

ENGINEERING ANALYSIS CLOSING REPORT

SUBJECT: Alleged Inadvertent and Sudden Vehicle Acceleration in Certain 1981 Through 1984 Toyota Cressida Vehicles.

EA No.: EAB5-045 **Date Opened:** 8/10/85 **Date Closed:** FEB 18 1988

BAFIS: This Engineering Analysis (EA) was opened on the basis of 16 OOI owner complaints and a defective cruise control computer discovered by OOI after inspecting a 1982 Toyota Cressida.

THE ALLEGED DEFECT: Unexpected vehicle sudden acceleration allegedly occurs in some subject vehicles when the automatic transmission lever is moved from "Park" to "Reverse" or "Drive".

DESCRIPTION OF COMPONENT OR VEHICLE SYSTEM: The subject vehicles are equipped with an automatic transmission and a cruise control system. Vehicle systems which have been suspected as having caused the sudden acceleration problems include the fuel injection system, accelerator pedal and throttle linkages, computerized control systems, cruise control systems, power brake systems, engine mounts, automatic transmissions, and floor mats. A description of the cruise control system is shown in Attachment I.

CORRESPONDENCE:

NHTSA to Mfg.	Mfg. to NHTSA	Mfg. to NHTSA Supplement	Date Requested	Date OCC Response	Confidentiality Items
09/20/85	12/05/85	02/21/86	12/06/85	02/10/86	Confidential Att. VII, VIII
02/28/86	03/28/86		02/28/86	04/14/86	Test Items
05/06/86	08/07/86	08/27/86	06/19/86	07/25/86	Inspections
	09/30/86		08/07/86	09/17/86	I, II, III, V
11/14/86	02/10/87		10/03/86	10/29/86	Attachment I
			02/10/87	07/30/87	Attachments
			05/05/87	05/28/87	Photos

PROBLEM EXPERIENCE:	STATUS			
	EA OPENED		EA CLOSED	
Reports	OOI	MFG	OOI	MFG
Owner	16	0	52	25
Field	N/A	0	N/A	INC
Lawsuits	0	0	0	1
Property Damage				
Accidents	11	0	28	23
Injury Accidents/Injuries	6	0	8	3
	7	0	11	3
Fatality Accidents/Fatalities	0	0	0	1
	0	0	0	1
Unknown Accidents				

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A review of the 77 complaints reports revealed the following:

1. As shown in Figure 1, there is no trend indicating over-involvement of complaints over certain vehicle mileage intervals. The number of complaints appears to be widely distributed over the range between 5,000 and 80,000 miles.
2. Figure 2 shows the distribution of complaints over the vehicle model years. The graph indicates that the 1982 through 1984 model year subject vehicles have more complaints than the 1980 and 1981 model year vehicles.
3. The number of alleged sudden vehicle acceleration incidents has been decreasing as shown in Figure 5. For example, there were 22 reported incidents in 1986, 9 in 1987, and no incidents have been reported to ODI since October 1987.

VEHICLE POPULATION: According to Toyota, the number of 1981 through 1984 Toyota Cressida vehicles equipped with an automatic transmission and cruise control system sold in the U.S. was about 135,263 units including 24,355 in 1981, 35,464 in 1982, 39,016 in 1983, and 36,428 in 1984 models.

WARRANTY: N/A.

SERVICE BULLETINS: N/A.

PART SALES: Toyota stated in its letter of December 6, 1985, that it sold a total of 521 cruise control computers for the subject vehicles, including 174 sold during 1981, 125 in 1982, 139 in 1983 and 83 in 1984.

DESIGN, MATERIAL, AND/OR PRODUCTION MODIFICATIONS: Toyota described in its letter of December 6, 1985, certain modifications to the cruise control system in the subject vehicles. The modifications were applicable to the speed control computer assemblies and the stop lamp switch assembly. A detailed description of these modifications is shown in Attachment II.

TESTING: The NHTSA Vehicle Research and Test Center has conducted inspections and tests on one 1982 Toyota Cressida and the cruise control system components from a 1981 model, two 1982 models, and two 1984 model Cressida vehicles allegedly involved in sudden vehicle acceleration, to determine possible causes. Results of tests showed:

1. The cruise control system (c/c) in the 1981 and 1982 Cressida peer cars operated normally with the respective c/c computers from the 1981 and 1984 "complaint" cars.

