTIONI	1	NYLN	0.0080	46	0.0281	0.0000	0.0000	0.0281	0.0095	0.0376	0.0051	0.0427
					0.0000	0.1583	0.2859	0.4442	0.0444	0.4886		
000 LEVER, VARIABLE PROP. ASM	1	****	0.0000	2	0.5007	0.0000	0.0000	0.5007	0.1687	0.6694	0.0910	0.7604
*** SUBTOTAL			0.8080	459	1.2822	0.0000	0.0000	1.2822	0.4321	1.7143	0.2332	1.9475
**** TOTAL ASSEMBLY			2.1080	501	2.6179	0.0000	0.0000	2.6178	0.8822	3.5000	0.4760	3.9760
05-01-020												
					3.0744	0.0000	0.0000	3.0744	0.3074	3.3818		
001 VALVE, VARIABLE PROPORTIONIN	1	****	0.8500	0	3.4657	0.0000	0.0000	3.4657	1.1679	4.6336	0.6301	5.2637
*** SUBTOTAL			0.8500	0	3.4657	0.0000	0.0000	3.4657	1.1679	4.6336	0.6301	5.2637
**** TOTAL ASSEMBLY			0.8500	0	3.4657	0.0000	0.0000	3.4657	1.1679	4.6336	0.6301	5.2637
05-01-000												
000 VALVE, VARIABLE PROPORTION A	1	****	0.0000	0	0.0262	0.0176	0.1469	0.1907	0.0643	0.2550	0.0347	0.2897
TOTAL: 01 SERVICE BRAKE			3.0330	501	6.1097	0.0176	0.1469	6.2742	2.1144	8.3886	1.1408	9.5294

COMPONENT COST SUMMARY OF 1984 G. M. C. 3/4 TON TRUCK

MACRO % COSTING
DEALER DISCOUNT -- 11.970%
OUTSIDE VENDOR MARKUP -- 10.0%

VARIABLE COST FACTOR -- 1.0248
VOLUME -- 350,000
RUN ECONOMICS -- 1983

WHOLESALE COST FACTOR -- 1.3370

	REQ PER VEH	MATL WEIGHT	TOTAL TOOLING ($000)	COST PER UNIT ($) VARIABLE COST MATL	LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHSALE COST	DEALER MARKUP	CONSUMER COST
TOTAL: 05 BRAKE SYSTEM		3.0380	501	6.1097	0.0176	0.1469	6.2742	2.1144	8.3886	1.1408	9.5294
*** GRAND TOTALS ***		3.0380	501	6.1097	0.0176	0.1469	6.2742	2.1144	8.3886	1.1408	9.5294

MACRO % COSTING
DEALER DISCOUNT -- 11.970%
OUTSIDE VENDOR MARKUP -- 10.0%

VARIABLE COST FACTOR -- 1.0248
VOLUME -- 350,000
RUN ECONOMICS -- 1983

WHOLESALE COST FACTOR -- 1.3370

	REQ PER VEH	MATL	WEIGHT	TOTAL TOOLING ($000)	COST PER UNIT ($) VARIABLE COST MATL	LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHSALE COST	DEALER MARKUP	CONSUMER COST
05 BRAKE SYSTEM												
05-01 SERVICE BRAKE												
05-01-010												
					0.4418	0.0189	0.0573	0.5180	0.0518	0.5698		
001 BRCKT, VARIABLE PROPORTIONIN	1	CRS2	1.6000	46	0.5839	0.0000	0.0000	0.5839	0.1968	0.7807	0.1062	0.8869
					0.1388	0.0150	0.0620	0.2158	0.0216	0.2374		
002 LINK, VARIABLE PROPORTIONING	1	CRS2	0.5000	10	0.2433	0.0000	0.0000	0.2433	0.0820	0.3253	0.0442	0.3695
					0.0228	0.0156	0.0256	0.0640	0.0064	0.0704		
003 BUSHING, PROPORTIONING	4	NYLN	0.0120	10	0.0721	0.0000	0.0000	0.0721	0.0243	0.0964	0.0131	0.1095
					0.0262	0.0036	0.0110	0.0408	0.0041	0.0449		
004 RIVET, VARIABLE PROPORTIONIN	2	ST8C	0.1000	1	0.0460	0.0000	0.0000	0.0460	0.0155	0.0615	0.0084	0.0699
					0.0661	0.0150	0.0620	0.1431	0.0143	0.1574		
005 LEVER, VARIABLE PROPORTIONIN	1	CRS2	0.2600	10	0.1613	0.0000	0.0000	0.1613	0.0544	0.2157	0.0293	0.2450
					0.0146	0.0039	0.0064	0.0249	0.0025	0.0274		
006 INSERT, VARIABLE PROPORTION1	1	NYLN	0.0080	10	0.0281	0.0000	0.0000	0.0281	0.0095	0.0376	0.0051	0.0427
					0.0040	0.0018	0.0043	0.0101	0.0010	0.0111		
007 CLIP, VARIABLE PROPORTIONING	1	SSHR	0.0080	51	0.0114	0.0000	0.0000	0.0114	0.0038	0.0152	0.0021	0.0173
001 LEVER, PROPORTIONING, ASSY	1	XXXX	0.0000	0	0.0000	0.1770	0.1877	0.3647	0.1229	0.4876	0.0663	0.5539
XXX SUBTOTAL			2.4880	138	1.1461	0.1770	0.1877	1.5108	0.5092	2.0200	0.2747	2.2947
XXXX TOTAL ASSEMBLY			2.4880	138	1.1461	0.1770	0.1877	1.5108	0.5092	2.0200	0.2747	2.2947
05-01-020												
					3.0744	0.0000	0.0000	3.0744	0.3074	3.3818		
002 VALVE, VARIABLE PROPORTIONIN	1	XXXX	0.8500	0	3.4657	0.0000	0.0000	3.4657	1.1679	4.6336	0.6301	5.2637
XXX SUBTOTAL			0.8500	0	3.4657	0.0000	0.0000	3.4657	1.1679	4.6336	0.6301	5.2637
XXXX TOTAL ASSEMBLY			0.8500	0	3.4657	0.0000	0.0000	3.4657	1.1679	4.6336	0.6301	5.2637
05-01-000												
000 VALVE, VARIABLE PROPORTION A	1	XXXX	0.0000	0	0.0262	0.0176	0.1469	0.1907	0.0643	0.2550	0.0347	0.2897
TOTAL: 01 SERVICE BRAKE			3.3380	138	4.6380	0.1946	0.3346	5.1672	1.7414	6.9086	0.9395	7.8481
TOTAL: 05 BRAKE SYSTEM			3.3380	138	4.6380	0.1946	0.3346	5.1672	1.7414	6.9086	0.9395	7.8481
XXX GRAND TOTALS XXX			3.3380	138	4.6380	0.1946	0.3346	5.1672	1.7414	6.9086	0.9395	7.8481

