

ADELAIDE IN-DEPTH ACCIDENT STUDY

1975-1979

PART 3: PEDAL CYCLE ACCIDENTS

by

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INFORMATION RETRIEVAL

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ABSTRACT : This report contains descriptions of the causes and consequences of the pedal cycle accidents contained in a representative sample of road traffic accidents to which an ambulance was called in metropolitan Adelaide. Reviews of the relevant characteristics of the cyclists and drivers, the vehicles, and the road and traffic environment are also included. One-third of these 22 accidents involved a child cyclist who was riding carelessly on a residential street. The other two-thirds mostly involved adult cyclists on arterial roads, and were a consequence of errors made equally by the cyclists and the drivers. Alcohol intoxication was not a significant factor in any of these accidents. Almost all of the cyclists were injured, and their injuries were often very severe. The front of the striking car caused two-thirds of the severe injuries. A number of possible countermeasures and topics worthy of further investigation are listed at the end of the report.

*Non IRRD Keywords

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FOREWORD

This study was conducted by the Road Accident Research Unit of the University of Adelaide and was jointly sponsored by the Office of Road Safety, Commonwealth Department of Transport and the Australian Road Research Board.

The general aims were to evaluate the effectiveness of many existing safety measures and to identify other factors related to accident or injury causation in road accidents in metropolitan Adelaide. The areas studied included characteristics of road users, the vehicles and the road and traffic environment.

To achieve these aims a representative sample of all road accidents to which an ambulance was called in the Adelaide metropolitan area was studied in the 12 months from March 1976. Two teams, each comprising a medical officer, an engineer and a psychologist attended 304

randomly selected accidents and collected medical, engineering and sociological data.

The findings are presented in a series of reports, each covering a specific topic. Part 1 provides an overview, and is followed by reports dealing with pedestrians, pedal cyclists, motorcyclists, commercial vehicles, passenger cars and road and traffic factors. The final report in the series provides a summary of the findings and recommendations.

Basic data from the study are held on computer by both the Road Accident Research Unit, University of Adelaide and the Australian Road Research Board. Access to these data can be arranged for bona fide research workers on application to the Australian Road Research Board. Further copies of this report and copies of other reports in the series are available from the Office of Road Safety, Commonwealth Department of Transport.

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(Engineers)

N.D. Brewer and B.L. Sandow
(Psychologists)

J.R. Lipert and P.J. Tamblyn
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Much of the road and traffic data was collected by W.J. Offler, who also attended the scenes of the accidents during the final three months.

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The St. John Ambulance Transport Division played an essential role in the conduct of this study by notifying the Road Accident Research Unit when an ambulance was called to attend a road accident. The South Australian Highways Department, the Road Traffic Board, and the Police Department cooperated in many ways in the execution of this study, as did the Hospitals Department. The proprietors and operators of towing services and crash repair shops facilitated inspections of the damaged vehicles.

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1. INTRODUCTION

A sample of road accidents to which an ambulance was called in the Adelaide metropolitan area was investigated at the scene by multi-disciplinary teams from the Road Accident Research Unit of the University of Adelaide. This survey, which ran for twelve months from 23 March, 1976, was sponsored by the Office of Road Safety of the Commonwealth Department of Transport and the Australian Road Research Board. Each accident was studied by an engineer, a psychologist and a medical officer. Their observations at the scene started an average of ten minutes after the ambulance was called and were supplemented by further investigations including interviews with the drivers and other active participants (pedestrians and cyclists), detailed observation of traffic behaviour at the accident site and examination of the injured persons in hospital and of the vehicles in towing service depots and elsewhere.

An eight per cent sample, totalling 304 accidents, was obtained of all road accidents as defined above. The sample was representative of this accident popul-

ation by time of day and day of week. The purpose of this survey, the sampling technique and the method of investigation are described in detail in another report in this series together with a review of the types of accidents investigated and an outline of the general conclusions.

