RESULTS

OVERALL RESULTS

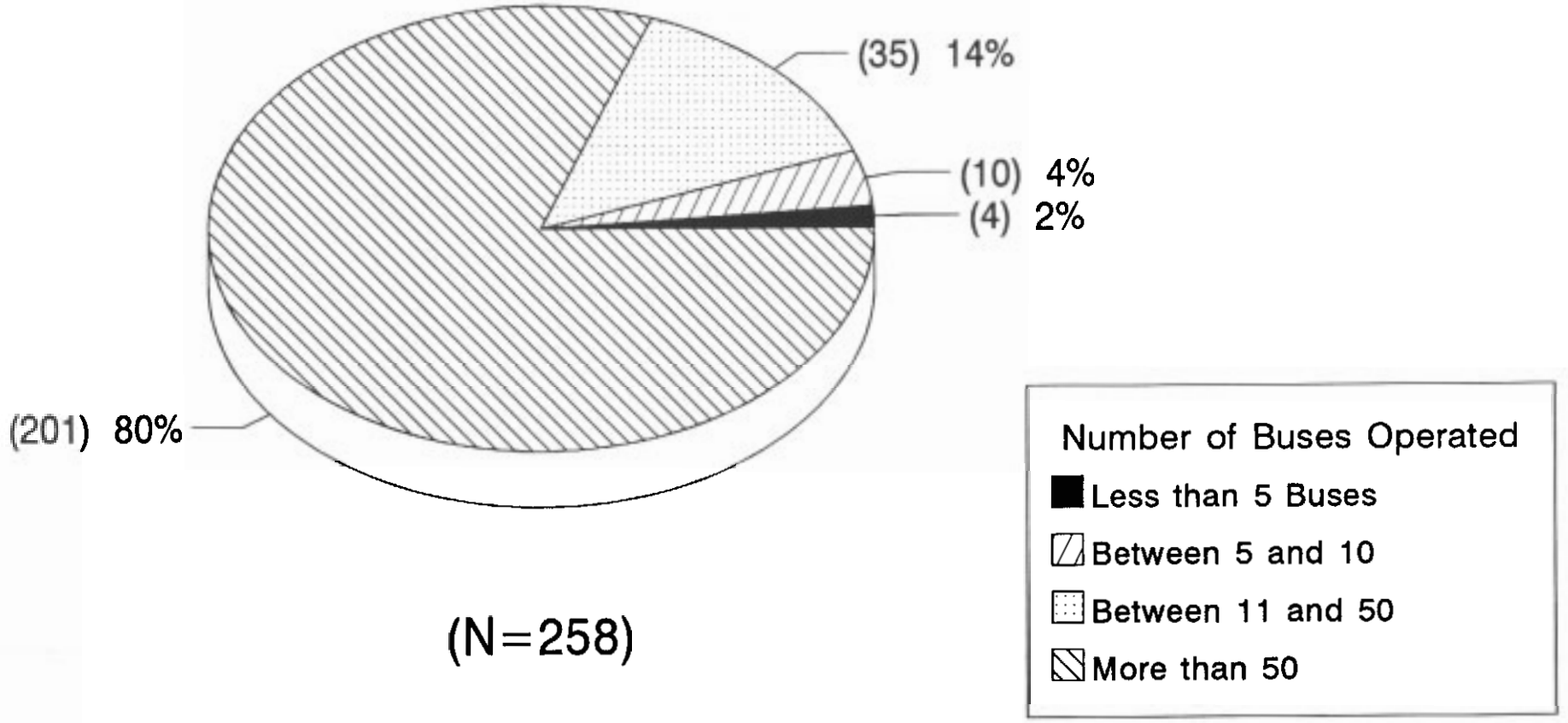
The overall results revealed that all except one of the drivers in the sample were male with an average age of 40.7 years (s.d. = 9.5). Most of the drivers were married or living in a defacto relationship (73.6%). Most had children (67.6%), with the average number of children being 2.7 (s.d. = 1.3).

Most drivers were extremely experienced. They reported an average of 16.1 years (s.d. = 9.9) experience of driving heavy vehicles and an average of 10.9 years (s.d. = 8.2) driving coaches. Only a relatively small proportion had less than 5 years experience driving coaches (36%). This is entirely consistent with the sample of truck drivers surveyed earlier as part of the present project. That sample also revealed that most drivers were reasonably experienced.