COMPONENT COST SUMMARY OF 1984 G.M.C. 7 TON TRUCK P-4042

MACRO % COSTING
DEALER DISCOUNT -- 11.970%
OUTSIDE VENDOR MARKUP -- 10.0%

VARIABLE COST FACTOR -- 1.0248
VOLUME -- 350,000
RUN ECONOMICS -- 1983

WHOLESALE COST FACTOR -- 1.3370

	REQ PER VEH	MATL	WEIGHT	TOOLING ($000)	COST PER UNIT ($) VARIABLE COST MATL	LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHSALE COST	DEALER MARKUP	CONSUMER COST
05 BRAKE SYSTEM												
05-01 SERVICE BRAKE												
05-01-011												
					6.0690	2.3002	3.7542	12.3144	1.2314	13.5458		
001 BRAKE, FRONT, CALIPER	2	NCIR	42.0000	512	13.8317	0.0000	0.0000	13.8817	4.6781	18.5598	2.5237	21.0835
					1.5996	0.6876	1.6868	3.9760	0.3976	4.3736		
002 BRAKE, FRONT, PISTON	4	APIG	1.7532	51	4.4821	0.0000	0.0000	4.4821	1.5105	5.9926	0.8149	6.8075
					0.0364	0.0936	0.1536	0.2836	0.0284	0.3120		
003 BRAKE, FRONT, PISTON SEAL	4	POLY	0.0440	51	0.3197	0.0000	0.0000	0.3197	0.1077	0.4274	0.0581	0.4855
					0.1020	0.1404	0.2304	0.4728	0.0473	0.5201		
004 BRAKE, FRONT, PISTON SHROUD	4	POLY	0.1232	102	0.5330	0.0000	0.0000	0.5330	0.1796	0.7126	0.0969	0.8095
					0.0284	0.0056	0.0112	0.0452	0.0045	0.0497		
005 BRAKE, FRONT, SHROUD RETAINE	4	STST	0.0220	51	0.0509	0.0000	0.0000	0.0509	0.0172	0.0681	0.0093	0.0774
					0.0410	0.1564	0.1818	0.3792	0.0379	0.4171		
000 BRAKE, CALIPER, SLIDING, ASM	2	****	0.0000	51	0.4274	0.0000	0.0000	0.4274	0.1440	0.5714	0.0777	0.6491
*** SUBASSEMBLY TOTAL			43.9424	818	19.6948	0.0000	0.0000	19.6948	6.6371	26.3319	3.5806	29.9125
05-01-010												
001 BRAKE, CALIPER, SCREW	8	STBC	0.3168	51	0.0864	0.8408	1.4635	2.3907	0.8057	3.1964	0.4346	3.6310
002 HUB, FRONT	2	GRIR	74.0000	154	9.1126	6.3710	8.2497	23.7333	7.9981	31.7314	4.3147	36.0461
003 BRAKE, FRONT, ROTOR	2	NCIR	77.0000	512	9.9364	3.0472	4.1797	17.1543	5.7810	22.9353	3.1187	26.0540
004 BRAKE, FRONT, BOLT	10	STBC	1.7620	205	0.4890	1.7520	3.6844	5.9254	1.9969	7.9223	1.0772	8.9995
05-01-012												
					1.2604	0.2272	0.7260	2.2136	0.2214	2.4350		
001 BRAKE, FRONT, PAD	4	CRS1	3.7500	102	2.4954	0.0000	0.0000	2.4954	0.8409	3.3363	0.4537	3.7900
					8.3620	0.0000	0.0000	8.3620	0.8362	9.1982		
002 BRAKE, FRONT, PAD	4	BRLI	5.0000	0	9.4263	0.0000	0.0000	9.4263	3.1767	12.6030	1.7137	14.3167
					4.0992	0.0000	0.0000	4.0992	0.4099	4.5091		
003 BRAKE, FRONT, PAD	4	BRLI	2.0000	0	4.6209	0.0000	0.0000	4.6209	1.5572	6.1781	0.8401	7.0182
					0.0000	0.1408	0.1636	0.3044	0.0304	0.3348		
007 BRAKE, FRONT,PAD,ASM	4	****	0.0000	102	0.3431	0.0000	0.0000	0.3431	0.1156	0.4587	0.0624	0.5211
*** SUBASSEMBLY TOTAL			163.8288	1126	36.5101	12.0110	17.5693	66.0894	22.2721	88.3615	12.0151	100.3766
05-01-000												
000 BRAKE, FRONT, FINAL ASM	2	****	0.0000	5	0.1680	1.4110	0.0000	1.5790	0.5321	2.1111	0.2871	2.3982
TOTAL: 01 SERVICE BRAKE			207.7712	1949	56.3729	13.4220	17.5693	87.3632	29.4413	116.8045	15.8828	132.6873
TOTAL: 05 BRAKE SYSTEM			207.7712	1949	56.3729	13.4220	17.5693	87.3632	29.4413	116.8045	15.8828	132.6873
*** GRAND TOTALS ***			207.7712	1949	56.3729	13.4220	17.5693	87.3632	29.4413	116.8045	15.8828	132.6873

MACRO % COSTING
DEALER DISCOUNT -- 11.770%
OUTSIDE VENDOR MARKUP -- 10.0%

VARIABLE COST FACTOR -- 1.0249
VOLUME -- 350,000
RUN ECONOMICS -- 1983

WHOLESALE COST FACTOR -- 1.3370

	REQ PER VEH	MATL	WEIGHT	TOOLING ($000)	COST PER UNIT ($) VARIABLE COST MATL	LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHSALE COST	DEALER MARKUP	CONSUMER COST
05 BRAKE SYSTEM												
05-01 SERVICE BRAKE												
05-01-011												
					14.9044	0.0000	0.0000	14.9044	1.4904	16.3948		
001 BRAKE, FRONT, LINING	4	BRLI	4.5000	0	16.8014	0.0000	0.0000	16.8014	5.6621	22.4635	3.0545	25.5180
					2.4944	0.9472	3.0124	6.4540	0.6454	7.0994		
002 BRAKE, FRONT, SHOE, FLANGE	4	CRS1	9.0000	61	7.2755	0.0000	0.0000	7.2755	2.4518	9.7273	1.3227	11.0500
					4.7268	0.4736	1.9036	7.1040	0.7104	7.8144		
003 BRAKE, FRONT, SHOE WEB	4	CRS1	7.4890	77	8.0082	0.0000	0.0000	8.0092	2.6989	10.7070	1.4559	12.1629
					0.0256	0.0312	0.0872	0.1440	0.0144	0.1584		
004 BRAKE, FRONT, SHOE, ABUTMENT	4	STBC	0.0968	10	0.1623	0.0000	0.0000	0.1623	0.0547	0.2170	0.0295	0.2465
					0.4096	0.0000	0.0000	0.4096	0.0410	0.4506		
005 BRAKE, FRONT, SHOE, RIVETS	4	8260	0.1716	0	0.4618	0.0000	0.0000	0.4618	0.1556	0.6174	0.0840	0.7014
					0.0000	0.9528	1.3520	2.3048	0.2305	2.5353		
001 BRAKE, FRONT, SHOE, ASM	4	XXXX	0.0000	26	2.5982	0.0000	0.0000	2.5982	0.8756	3.4738	0.4724	3.9462
XXX SUBASSEMBLY TOTAL			21.2484	174	35.3074	0.0000	0.0000	35.3074	11.9986	47.2060	6.4190	53.6250
05-01-012												
					0.9776	1.6444	3.5838	6.2108	0.6211	6.8319		
001 BRAKE, FRONT, CYLINDER	4	GRIR	7.5000	77	7.0013	0.0000	0.0000	7.0013	2.3594	9.3607	1.2728	10.6335
					0.0204	0.0000	0.0000	0.0204	0.0020	0.0224		
002 BRAKE, FRONT, CYLINDER, SPRI	4	SPWI	0.0400	0	0.0230	0.0000	0.0000	0.0230	0.0079	0.0309	0.0042	0.0350
					0.1056	0.0572	0.1596	0.3224	0.0322	0.3546		
003 BRAKE, FRONT, CYLINDER, PAD	4	ABAR	0.0528	1	0.3634	0.0000	0.0000	0.3634	0.1225	0.4859	0.0661	0.5520
					0.0238	0.0092	0.0152	0.0532	0.0053	0.0585		
004 BRAKE, FRONT, CYLINDER, CUP	4	POLY	0.0352	51	0.0600	0.0000	0.0000	0.0600	0.0202	0.0802	0.0109	0.0911
					0.0784	0.2492	0.8124	1.1400	0.1140	1.2540		
005 BRAKE, FRONT, CYLINDER, PIST	4	STBC	0.2468	15	1.2851	0.0000	0.0000	1.2851	0.4331	1.7182	0.2336	1.9519
					0.0616	0.0140	0.0232	0.0988	0.0099	0.1087		
006 BRAKE, FRONT, CYLINDER, SHRO	4	POLY	0.0748	102	0.1114	0.0000	0.0000	0.1114	0.0375	0.1489	0.0202	0.1691
					0.0040	0.4736	0.3884	0.8660	0.0866	0.9526		
002 BRAKE, FRONT, CYLINDER, ASM	4	XXXX	0.0000	0	0.9762	0.0000	0.0000	0.9762	0.3290	1.3052	0.1775	1.4827
XXX SUBASSEMBLY TOTAL			7.9496	246	9.8204	0.0000	0.0000	9.8204	3.3095	13.1299	1.7853	14.9152
05-01-013												
					10.1000	0.2363	0.6632	11.0000	1.1000	12.1000		
001 BRAKE, FRONT, BACKPLATE	2	CRS2	32.2500	1230	12.4001	0.0000	0.0000	12.4001	4.1788	16.5789	2.2543	18.8332
					0.1260	0.1580	0.3912	0.6752	0.0675	0.7427		
002 BRAKE, FRONT, CAM	4	CRS2	0.4000	10	0.7611	0.0000	0.0000	0.7611	0.2565	1.0176	0.1384	1.1560
					0.6208	0.0000	0.0000	0.6208	0.0621	0.6829		
003 BRAKE, FRONT, BKPLT SPRING	4	SPWI	0.3080	0	0.6998	0.0000	0.0000	0.6998	0.2358	0.9356	0.1272	1.0628
					0.0840	0.1512	0.5468	0.7820	0.0782	0.8602		
004 BRAKE, FRONT, SHAFT	4	ST8C	0.2732	0	0.8815	0.0000	0.0000	0.8815	0.2971	1.1786	0.1603	1.3389