There were 22 accidents in which a pedal cycle was involved in this sample of 304 accidents. This report contains a general review of these 22 accidents, followed by a detailed presentation of information obtained from interviewing each cyclist. The characteristics of the drivers whose vehicles collided with a pedal cycle are dealt with briefly. The injuries sustained by the cyclists are described, and specific injuries are related to the objects which caused them. A discussion of the possibilities for preventing accidents involving pedal cyclists, and for minimizing the severity of the injuries sustained in those accidents which do occur, precedes the final sections of this report which list the general conclusions and recommendations.

2. THE ACCIDENTS

Half of these accidents occurred between 3 p.m. and 5 p.m. on a week day (Figure 1). Children riding home from school, or just riding around after school, accounted for most of the pedal cycle accidents in this two-hour period. In two of the three accidents which happened at night there were no lights fitted to the bicycle. The third of these night-time accidents occurred when it was raining. None of these cyclists, or any of the drivers of the striking cars, was found to have a blood alcohol level above .04, and only three had been drinking at all.

ACCIDENT LOCATION

The types of locations at which these 22 accidents occurred, and the associated vehicle movements, are shown in Table 1. The categories shown in this Table are not necessarily mutually exclusive, and so some accidents could have been listed under either of two 'locations'. The most common type of pedal cycle accident in this survey was a midblock collision with a motor vehicle.

2.1 MIDBLOCK ACCIDENTS

CYCLIST TURNED RIGHT, STRUCK BY OVERTAKING VEHICLE

Four of the five cyclists involved in this type of collision did not look to check that the road was clear before they started to turn. They were all children, aged from nine to 13 years, and the careless way in which they turned across the road was similar to the manner in which most of the child pedestrians in this sample of accidents ran onto the road without looking.

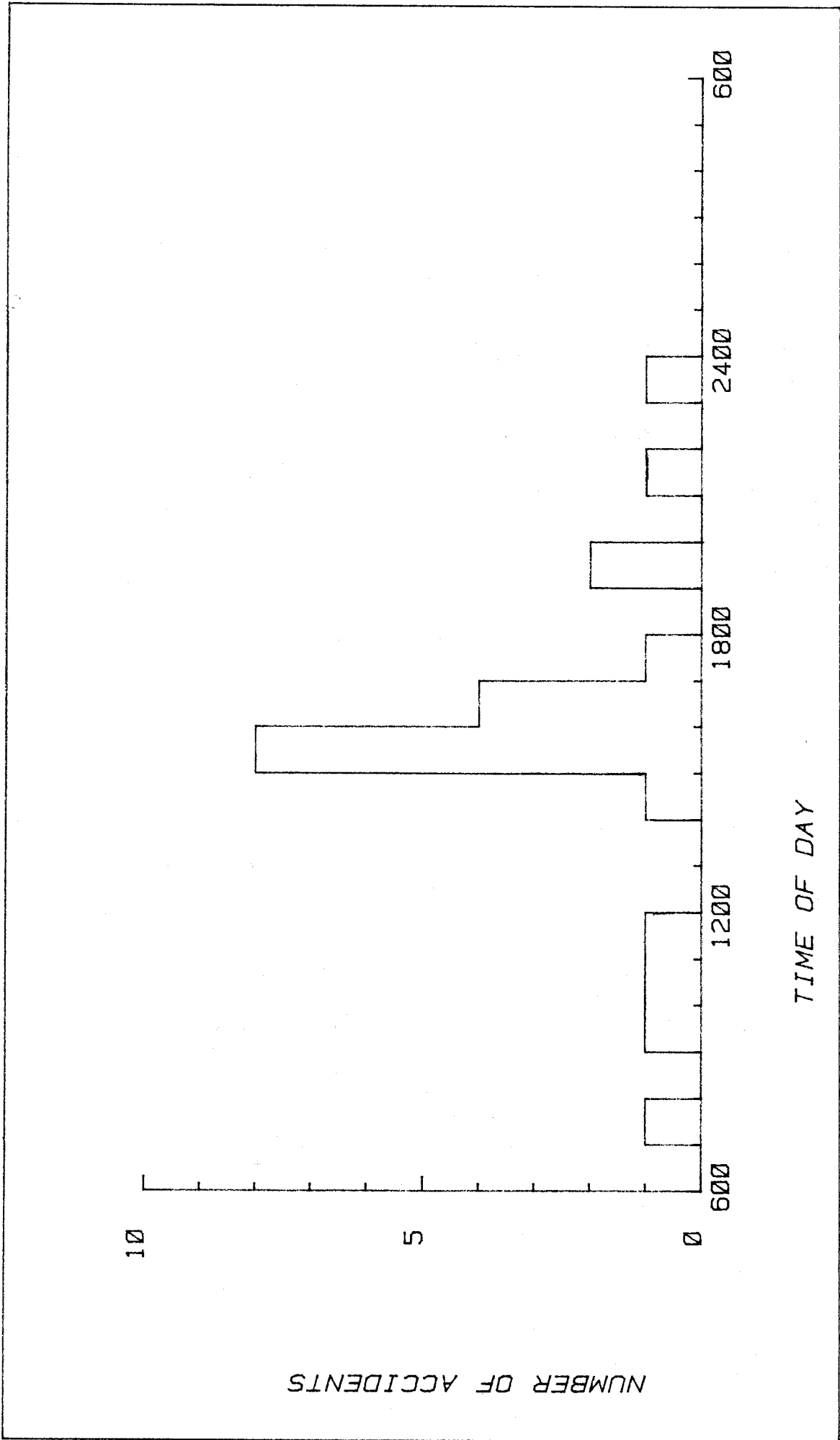
In Accident 177 a ten year old cyclist rode out from behind a telephone call box on the left hand side of the road. He swerved left around a parked car, and then suddenly turned right, just as a car was about to overtake (Figure 2). This accident occurred at a T-junction as can be seen in Figure 2, but it is classified here as a midblock collision because the presence of the intersection had no discernible influence on the actions of either the driver or the cyclist (who was not intending to turn into the intersecting road). The driver of the car had been drinking. His blood alcohol level was .03, which is unlikely to have been an important factor, particularly since a completely sober driver probably could not have avoided colliding with the cyclist.