Working conditions

The vast majority of drivers were employee drivers (97.6%), with the majority working for large companies of more than fifty coaches (see Figure 1). The majority of drivers reported doing a combination of various types of driving. Virtually all drivers in the sample had experience of night driving (93.2%), with the majority doing overnight driving as part of their current work (58.8%).

Figure 1: Distribution of Drivers by Company Size



Type of vehicle and number of passengers

The majority of the sample reported that they drove a combination of several different vehicle types (see Figure 2). For those who usually drove a particular vehicle type, single deck three axle vehicles were most common, with just over one third of the sample reporting this as the usual vehicle driven. Two axle vehicles and double deck three axle vehicles were usual for only small proportions of the sample.

Irrespective of vehicle type, the number of passengers usually carried was more than thirty for the vast majority of the sample (see Figure 3).

Payment arrangements

The most common way for drivers to be paid was an hourly rate with almost two thirds of the sample being paid this way (see Figure 4). A substantial minority reported being paid a weekly rate with overtime, with only a small proportion reporting being paid by the kilometre travelled. This is in sharp contrast to drivers in the freight sector, the majority of whom reported being paid by the kilometre (km).

Most drivers reported receiving payment at the award rate (85.6%). Only a small proportion of drivers, and substantially fewer than among the truck drivers, reported being paid less than the award (6.8%), or not knowing how their pay rate measured up against the award (3.2%)