MACPO % COSTING
DEALER DISCOUNT -- 11.970%
OUTSIDE VENDOR MARKUP -- 10.0%

VARIABLE COST FACTOR -- 1.0243
VOLUME -- 350,000
RUN ECONOMICS -- 1983

WHOLESALE COST FACTOR -- 1.3370

	REQ PER VEH	MATL	WEIGHT	TOOLING ($000)	COST PER UNIT ($) MATL	VARIABLE COST LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHSALE COST	DEALER MARKUP	CONSUMER COST
					0.0000	0.0156	0.0228	0.0384	0.0038	0.0422		
005 BACKPLATE STANDOFF	4	STTU	0.0000	0	0.0432	0.0000	0.0000	0.0432	0.0146	0.0578	0.0079	0.0657
					0.0920	0.1508	0.3122	0.5450	0.0545	0.5995		
003 BRAKE, FRONT, BACKPLATE, ASM	2	XXXX	0.0000	1	0.6144	0.0000	0.0000	0.6144	0.2071	0.8215	0.1117	0.9332
XXX SUBASSEMBLY TOTAL			33.2312	1241	15.4001	0.0000	0.0000	15.4001	5.1899	20.5900	2.7999	23.3873
05-01-014												
					0.0852	0.0312	0.0616	0.1780	0.0178	0.1958		
001 BRAKE, FRONT, SPRING	4	SSBT	0.0220	10	0.2007	0.0000	0.0000	0.2007	0.0676	0.2683	0.0365	0.3048
05-01-015												
					0.0124	0.0312	0.0616	0.1052	0.0105	0.1157		
001 BRAKE, FRONT, WASHER	4	CRS2	0.0400	5	0.1186	0.0000	0.0000	0.1186	0.0400	0.1586	0.0216	0.1802
05-01-016												
					0.9108	0.0000	0.0000	0.9108	0.0911	1.0019		
001 BRAKE, FRONT, SPRING, RETURN	4	SPW1	0.7136	2	1.0267	0.0000	0.0000	1.0267	0.3460	1.3727	0.1867	1.5594
05-01-017												
					0.1968	0.6312	2.0040	2.8320	0.2832	3.1152		
001 BRAKE, FRONT, BOLT	12	STBC	0.7296	769	3.1925	0.0000	0.0000	3.1925	1.0759	4.2684	0.5804	4.8489
05-01-010												
					0.0000	0.1134	0.1456	0.2640	0.0264	0.2904		
000 BRAKE, FRONT, ASM	2	XXXX	0.0000	1	0.2976	0.0000	0.0000	0.2976	0.1003	0.3979	0.0541	0.4520
XXX SUBTOTAL			1.5052	787	4.8361	0.0000	0.0000	4.8361	1.6298	6.4659	0.8793	7.3452
XXXX TOTAL ASSEMBLY			63.9344	2448	65.3640	0.0000	0.0000	65.3640	22.0278	87.3918	11.8834	99.2752
05-01-020												
001 DRUM, BRAKE, FRONT HEAT SINK	2	GR1R	78.8000	51	10.2470	3.7434	4.6562	18.6466	6.2839	24.9305	3.3900	28.3205
002 DRUM,BRAKE,FRONT,DIAPHRAM	2	STBA	20.0000	26	8.1148	0.1410	0.9254	9.1812	3.0941	12.2753	1.6692	13.9445
004 DRUM,BRAKE,FRONT,ASM	2	XXXX	0.0000	4	0.7426	1.4166	3.7447	5.9039	1.9896	7.8935	1.0733	8.9668
XXX SUBTOTAL			98.8000	81	19.1044	5.3010	9.3263	33.7317	11.3676	45.0993	6.1325	51.2318
XXXX TOTAL ASSEMBLY			98.8000	81	17.1044	5.3010	9.3263	33.7317	11.3676	45.0993	6.1325	51.2319
05-01-030												
001 HUB, FRONT	2	GR1R	84.4000	154	10.7024	5.0350	6.4366	22.2240	7.4895	29.7135	4.0403	33.7538
05-01-100												