In a somewhat similar accident (298) a 13 year old girl cyclist veered to her right to pass a car parked in a residential street. A motorcyclist who was about to overtake thought that she was turning right, but as she then appeared to be continuing on past the parked car he moved to the centre of the road to allow plenty of room to pass both the cyclist and the car. At this moment the cyclist turned right, heading for the driveway of her parent's house. The motorcyclist was unable to avoid her, and fell from his machine following the collision.

The second of the two accidents in this study which involved a collision between a pedal cyclist and a motorcyclist happened when a 12 year old boy, riding in a group of three cyclists, decided to take a short cut home by riding through the forecourt of a service station on the right hand side of the road (Accident 297). He broke away from his two companions and turned right, to cross the road, having glanced back over his shoulder. He vaguely recalled having seen the motorcycle, but had not thought that it was close enough to bother him (he even thought, after the accident, that he may have mistakenly believed that it was travelling in the other direction). The motorcyclist had noticed the group of cyclists, but he did not expect one to turn across in front of him. When he realized that one was doing so, he swerved to his right and tried to stop. He, too, fell from his motorcycle following the collision.

The remaining pedal cycle accident in this category (Accident 276) happened when a nine year old boy, who was riding a cycle which he had had for two months, suddenly turned right from the far left side of the road. Like the girl in Accident 298, this cyclist also was heading for his home on the opposite side of the road. He was hit by a car as he turned. The driver had seen the cyclist as the boy rode across a four-way intersection, travelling in the same direction as the car. As he caught up with the bicycle, just past the intersection, the driver decided that the rider showed no sign of doing anything other than continuing straight ahead, and so he proceeded to overtake him. By the time that he realized that the cyclist was turning across his path it was too late to avoid a collision. This driver said that cyclists should be allowed to ride on the footpath. Had the cyclist in this accident been doing so, it is possible that the driver would have had enough warning of the cyclist's change in direction to have been able to have avoided hitting the child.