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2. The c/c system in the 1982 Cressida peer car would cause the vehicle to rapidly accelerate from idle to 5,000 rpm if the c/c main switch was on and the c/c computer from each of the two 1982 "complaint" cars was installed. The 1982 "complaint" Cressida reacted similarly. The c/c system on the "complaint" car operated normally when the c/c computer from the peer car was used. Although brake application would not cancel the c/c system acceleration command, a heavy brake application could stop the vehicle, but did not disable the acceleration response of the c/c system. Additionally, the failure of the c/c computer was found to be intermittent.
3. During the inspection and testing of all Cressida vehicles, no vehicle sudden acceleration has been experienced or observed other than that described above.

The test results are described in detail in the final test report dated July 1986, and the addendum dated August 1986. The two defective c/c computers from the two 1982 "complaint" cars were sent to Toyota after ODI's inspection and testing. Toyota verified defects of the two c/c computers and subsequently recalled certain subject vehicles equipped with potentially defective c/c computers (Attachment III).

An ODI contractor, GAB Business Services, Inc., inspected and tested a 1982 Toyota Cressida involved in alleged sudden vehicle acceleration incident on May 6, 1985. They were able to obtain rapid engine acceleration by turning on the cruise control main switch and ignition switch. ODI leased the vehicle for testing and inspection as described above.

Toyota has conducted many tests on the subject vehicles concerning the effects of electromagnetic interference. In its letter of August 7, 1986, Toyota stated that "We have not experienced any problem with electromagnetic interference (EMI) failure source during development or from the field. Thus we do not believe that EMI is the probable source of the subject problem."

In its letter of March 28, 1986, Toyota mentioned that it has inspected and tested 21 subject vehicles allegedly involved in sudden vehicle acceleration and was unable to find any component failure which could cause sudden vehicle acceleration.

ADDITIONAL INFORMATION: Toyota notified ODI in its letter dated September 30, 1986, that it would conduct a voluntary safety recall campaign (87V-098) on certain 1982 Cressida, Celica, and Supra vehicles. A replacement cruise control computer will be installed in these vehicles to replace the defective cruise control computer. A copy of the Recall Campaign letter is shown in Attachment III.

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WARNING SYMPTOMS: There are no apparent warning symptoms before the alleged sudden vehicle acceleration occurs.

CONTRIBUTING FACTORS: During the manufacturing process of the cruise control computer, certain printed circuit boards may have had an improper coating application, which could cause the soldered terminals of the integrated circuit to develop cracks. Continuing use of the cruise control system may lead to a complete separation of the soldered terminals, resulting in non-conductivity of the circuit. Other mechanical or electrical/electronic causes common to the subject vehicles related to sudden unexpected vehicle acceleration with a simultaneous lack of braking system effectiveness were not detected.

FAILURE/MALFUNCTION MODES: If a complete separation of the soldered terminals exists in the cruise control computer, in the worst failed circuit case, should the engine be started with the cruise control main switch in the "On" position, the engine speed may instantly race, and if the driver of an automatic transmission equipped vehicle shifts into "Drive" or "Reverse" without firmly applying the brakes, the vehicle could suddenly accelerate.

Inadvertent and unknowing driver application of the accelerator pedal when the driver intended to apply the brake may be the cause of some of the reported sudden acceleration related accidents, even though many of the drivers continue to believe that they had been pushing on the brake pedal.

An analysis of all complaint reports received since the opening of this EA revealed various failure/malfunction modes according to the driver's remarks in his or her report as shown in Figure 3. A majority (48) stated that the vehicle accelerated very rapidly from a stationary position upon shifting the transmission gear from "Park" to "Reverse" or "Drive".

MANUFACTURERS EVALUATION OF THE ALLEGED DEFECT: Toyota states in its letter of February 10, 1987, that "It is our policy that once an identifiable systematic defect is found, we initiate proper action to rectify it. Although we have investigated more than 60% of the alleged sudden acceleration incidents, no problems were found other than the two in which NHTSA recovered the defective cruise control computers. Once we were able to verify the defect, we initiated a voluntary recall campaign (see attachment II) of those early production 1982 models which may have been equipped with defective computers.

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However, in spite of our intense efforts, we have not been able to reproduce nor verify the existence of the alleged problem for the rest of the subject vehicles. Therefore, there is no justification to expand the scope of the recall. Needless to say, we continue to monitor and investigate the problem."