Figure 2: Type of Vehicle Usually Driven

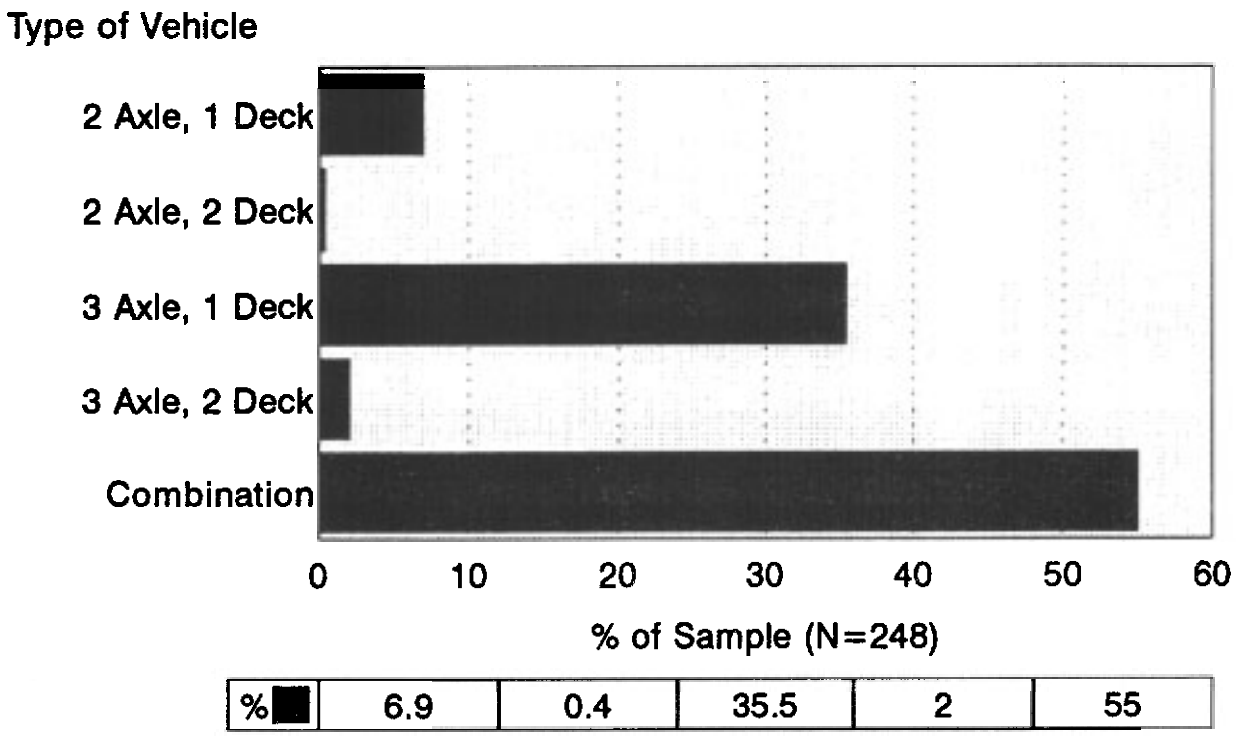


Figure 3: Number of Passengers Usually Carried

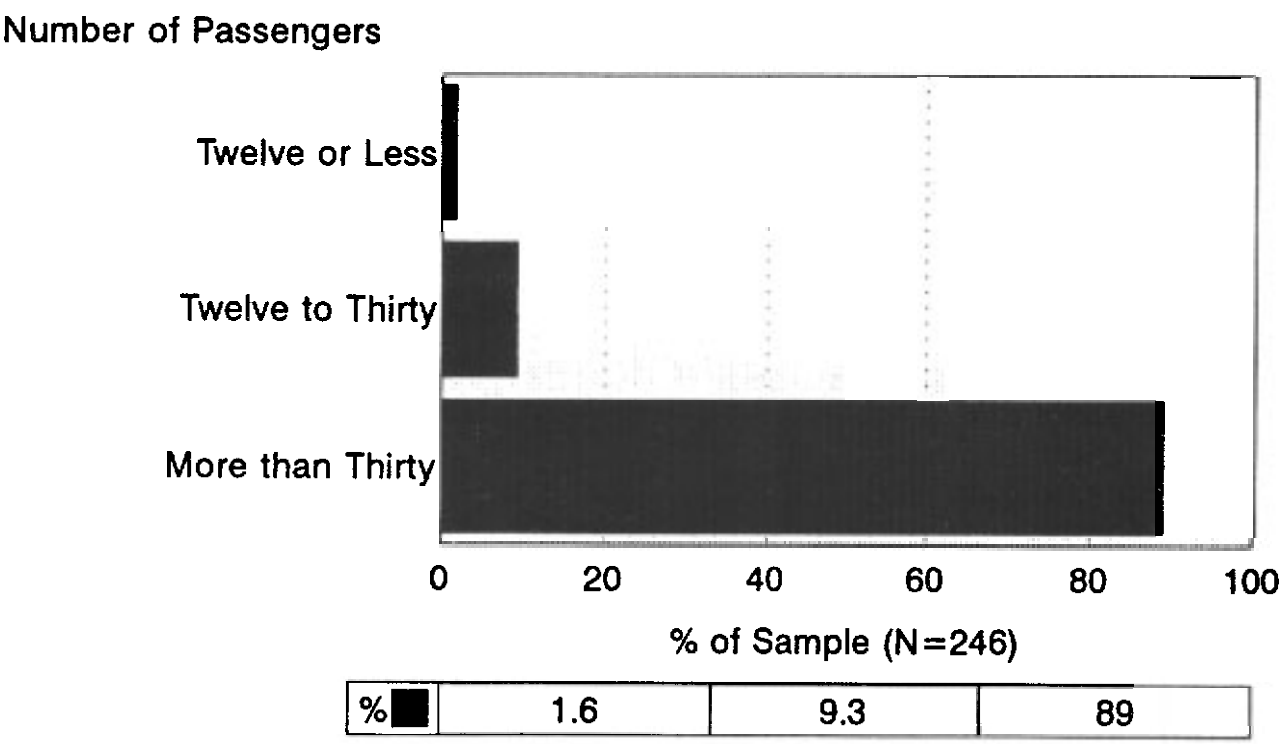
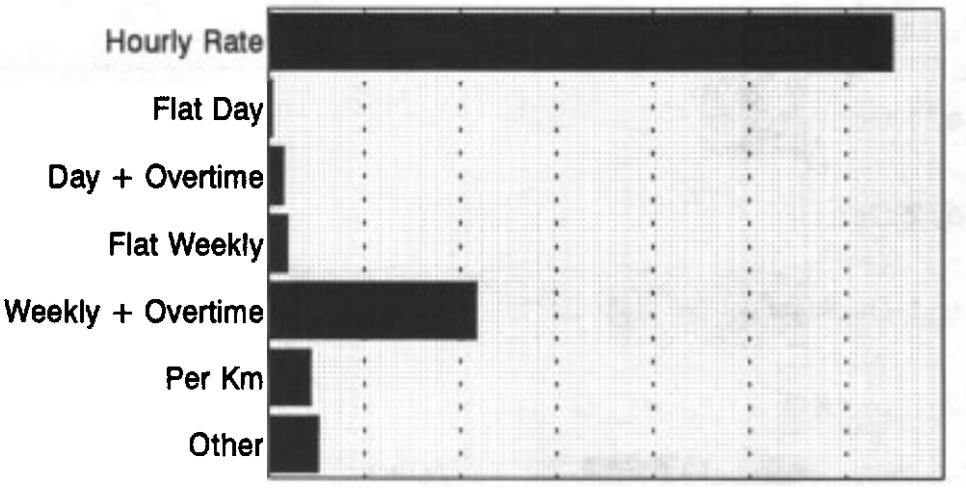
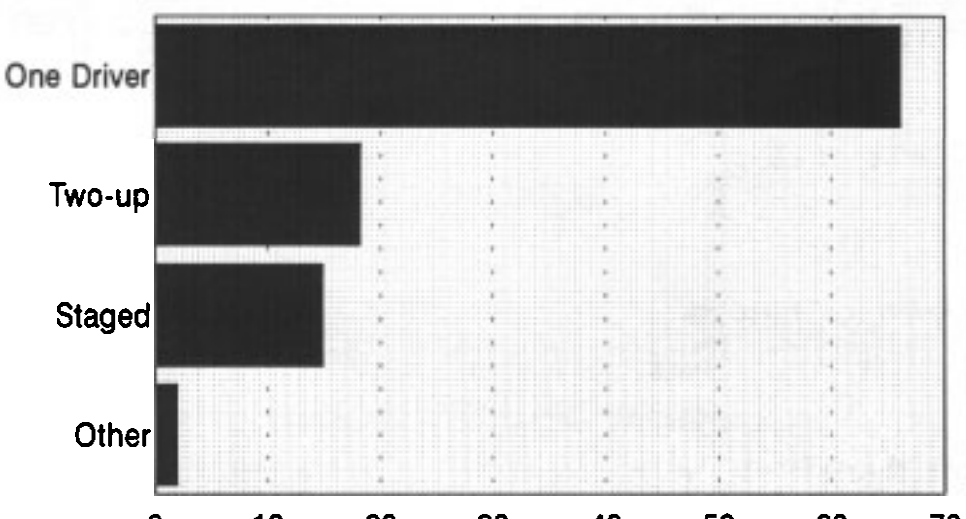