FIGURE 1: Pedal cycle accidents by time of day.



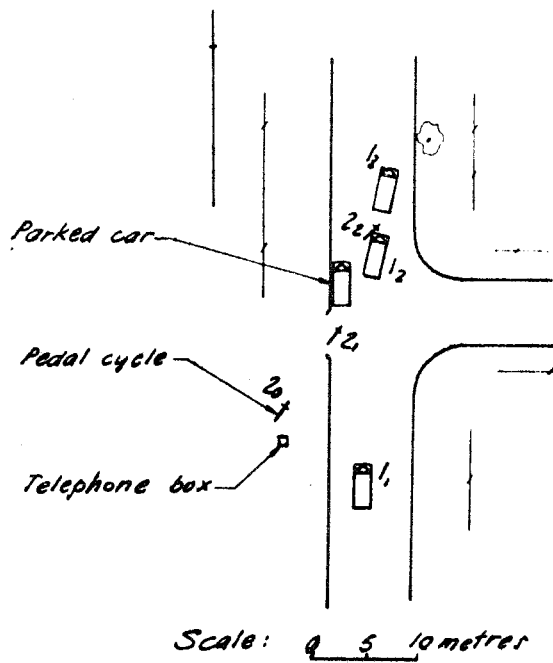


FIGURE 2:
Accident 177.

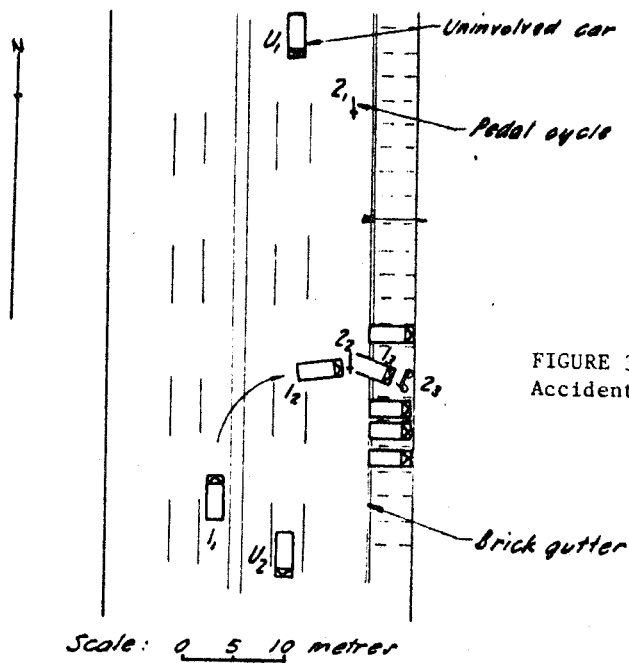
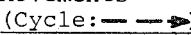









FIGURE 3:
Accident 069.

TABLE 1: PEDAL CYCLE ACCIDENTS BY LOCATION, VEHICLE MOVEMENT AND ACCIDENT NUMBER

Vehicle Movements (Cycle: )	Accident Location				Total Accidents
	Signalised	Sign Controlled Intersection	Uncontrolled Intersection	Midblock	
	-	-	-	023 177 276 297 298	5
	030 ¹	005	028	069 284	5
	087 ²	238	031 226 296	-	5
	-	-	-	154 214 271	3
	-	250	254 ³	-	2
	107	-	-	-	1
	-	-	-	157	1
(car door)					
Total Accidents	3	3	5	11	22

- Notes:
- ¹ Turning vehicle not physically involved.
 - ² Inactive School Crossing, cyclist walking alongside bicycle.
 - ³ Roundabout.

The one adult cyclist who was involved in this type of collision was merging across to the centre of the road in order to turn right at the next intersection. He was on his way home from work, and followed this route every day. On this occasion he misjudged the approach speed of an overtaking car which, based on the braking skid marks, was travelling at about 90 km/h in a 60 km/h speed limit area (Accident 023).