REASON FOR CLOSING: Toyota conducted a safety recall campaign to replace the potentially defective cruise control computers on certain subject vehicles. Additionally, a mechanical or electrical/electronic cause other than the defective cruise control computer common to the subject vehicles related to sudden unexpected vehicle acceleration with a simultaneous lack of braking system effectiveness was not detected. We will continue to monitor the subject vehicles for additional reports. Further commitment of resources to determine whether a trend exists outside the recall group does not appear to be warranted at the present time.

Attachments

George Williams
Safety Defects Engineer

Feb. 18, 1988
Date

I Concur:
W. H. Rosten
Chief, Engineering and Test Branch

2/18/88
Date

J. C. [Signature]
Chief, Defect Evaluation Division

2/18/88
Date

[Signature]
Director, Office of Defects Investigation

2-18-88
Date

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DISTRIBUTION OF COMPLAINTS (EAB85-045)

TOYOTA CRESSIDA SUDDEN ACCELERATION

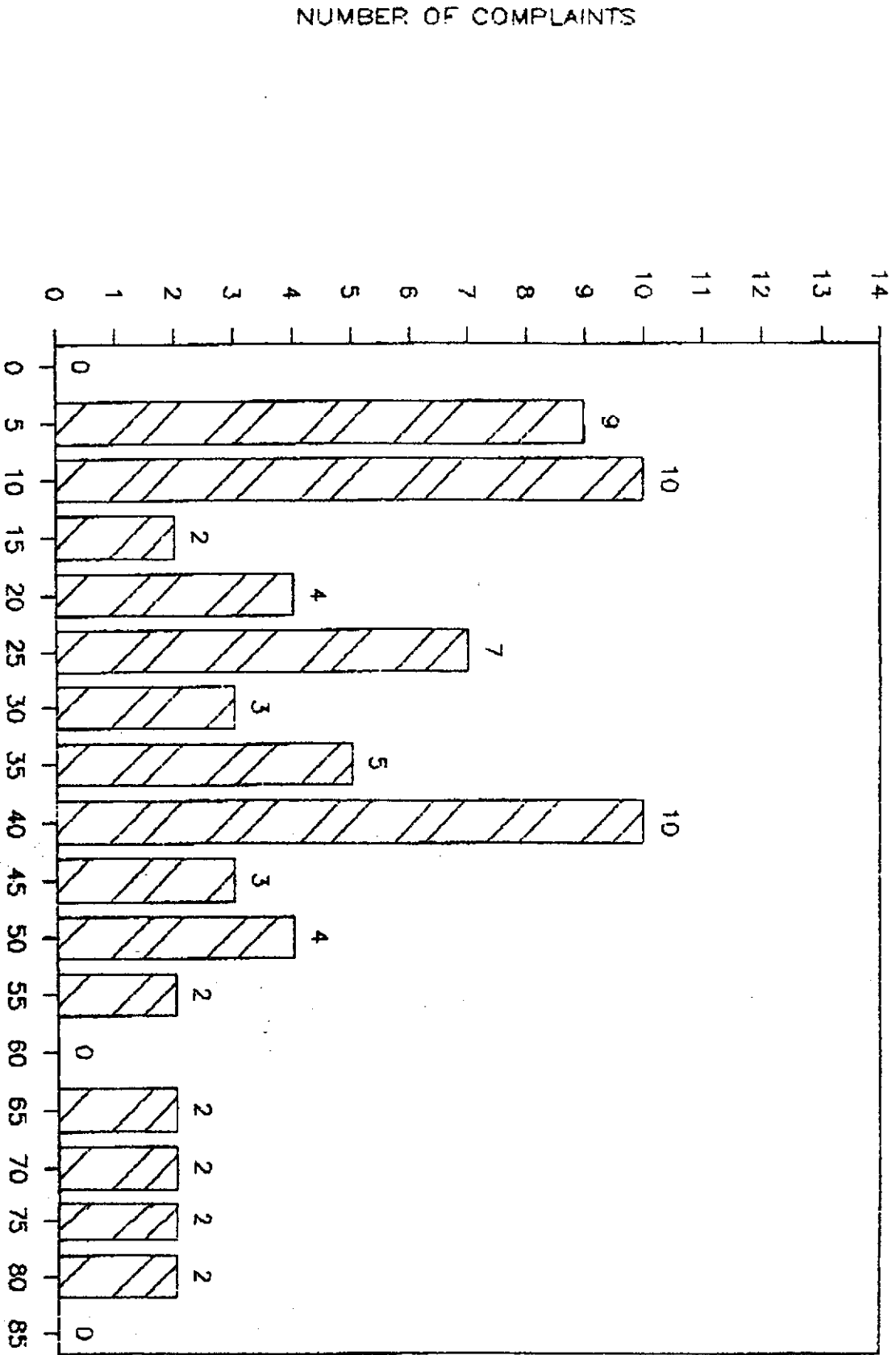


FIGURE 1. MILES X 1,000

DISTRIBUTION OF COMPLAINTS(EA85-045)

TOYOTA CRESSIDA SUDDEN ACCELERATION

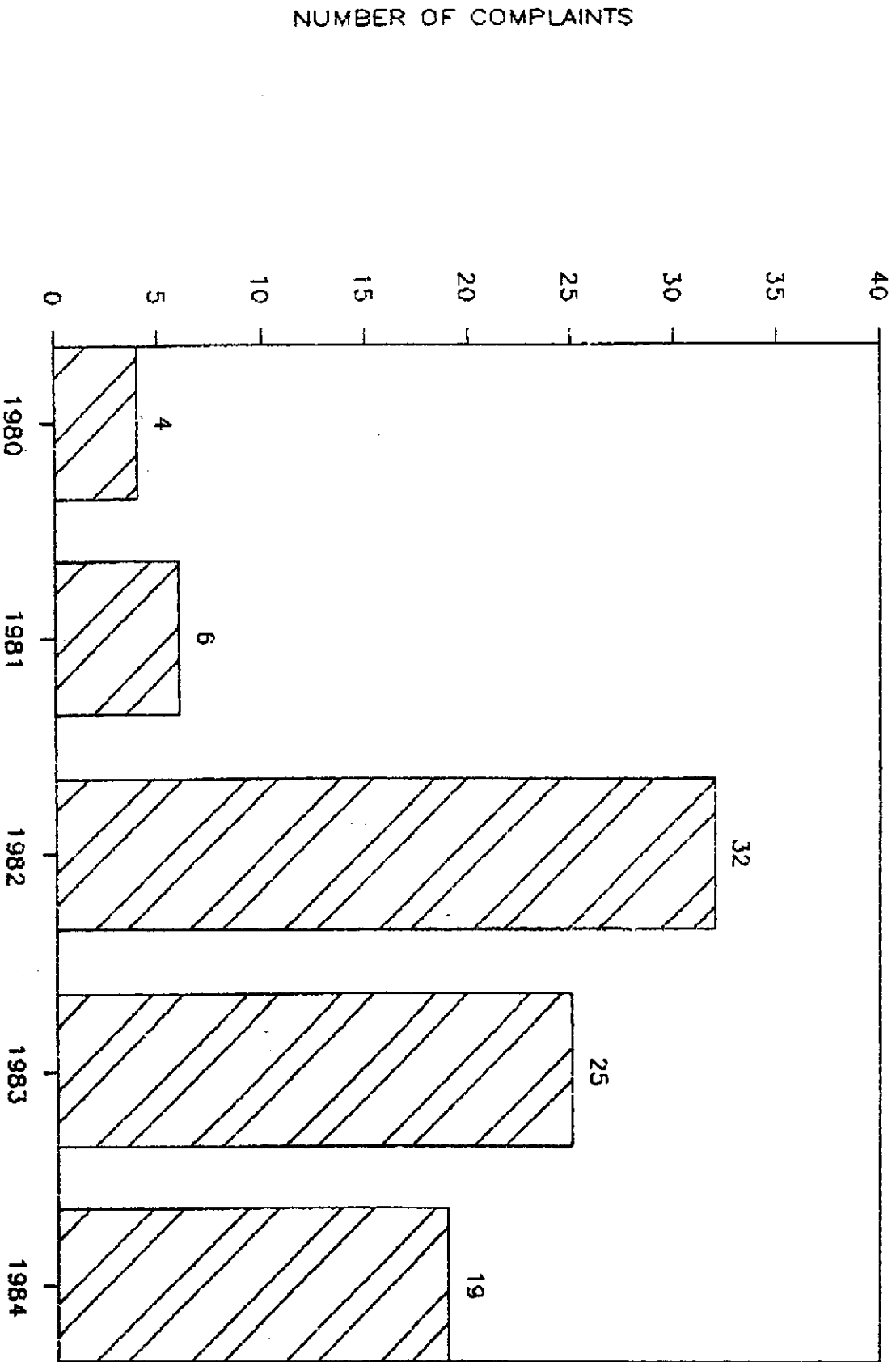


FIGURE 2.