Figure 4: Type of Payment



%	64.8	0.4	1.6	2	21.6	4.4	5.2

Figure 5: Type of Driving



%	66.1	18.2	14.9	2

Last trip

Drivers were asked for a number of details of their last long distance trip. Long distance was defined as being a trip of 300 km or longer. For about three quarters of drivers the last trip was reported as being similar to those that drivers usually did (76.6%).

Trip length

Table 1 shows details of the length and duration of the last trip. The mean trip distance was 2204 km (s.d. = 2528) and the mean duration was 78.7 hours (s.d = 111.4). Since the standard deviations indicated that there was considerable variation in the sample with respect to trip length and duration, the proportion of drivers falling in various parts of the distribution of trip distance and trip duration was examined. A substantial proportion of drivers did relatively short trips, with almost half reporting trips of less than 700 km. Somewhat fewer, although still a substantial proportion, reported relatively long trips of longer than 1500 km. For most drivers the trip lasted longer than 12 hours, with a one third of drivers reporting relatively long trips lasting longer than 30 hours. Compared with truck drivers, far more coach drivers reported doing shorter trips in terms of distance covered but longer trips in terms of time taken.

Type of driving and type of operation

When the types of driving, tour or express were examined, the results revealed that express driving was approximately twice as common as tour driving on the last trip. For about two thirds of the sample the last trip involved express driving (68.4%).