COMPONENT COST SUMMARY OF 1983 G. M. C. 7 TON TRUCK P-4H

MACRO % COSTING
DEALER DISCOUNT -- 11.970%
OUTSIDE VENDOR MARKUP -- 10.0%

VARIABLE COST FACTOR -- 1.0248
VOLUME -- 350,000
RUN ECONOMICS -- 1983

WHOLESALE COST FACTOR -- 1.3170

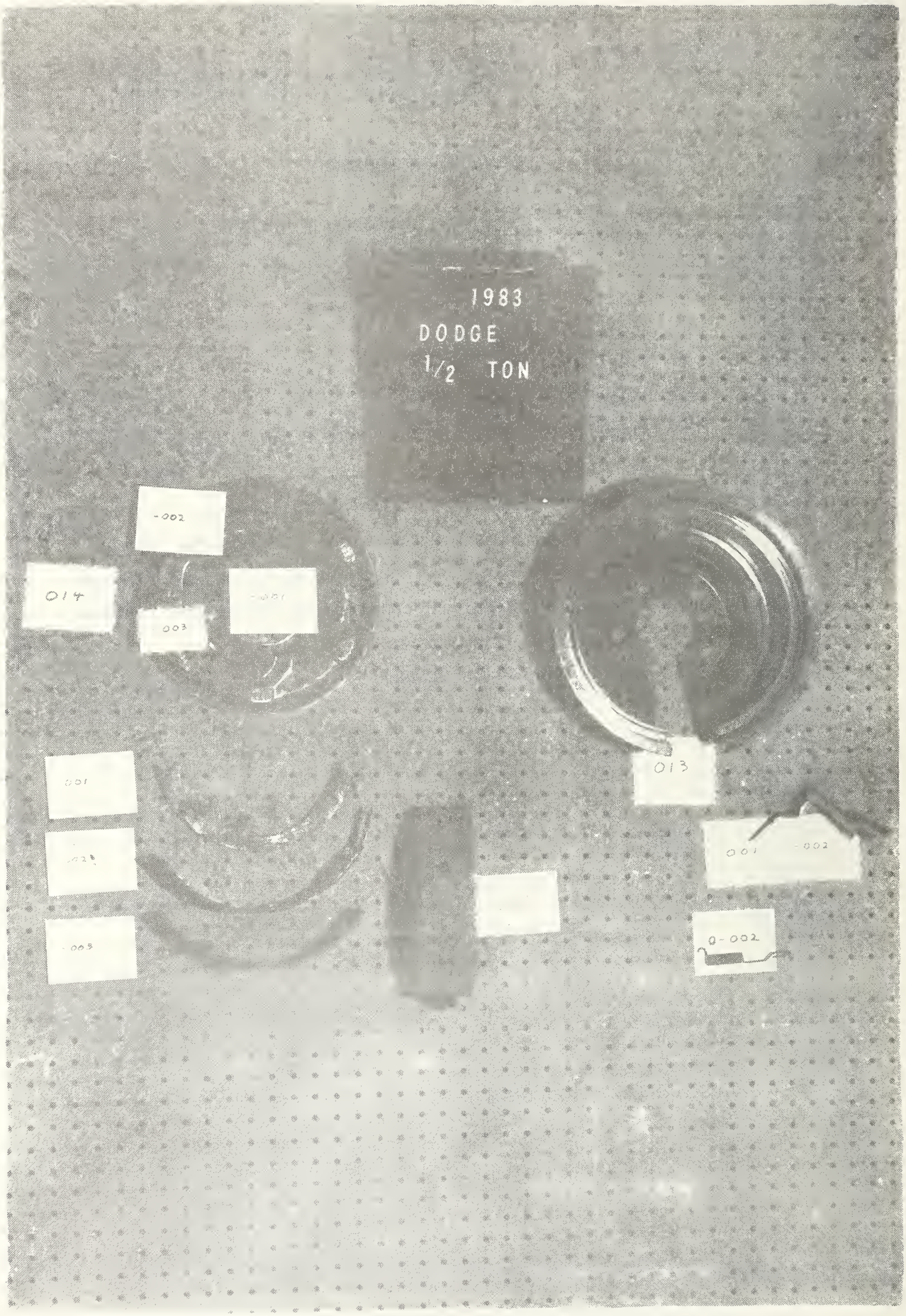
	REQ PER VEH	MATL	WEIGHT	TOTAL TOOLING ($000)	COST PER UNIT ($) MATL	VARIABLE COST LABOR	BURDEN	TOTAL	OTH COST + PROFIT	WHSALE COST	DEALER MARKUP	CONSUMER COST
000 BRAKE, FRONT, FINAL ASM	2	XXXX	0.0000	0	1.6802	1.4110	0.0000	3.0912	1.0417	4.1329	0.5629	4.6949
XXX SUBTOTAL			84.4000	154	12.3826	6.4760	6.4366	25.3152	8.5312	33.8464	4.6023	38.4487
XXXX TOTAL ASSEMBLY			84.4000	154	12.3826	6.4760	6.4366	25.3152	8.5312	33.8464	4.6023	38.4487
TOTAL: 01 SERVICE BRAKE			247.1344	2683	96.8510	11.7970	15.7629	124.4109	41.9266	166.3375	22.6182	188.9557
TOTAL: 05 BRAKE SYSTEM			247.1344	2683	96.8510	11.7970	15.7629	124.4109	41.9266	166.3375	22.6182	188.9557
XXX GRAND TOTALS XXX			247.1344	2683	96.8510	11.7970	15.7629	124.4109	41.9266	166.3375	22.6182	188.9557