MODEL YEAR

DISTRIBUTION OF COMPLAINTS (EA85-045)

TOYOTA CRESSIDA SUDDEN ACCELERATION

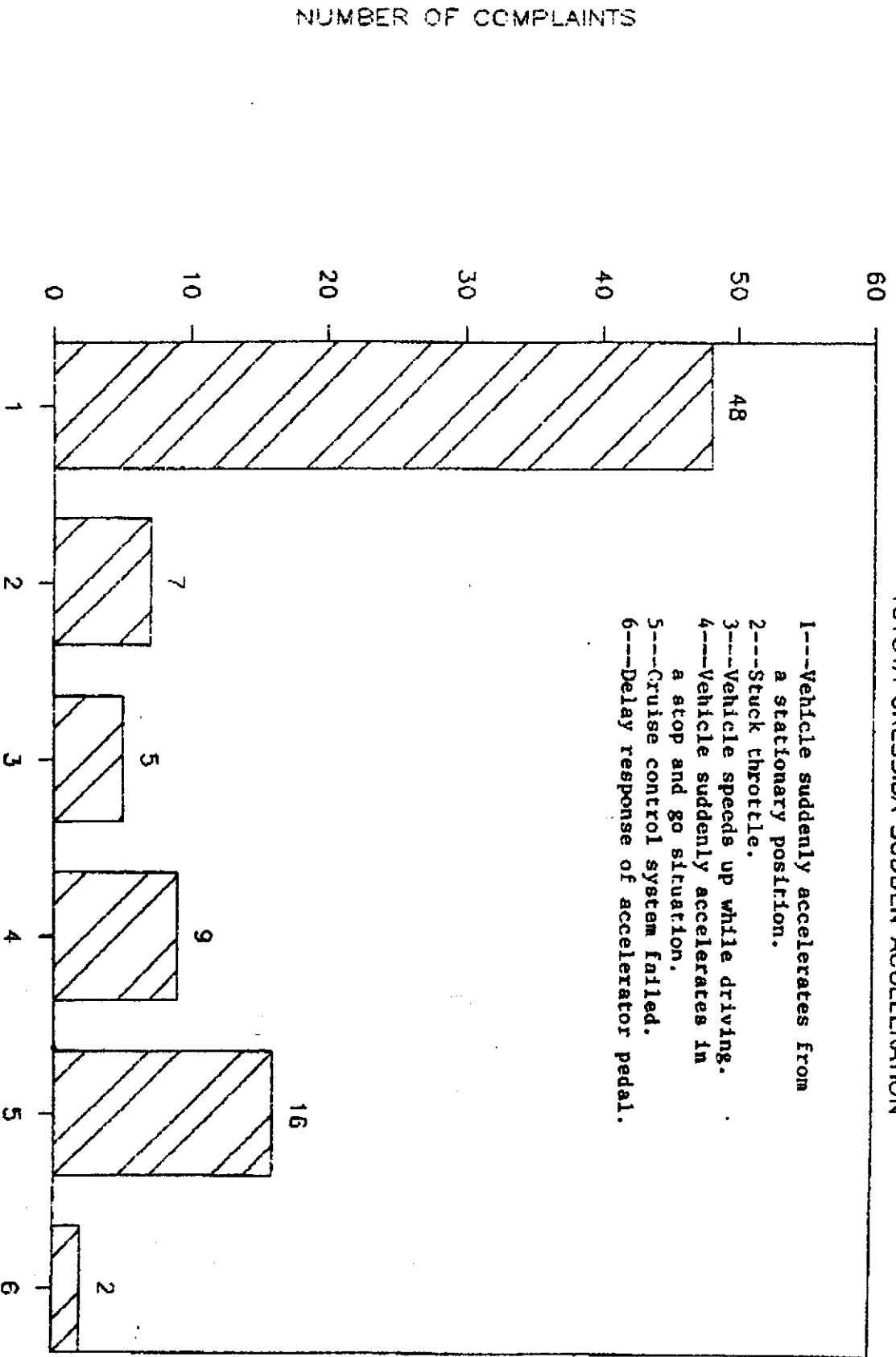


FIGURE 3. DRIVER'S REMARKS

DISTRIBUTION OF COMPLAINTS(EA85-045)