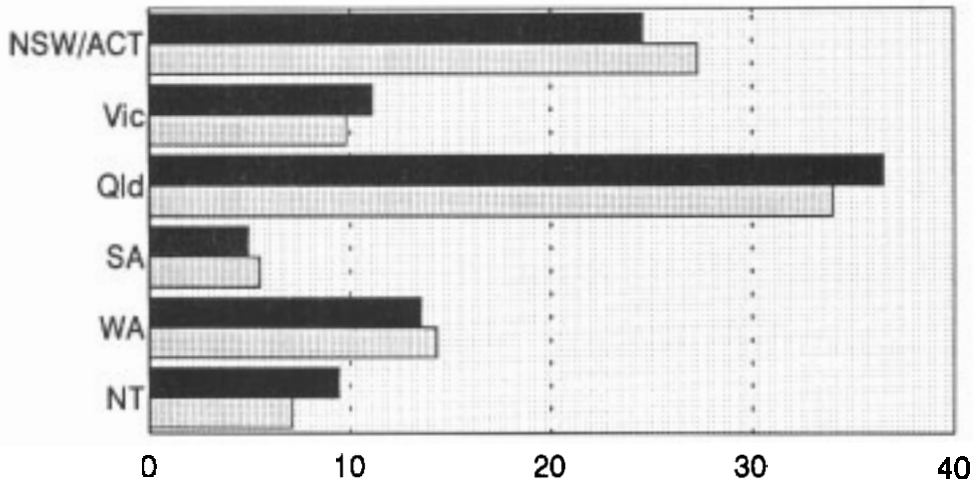
Table 1: Length of Last Trip

Trip Distance	
Mean in Kms (SD)	2204.0 (2528.0)
% Whose Trip was < 700kms	43.0
% Whose Trip was > 1500kms	31.2
Trip Duration	
Mean in Hours (SD)	78.7 (111.4)
% Working > 12Hrs	74.9
% Working >= 30Hrs	35.4

Table 2: Timing and Scheduling of Last Trip

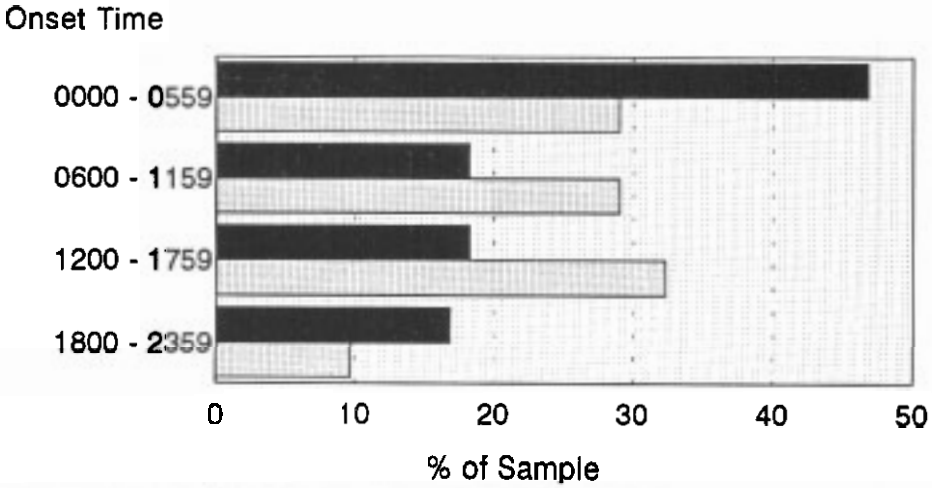
Start Time	
% 0000 - 0559	10.3
% 0600 - 1159	53.9
% 1200 - 1759	21.4
% 1800 - 2359	14.4
Average Crusing Speed	
% At or Below Speed Limit	88
% Above Speed Limit	12

Figure 6: Start and Finish States for Last Trip



Start State	24.6	11.1	36.5	4.9	13.5	9.4
Finish State	27.3	9.8	34	5.5	14.3	7.1

Figure 7: Onset Time of Fatigue for Those Reporting Fatigue on Last Trip



1st fatigue Period	46.8	18.2	18.2	16.8
2nd Fatigue Period	29	29	32.3	9.7

Figure 5 shows the distribution of drivers doing each type of driving operation. By far the most common driving operation on the last trip involved a single driver taking the coach from point of origin to point of destination. Similar but much smaller proportions of the sample reported that their last long distance trip involved two-up or staged driving.

Distribution of drivers across states

All mainland states were represented in the sample (Figure 6). Approximately three quarters of trips started or finished in the Eastern States, with the most common starting or finishing point being Queensland. In part, this pattern reflects the distribution process (see Methodology). It may also reflect, however, the concentration of coach traffic in the Eastern states, particularly in the express sector, which formed the majority of the sample.