APPENDIX B

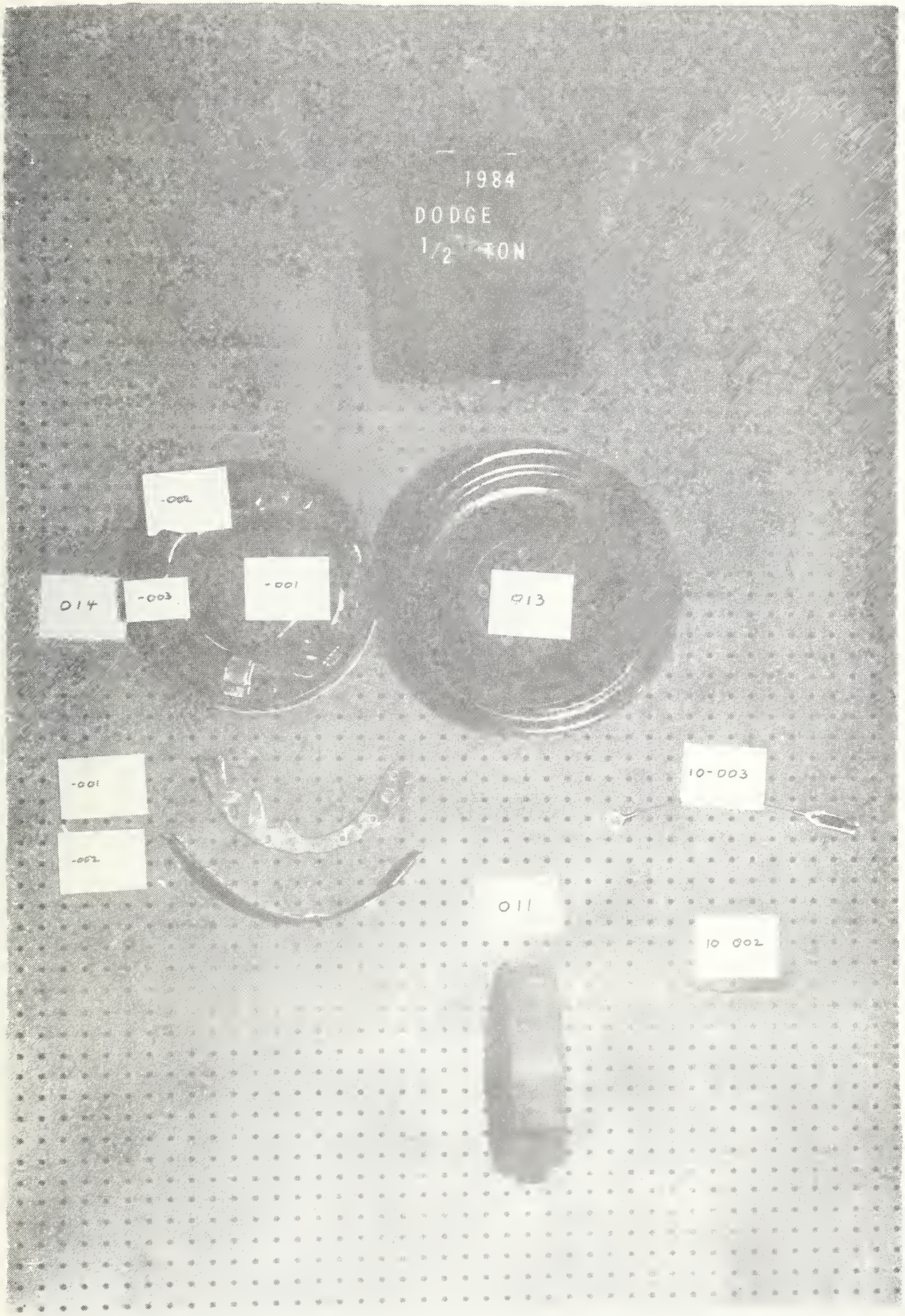
COMPONENT PHOTOGRAPHS

Component

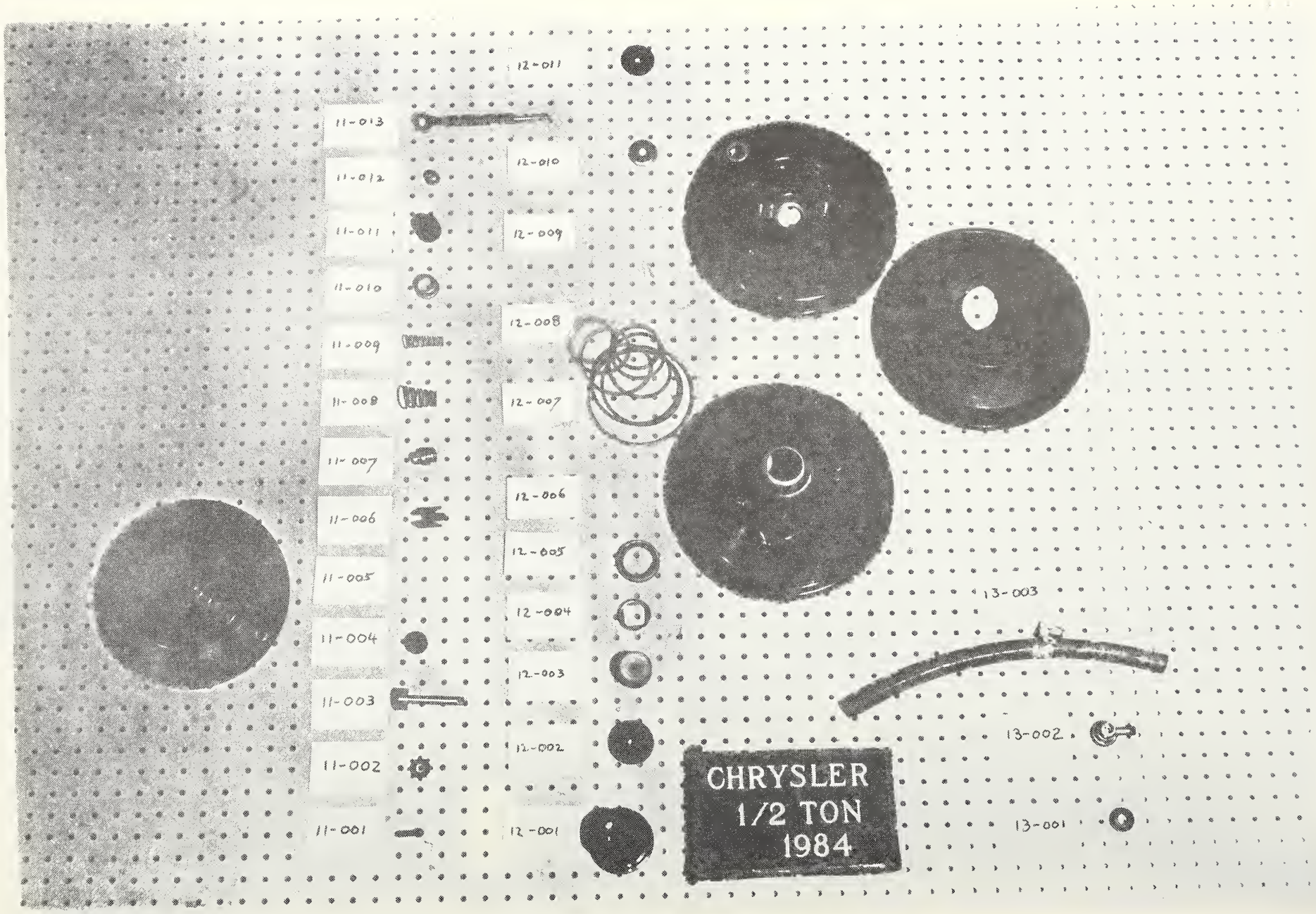
1983 Dodge 150, Rear Brake
1984 Dodge 150, Rear Brake
1984 Dodge 150, Brake Servo
1984 Dodge Multi-Purpose, Variable Proportioning Valve and Linkage
1984 Ford, Emergency Brake Warning Switch
1984 Ford F-250, Binary Proportioning Valve and Linkage
1984 G.M.C. 2500, Binary Proportioning Valve and Linkage
1984 G.M.C. 3500, Binary Proportioning Valve and Linkage
1983 G.M.C. 7000, Front Brake
1984 G.M.C. 7000, Front Brake