TOYOTA CRESSIDA SUDDEN ACCELERATION

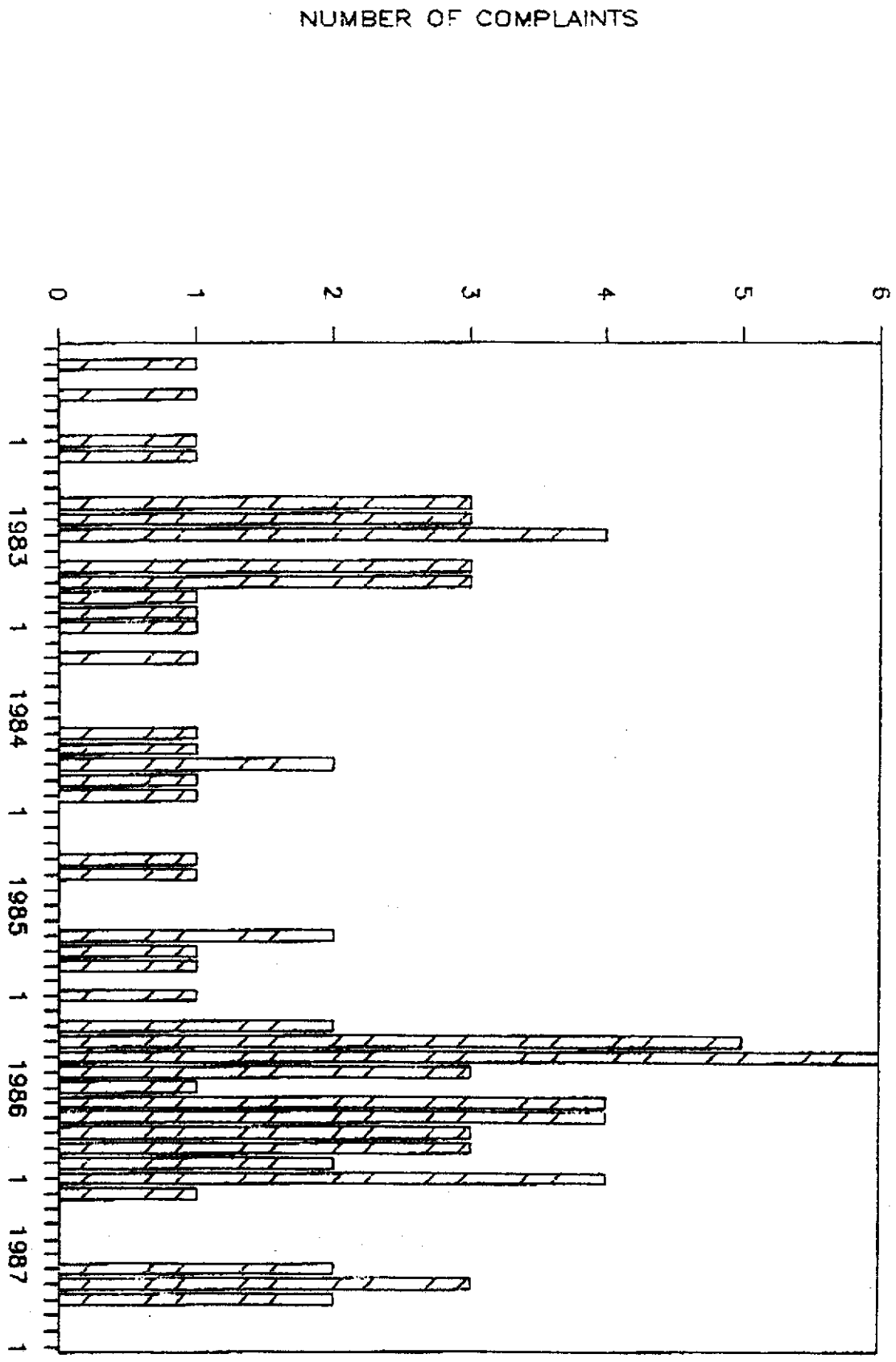


FIGURE 4. DATE OF COMPLAINTS

NUMBER OF COMPLAINTS

DISTRIBUTION OF COMPLAINTS(EA85-045)