CAR TURNED RIGHT, COLLISION WITH ONCOMING CYCLIST

A 17 year old youth (Accident 284) stopped his car in the centre lane of a four lane road to allow another car to pass from the opposite direction. He then turned right to enter a shopping centre parking area. As his car reached the driveway entrance it was hit on the left side by a pedal cycle. The driver had never driven this particular car before, and had not driven at all for the previous two months. The 15 year old cyclist was riding near the concrete gutter, and as he approached the entrance to the shopping centre he veered across to his right onto the bitumen pavement. He was concentrating on doing this, because there was a rough edge between the gutter and the road surface, and he noticed the car only as it suddenly turned across his path. He braked, but could not stop in time. The driver did not see the cyclist at all before the impact, possibly because the rider was in the shade of overhanging trees and also wearing relatively inconspicuous clothing. The accident occurred in daylight during the afternoon peak traffic period.

The other collision of this type involving a cyclist occurred in heavy rain at night (Accident 069). The car driver turned right, after waiting for an oncoming car to pass, to cross the road and enter a parking space (Figure 3). He slowed down to cross a brick-paved gutter, and was about to accelerate into the parking space when the left front corner of the car hit a cyclist, who was thrown over the bonnet. The driver had not seen the cyclist at all before the impact. The street lighting on the approach path of the cyclist was good, with a sodium vapour lamp directly above, but the rider was hard to see because of the heavy rain. The 21 year old cyclist had seen the car waiting in the centre of the road, and had anticipated the possibility that it might turn across in front of him, but when it did so he found that he could not stop because the rims of the wheels on his bicycle were wet and the brakes were not effective.

CAR DOOR OPENED IN THE PATH OF A CYCLIST

The one accident of this type in the survey happened late at night (Accident 157). The 18 year old cyclist said that he was riding quite fast through a signal-

ised intersection, keeping well to the left on a left hand curve. On leaving the intersection he saw a car parked at the kerb ahead of him. It did not have its parking lights on, and appeared to be empty. As he was about to pass the car the driver's door was opened and he crashed into it, breaking the door off its hinges.

The driver of the car had stopped at the kerb intending to go to a nearby shop. He had stayed in the car for a short time, talking with his passenger, before opening the car door to get out. He had not noticed the cyclist approaching.

The car had high-backed front seats, which both restricted the driver's rear vision a little and may have concealed the occupants from the view of the cyclist. The bicycle was not equipped with either lights or fittings for lights, and the cyclist was wearing dark, inconspicuous clothing.

SINGLE VEHICLE ACCIDENTS

One of these three accidents was the direct result of the cyclist, a 69 year old man, suffering a stroke while riding his bicycle along a footpath (Accident 271). The other two cases each involved 16 year old girls who lost control of their bicycles when descending a steep slope. In the first of these two accidents (Accident 154), the bicycle was intended for use by a child of about ten years of age. The rider, although she owned the bicycle, had not ridden it for more than two years and she was trying to carry another girl as a pillion passenger. The girl in the other accident was on a friend's bicycle which she had not ridden before (Accident 214). She was descending a steep slope into a subway when the cycle began to wobble from side to side and she eventually fell off, striking the retaining wall at the side of the roadway. This bicycle had a heavy bag of books strapped to the rear carrier.

2.2 COLLISIONS AT UNCONTROLLED INTERSECTIONS

In three of the five accidents at uncontrolled intersections a child cyclist turned right from the stem of a T-junction without allowing for the possibility that a car might be approaching on the intersecting road (Accidents 031, 226 and 296). The fourth accident was at an intersection at which a roundabout had been installed, but with no 'Give Way' lines painted on the road (Accident 254). A child on a bicycle was about to turn right at the roundabout when he was hit on his left side by the front of a car which had approached on the intersecting road (Figure 4). The rider and his bicycle were trapped under the front of the car, which continued on for 60 metres past the