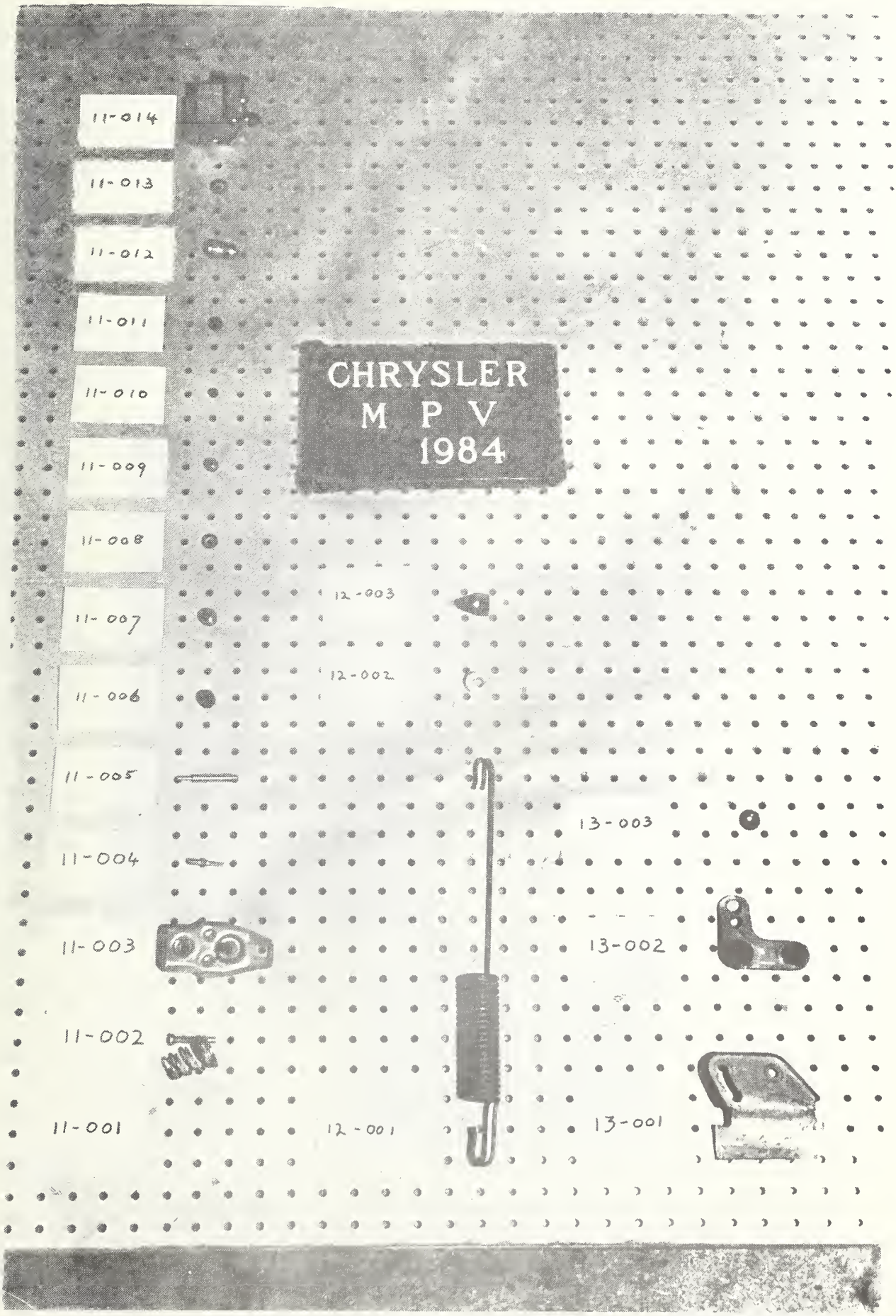
1983 DODGE 150, REAR BRAKE



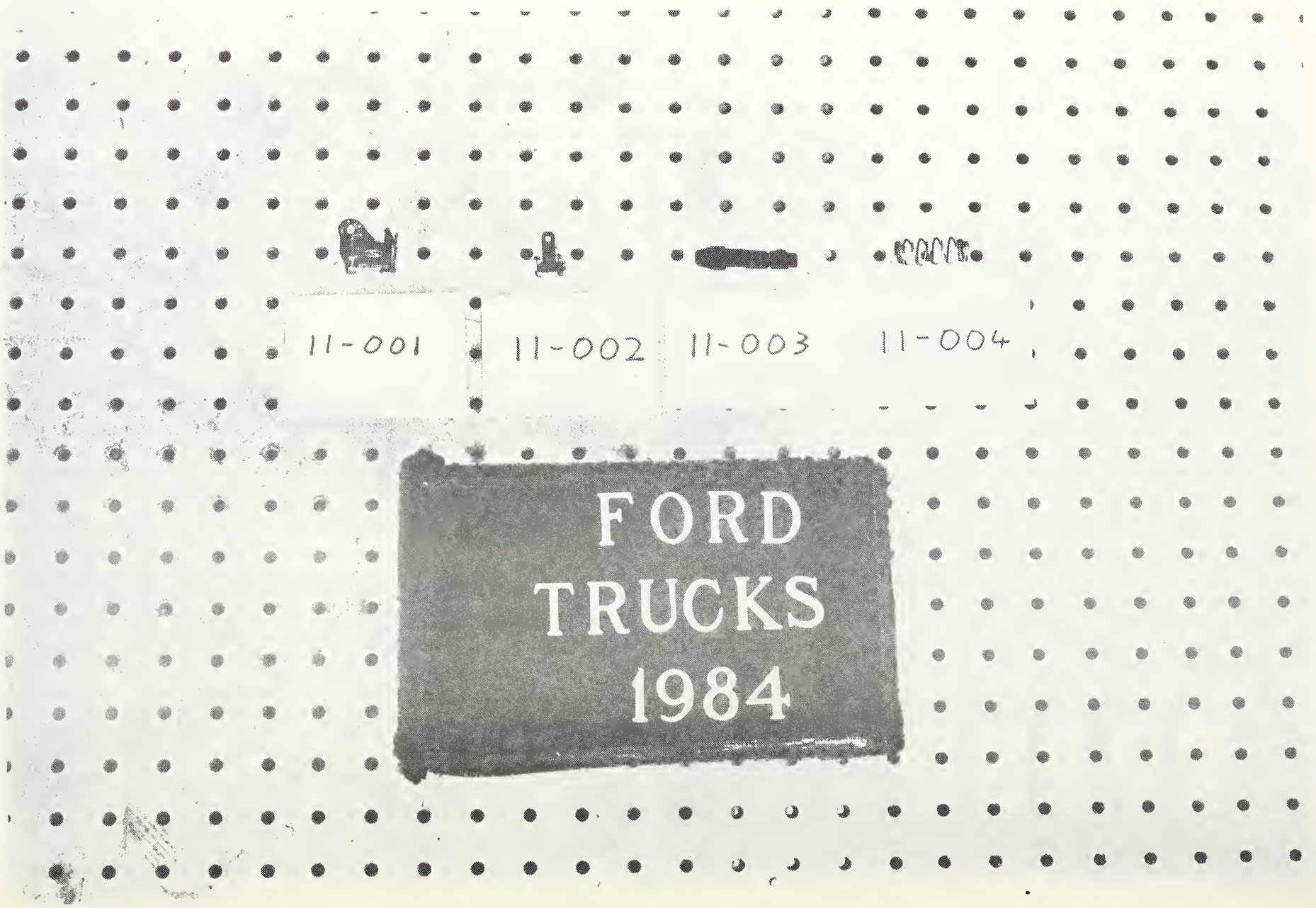
1984 DODGE 150, REAR BRAKE



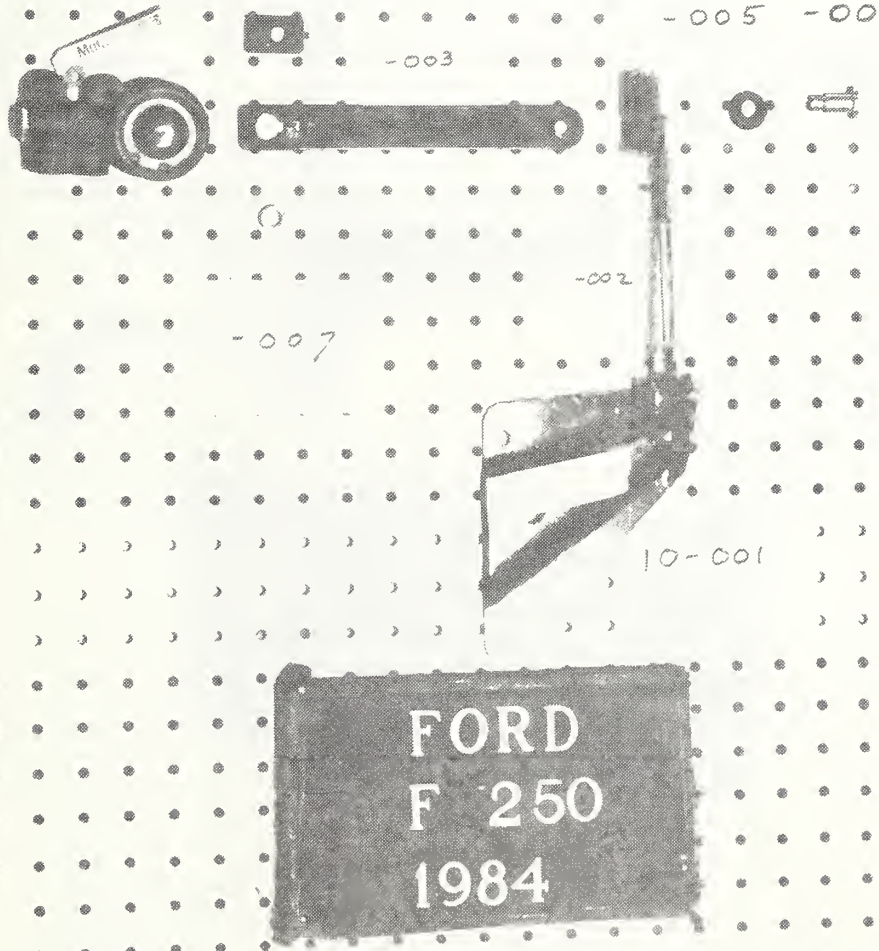
1984 DODGE 150, BRAKE SERVO