TOYOTA CRESSIDA SUDDEN ACCELERATION

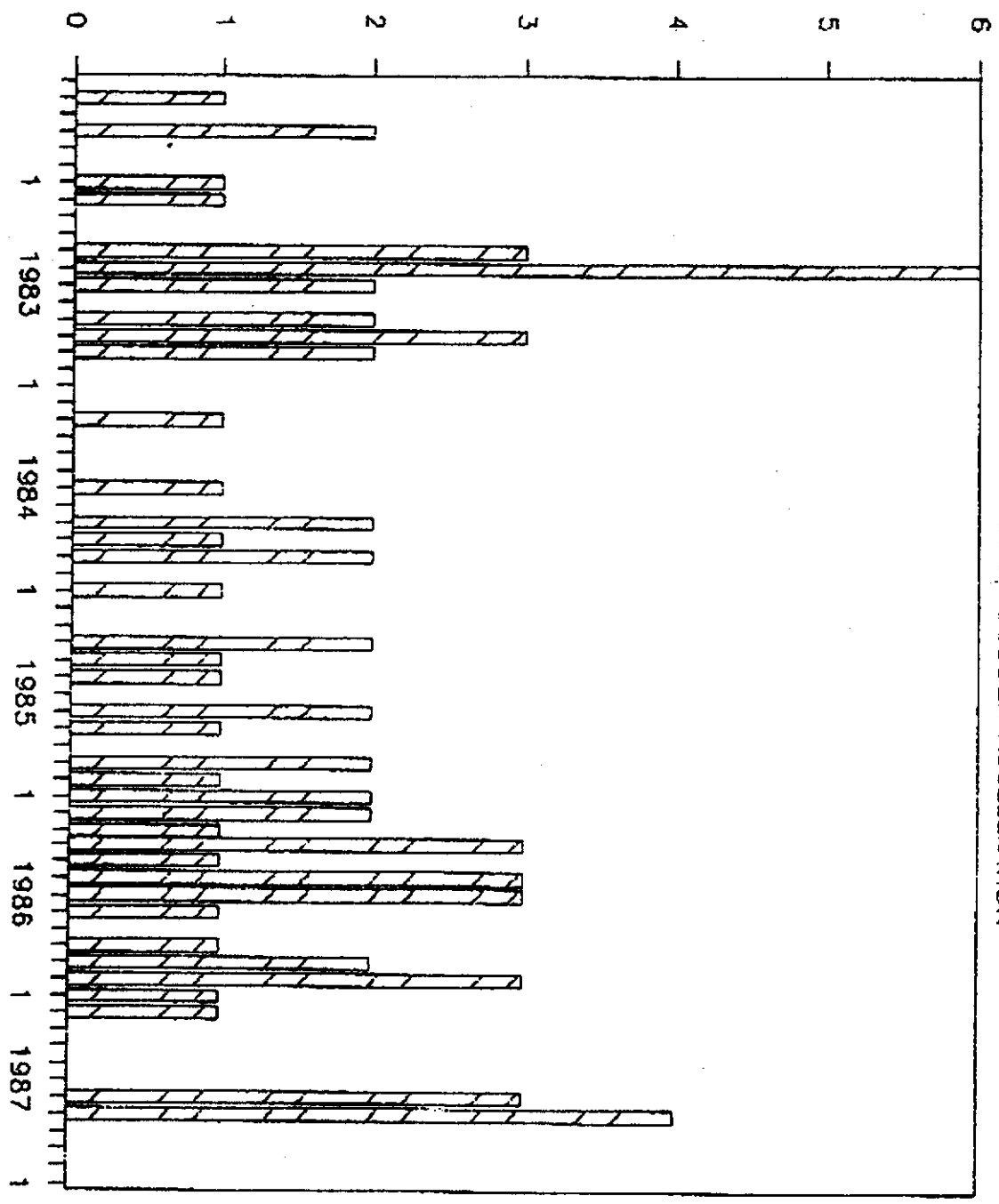


FIGURE 5. DATE OF INCIDENTS