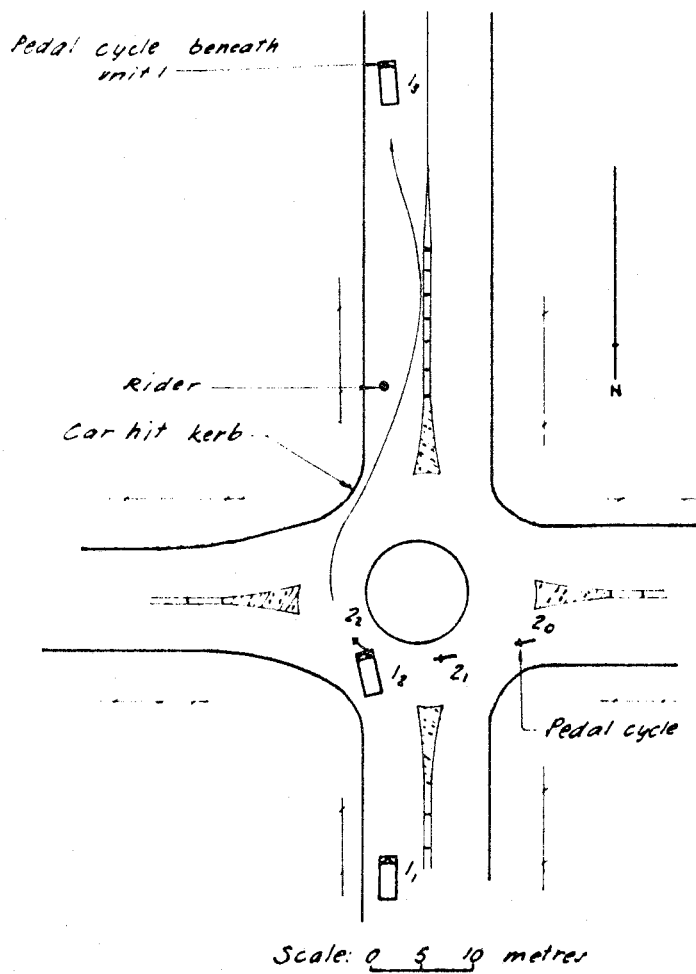


FIGURE 4:
Accident 254.

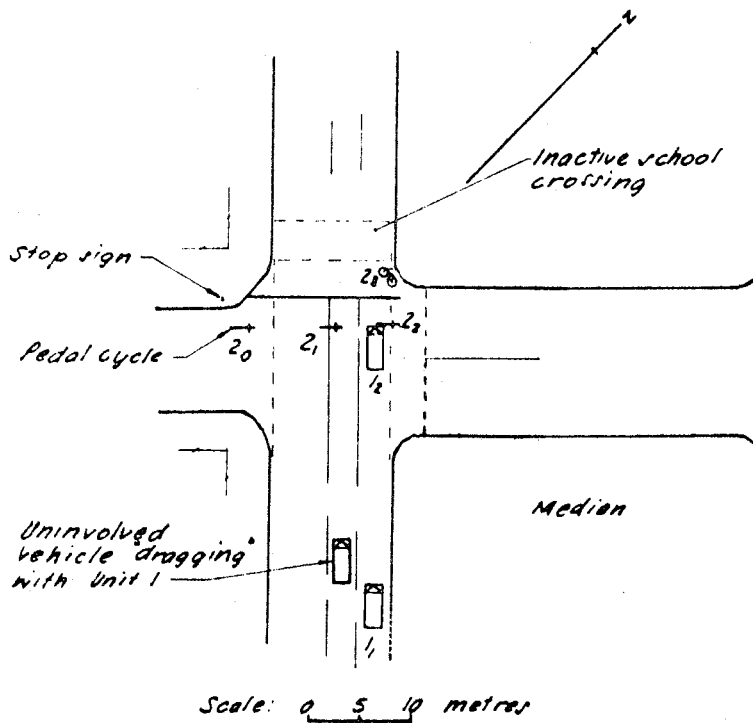


FIGURE 5:
Accident 238.

impact point. The cyclist came to rest 35 metres behind the car, which still had the bicycle wedged under the front bumper. The driver claimed that his brakes had failed. We were not able to get access to the car to check on this claim, but the fact that the driver continued on his way in the same car after the accident suggested that it may not have been correct.