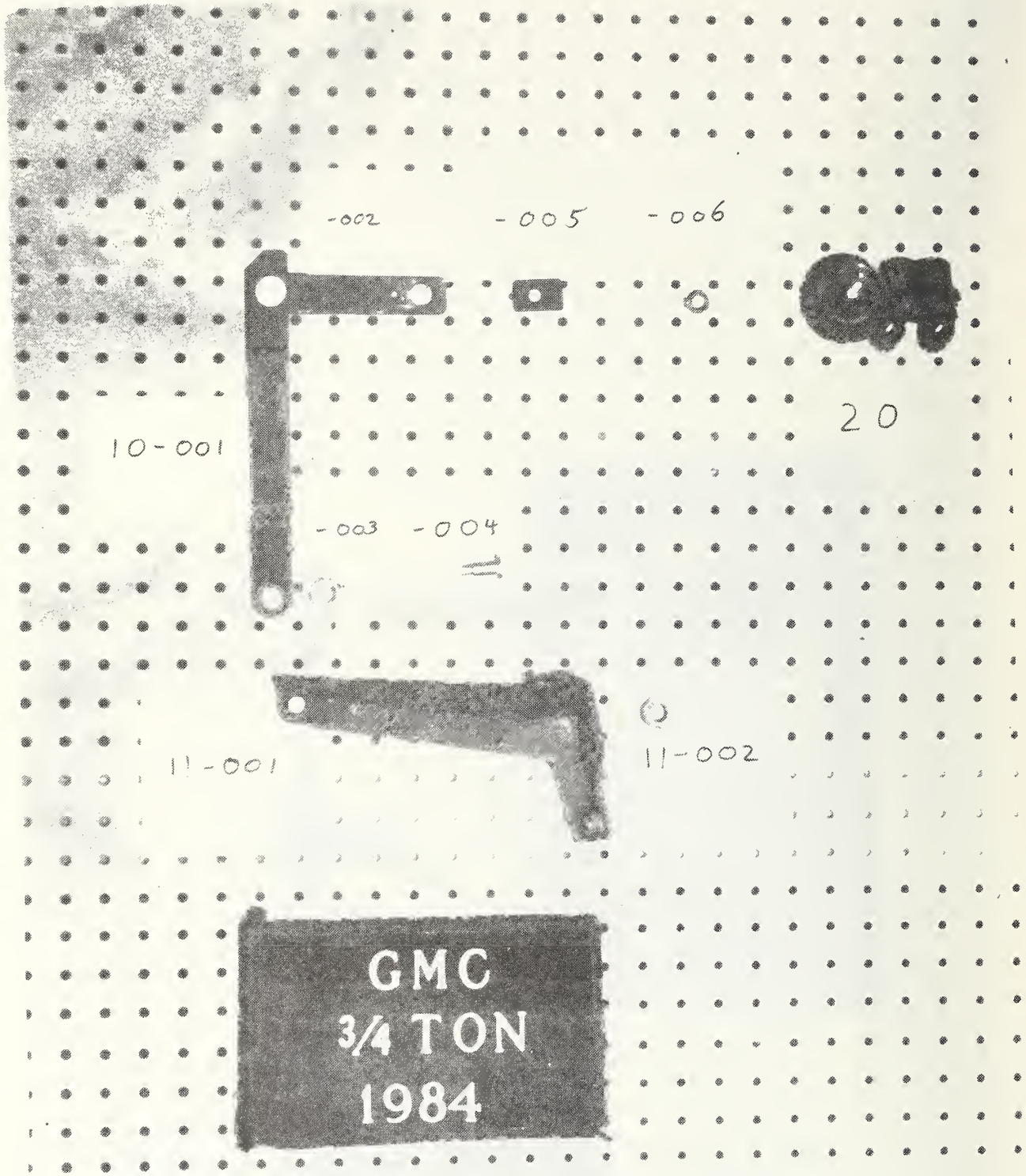
1984 DODGE MULTI-PURPOSE, VARIABLE PROPORTIONING VALVE AND LINKAGE



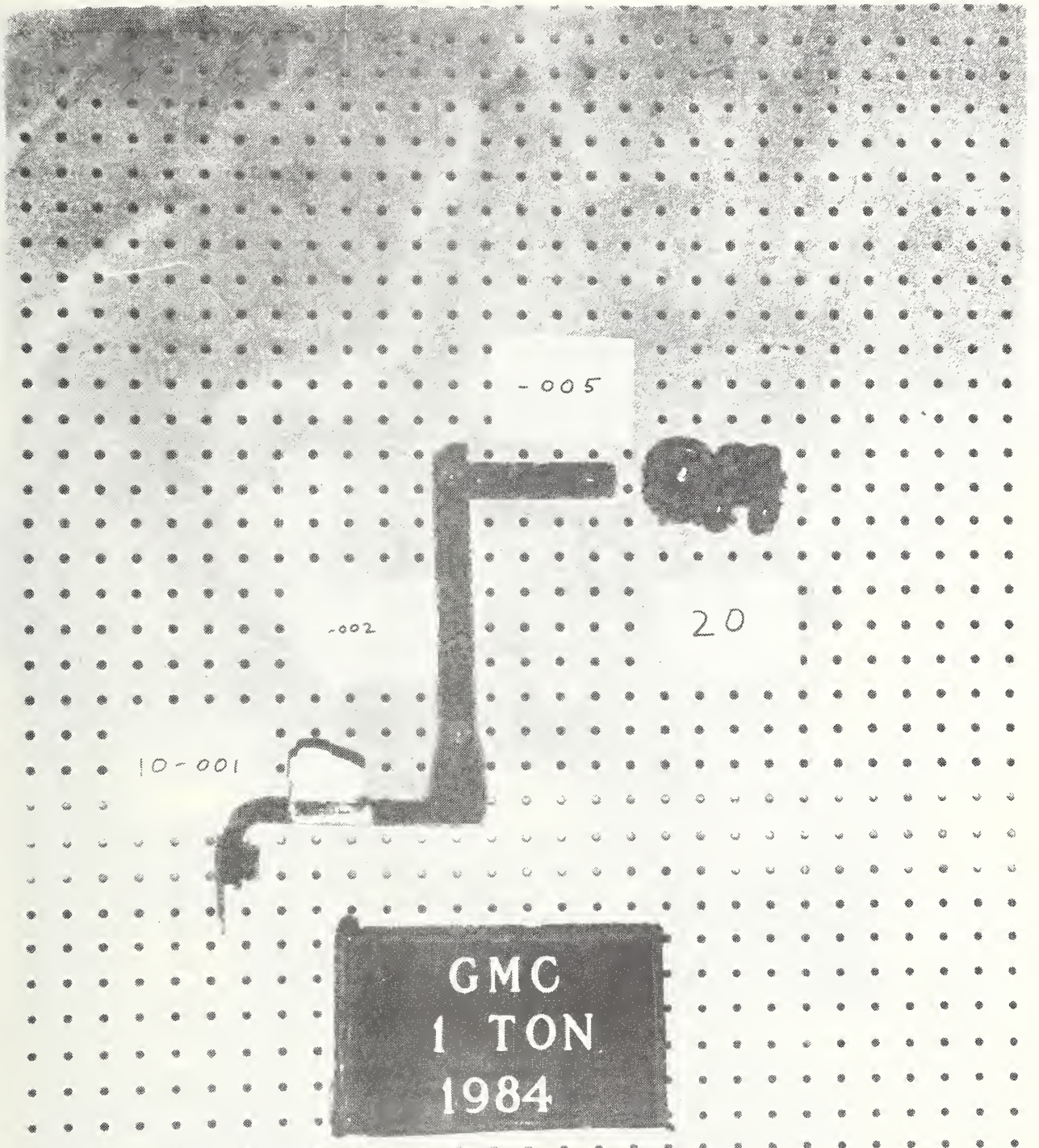
1984 FORD, EMERGENCY BRAKE WARNING SWITCH