Timing and Scheduling of the trip

Table 2 shows some details of how trips were scheduled by or for the driver. In the main, the trip was scheduled by someone other than the driver (92.9%).

The majority of drivers started their trips during the day, between 0600 and 1759. Close to one third of drivers started their trips in the evening or night, between 6.00pm and 6.00am. However, the least common starting time for coach drivers was the early hours of the morning, with less than one in ten drivers starting at this time.

The overall pattern was similar to truck drivers, with 0600 to 1159 being the most common and 0000 to 0559 being the least common starting times. However, the proportion of truck drivers starting in the early hours of the

morning was significantly higher. Another difference was found in the source of scheduling. Virtually all coach drivers had their trips scheduled for them, whereas a substantial proportion of truck drivers appeared to have much greater control over details of scheduling. These differences clearly reflect differences in the pressures associated with loading/unloading and transporting passengers as opposed to freight.

Drivers reported mostly keeping to their schedules on their last trip (82.4%). For the majority of them this did not involve having to travel above the speed limit (Table 2). Only 15.6% of drivers reported their cruising speed on the open road as being above the speed limit. Although the proportion of truck drivers reporting driving above the speed limit was a little higher (approximately one quarter of drivers), speed limit violations are clearly relatively rare events across the long distance road transport industry as a whole.

Driver involvement in other duties

The majority of drivers were involved in non-driving work activities at various points in the trip. These activities included loading and unloading, refuelling the coach, maintenance, for example cleaning the coach, and, in the case of tour drivers, setting up camp. At least three quarters of the drivers were involved in loading/unloading activities at the start and finish of the trip, as well as during the trip. Additionally, virtually all drivers (96%) were involved in other activities such as refuelling and maintenance. The average total time spent on these activities involved 33.2 hours (s.d. = 21.9), with an average of 1.7 hours (s.d. = 0.4) for refuelling and maintenance and an average of 11.5 hours (s.d. = 17.9) for loading and other activities. On average, the proportion of the total trip

time spent in these activities was 13%.

Breaks, rest and fatigue during the trip

Drivers appeared to be well rested before the trip. The average time spent sleeping in the ten hours before the last trip was 6.4 hours (s.d. = 1.9). The vast majority of drivers (89.2%) spent five or more of the 10 hours before the last trip sleeping or resting.

Most drivers had at least one break longer than 15 minutes on their last trip (92.8%). Table 3 shows the distribution of the length of breaks taken by drivers during their last trip. Overall, breaks were most commonly less than one hour in duration. The first break in the trip was more likely to be less than 30 minutes in duration, while the seventh break was likely to be more than 30 minutes in duration and breaks longer than 1 hour were most common at Break 2. While longer breaks were generally more common for later breaks in the trip, the results show that longer breaks had a bimodal distribution. Breaks lasting longer than 5 hours were most common at the fourth break and again at the seventh break, and, at these times, were substantially more common than at other break times.

Table 4 shows the distribution of reasons for breaks on the last trip. The most striking feature of these results is that at all points in the trip, breaks most commonly involved work activities, either as a scheduled stop or as a rest break which included some work-related activities. Exclusively non-work breaks were relatively uncommon across all breaks, although they increased in relative frequency in the later breaks. Breaks taken for a combination of work and non-work reasons also increased later in the trip. These results closely mirror the finding that longer breaks occurred more frequently later in the trip. Taken together these findings most likely

Table 3: Length of Each Break Taken Over the Last Trip Expressed as a Percentage of the Number of Drivers Taking Each Break

Break Number in Chronological Order	N	% Breaks 15-30 Minutes	% Breaks 31 - 60 Minutes	% Breaks 61 - 300 Minutes	% Breaks > 300 Minutes
Break 1	232	58.2	35.8	4.3	1.7
Break 2	159	36.5	33.3	21.4	8.8
Break 3	122	39.3	38.5	13.1	9.1
Break 4	80	36.2	27.5	18.7	20.0
Break 5	53	35.8	35.8	18.9	9.5
Break 6	30	43.3	36.7	10.0	10.0
Break 7	24	25.0	33.4	20.8	20.8

Table 4: Reason for Each Break Taken Over the Last Trip Expressed as a Percentage of the Number of Drivers Taking Each Break