The remaining collision at an uncontrolled intersection occurred at night (Accident 028). A car turned right, across the path of a cyclist who was riding a bicycle which was not equipped with lights. The sole street lighting at the scene was provided by one tubular fluorescent lamp.

2.3 COLLISIONS AT SIGN-CONTROLLED INTERSECTIONS

In two of the three accidents in this category there was evidence that the striking car had been travelling well in excess of the 60 km/h speed limit. In Accident 250 the cyclist turned right, past a Give Way sign, from the stem of a T-junction without looking to his left. A car which was approaching from the cyclist's left, at a speed of about 95 km/h, was unable to avoid him. Even though the cyclist should have given way, had the car been travelling at the legal speed limit of 60 km/h it could have been stopped at least 10 metres before the actual collision point.

The other speeding vehicle had been racing another car. An elderly cyclist had moved off from a Stop sign at the left of the three-lane one-way road when the two cars were still some distance away. He was hidden from the view of the driver of the striking car by the second car until just before the impact (Accident 238, Figure 5). As in the previous accident, this collision may have been avoided had the striking car been travelling at the legal speed limit rather than at about 85 km/h.

The third accident at a sign-controlled intersection had no relevance to the traffic control sign. It involved a car which turned right into the stem of a T-junction, only to be hit by an oncoming cyclist who had passed a stationary bus on its left by riding between it and the kerb (Accident 005). The bus driver had been held up by a queue of vehicles banked up from pedestrian-actuated traffic signals. He had stopped his bus clear of the entrance to the side-street to allow vehicles waiting to turn right to clear the intersection.

2.4 COLLISIONS AT SIGNALISED LOCATIONS

There were three pedal cycle accidents at signalised locations, but the presence of

the signals was directly relevant in only one case, Accident 107. In this accident the cyclist, although turning right with a green arrow (or possibly at the start of the yellow phase), failed to clear the intersection during the intergreen period and was hit by an oncoming car which had entered the intersection from the kerb lane (Figure 6). The car had moved across into this lane to pass vehicles which were stationary in the other three lanes, and continued on into the intersection, without slowing down, as the signal turned to green. The cyclist had covered 37 metres from the STOP line, and still had another eight metres to go to clear the intersection completely, when she was struck by the car.

The intergreen period for right-turning traffic was four seconds, including a three second yellow. This meant that a vehicle which commenced a right turn when the signal changed from green to yellow had to average 40 km/h to clear the intersection before oncoming traffic got a green signal. This is obviously an unrealistic requirement for a pedal cyclist.

An all-red period of one second may have been selected for this turning movement on the assumption that the oncoming vehicles have a clear view of any turning vehicles, but this is not necessarily so, as this accident demonstrates. Increasing the all-red period to four seconds would make the intersection safer, but even then a cyclist would have to average 23 km/h to be clear of the intersection before oncoming traffic entered. This topic is discussed at greater length in the companion report on road and traffic factors.

The cyclist in Accident 030 appeared to have been approaching a four-way signalised intersection too fast to have been able to take safe avoiding action when a car began to turn right, across his path. Although the car stopped before completing the turn the cyclist, who had swerved to his left, could not stop and fell from his bicycle when it hit the kerb.

The traffic signals were not operating at a School Crossing which was being used by a cyclist who was walking alongside her bicycle across a four-lane priority road (Accident 087). Despite the fact that the crossing was not activated, and therefore had no legal significance, this accident is included in this category because the cyclist chose to cross at this point on her way home from work each day; possibly being encouraged to do so by the presence of the pavement markings and a raised median refuge. The driver of the striking car said that he did not see the 'cyclist' until she was almost directly in front of him, because he had just pulled out to pass the car ahead of him.