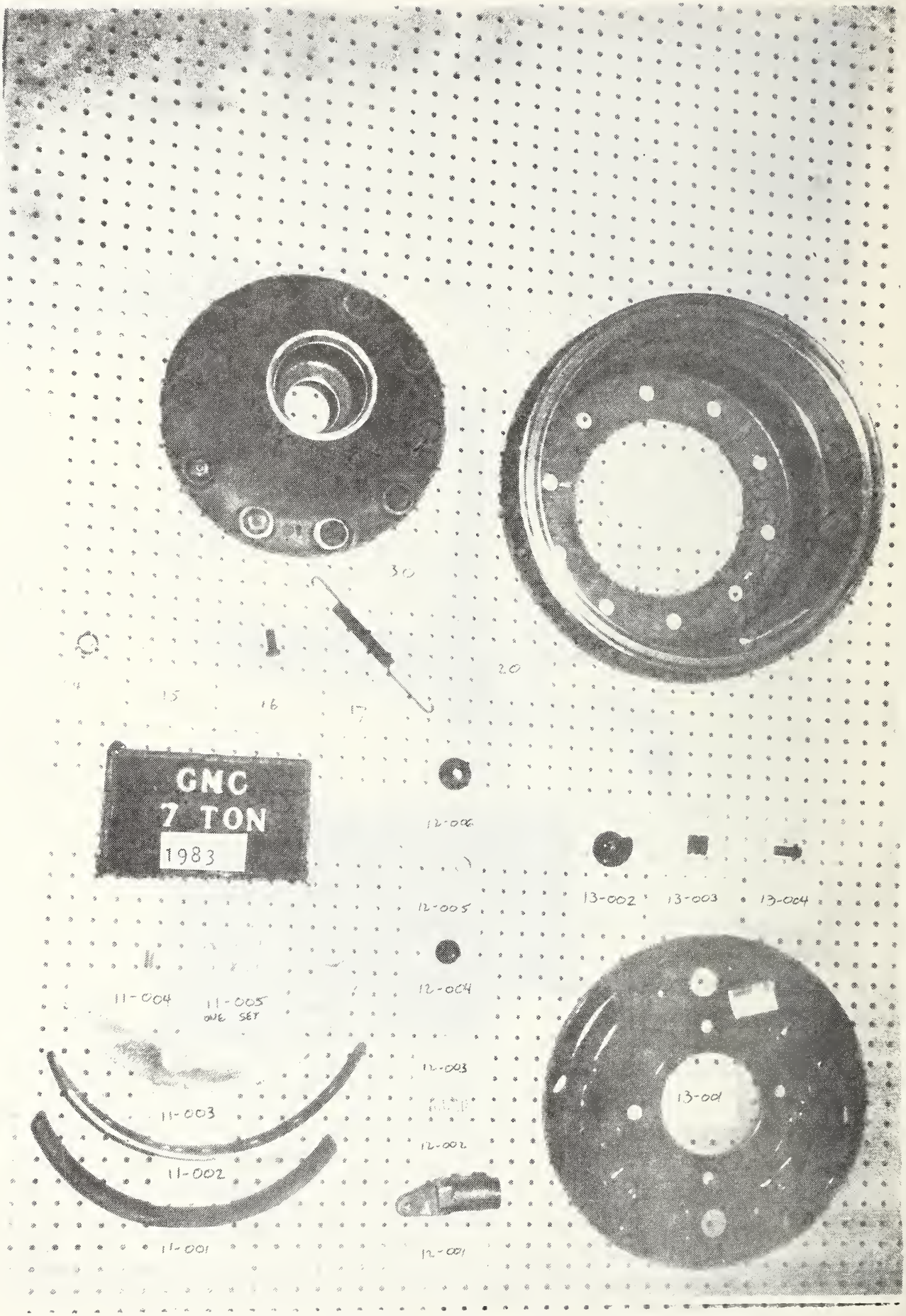
1984 FORD F-250, BINARY PROPORTIONING VALVE AND LINKAGE



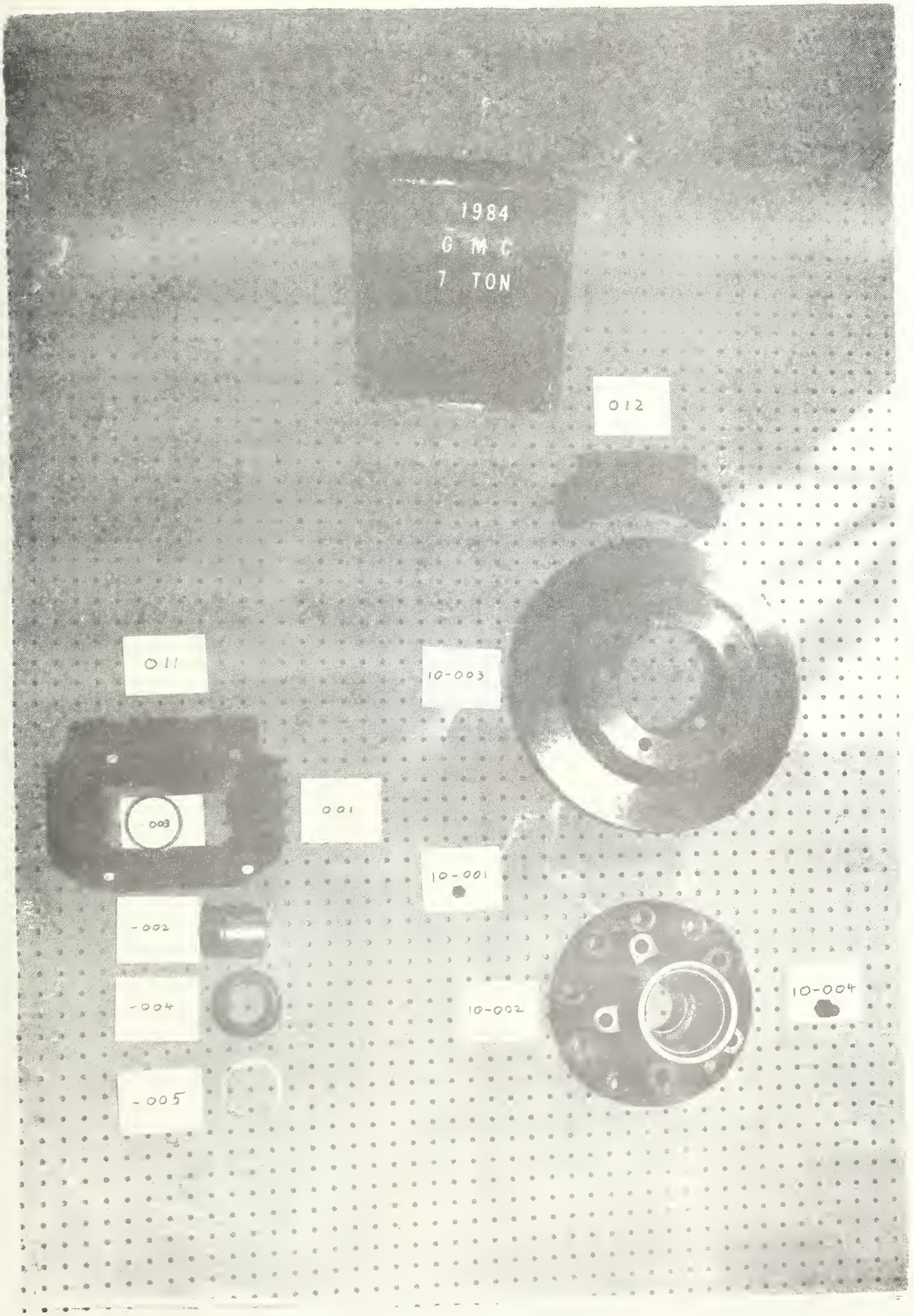
1984 G.M.C. 2500, BINARY PROPORTIONING VALVE AND LINKAGE



1984 G.M.C. 3500, BINARY PROPORTIONING VALVE AND LINKAGE



1983 G.M.C. 7000, FRONT BRAKE



1984 G.M.C. 7000, FRONT BRAKE


Form DOT F 1720.2
FORMERLY FORM DOT F