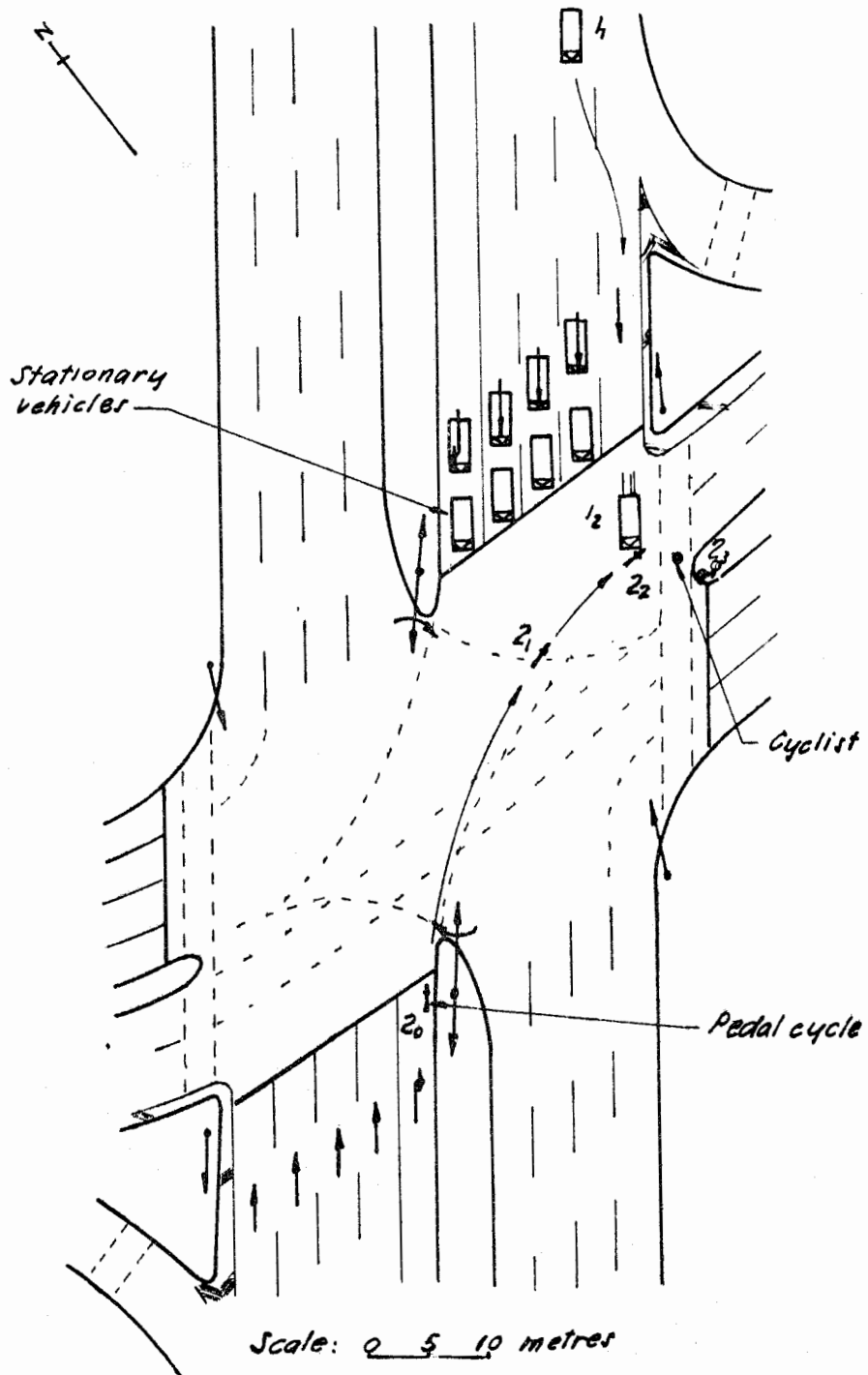


FIGURE 6: Accident 107.