Break Number in Chronological Order	N	% Sleep/ Rest	% Work, e.g. Scheduled Stop	% Personal Comfort	% Combination Including Work	% Combination Not Including Work
Break 1	232	4.4	45.0	12.5	35.0	3.1
Break 2	159	8.8	45.3	11.9	30.8	3.2
Break 3	122	8.2	40.2	9.8	37.7	4.1
Break 4	80	13.7	40.0	13.7	30.2	2.2
Break 5	53	5.7	37.7	11.3	45.3	0
Break 6	30	13.3	30.0	3.3	50.0	3.4
Break 7	24	16.7	12.5	16.7	50.0	4.1

reflect that the longer breaks taken later in the trip were ones either dedicated to rest and sleep or including sleep. The longer periods are necessary to allow effective rest/sleep.

In summary, it seems that rest breaks not at least some work are relatively rare among coach drivers. Even at their most common, breaks in the trip which did not involve work were much less commonly reported by coach drivers than by truck drivers.

Approximately one third of coach drivers reported feeling fatigued on their last trip (33.2%). This is substantially less frequently than reported by truck drivers where half of the drivers reported feeling fatigued on their last trip (50.6%). The majority of drivers reporting fatigue on their last trip experienced it once (54.5%), with about one quarter of drivers experiencing it twice (25.9%), and the remainder of drivers experiencing fatigue three or more times.

Figure 7 shows the distribution of fatigue occurrence across the day. Overall, fatigue on the last trip was most likely to be experienced in the early hours of the morning, between 0000 and 0559. If a second period of fatigue was reported, this was most likely to occur in the afternoon, between 1200 and 1759. These results are entirely consistent with the well documented relationship between circadian rhythm and alertness. Loss of alertness is expected to be greatest in the midnight to dawn hours, with a second smaller peak loss in the afternoon hours. Drivers appeared to be freshest in the evening, as this was the least common period for reporting fatigue, irrespective of how many fatigue periods were reported.

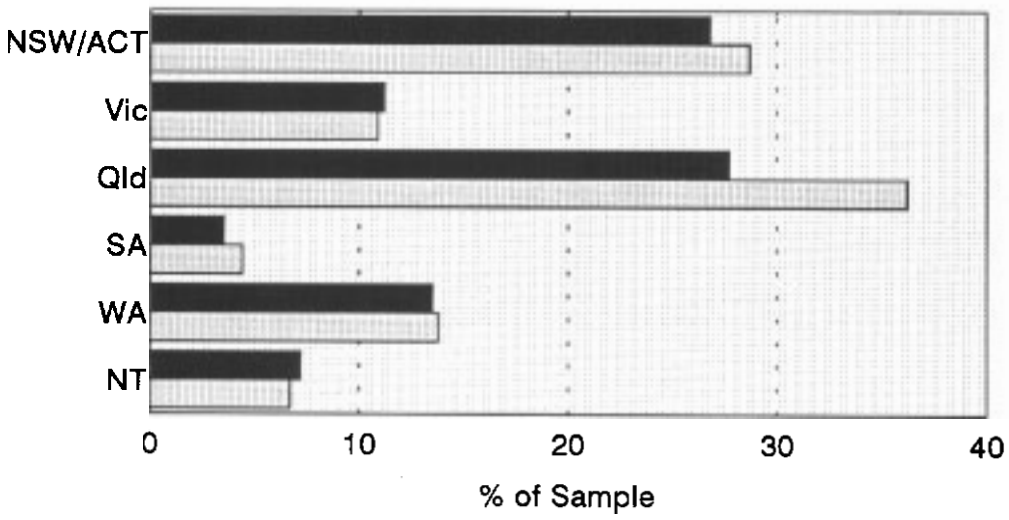
Work/rest schedule in the past week

Drivers reported details of their work schedule for the week before the last trip. Most drivers reported doing some long distance trips in the last week (73.4%), and for the vast majority of drivers this week was typical for them (85.6%). This section of the questionnaire was clearly asking a great deal of drivers, as they were asked to recall quite detailed information about all of their trips in the last week. Consequently, 12.9% of drivers who reported doing some long distance trips in the last week failed to complete the section.

For drivers who did provide details of their work during the previous week, the average hours worked was 60.7 hours (s.d. = 3.9). This involved working an average of 2.6 nights (s.d. = 1.0). These results are extremely similar to the findings for truck drivers, who reported working an average of 62.6 hours per week involving an average of 2.9 nights.

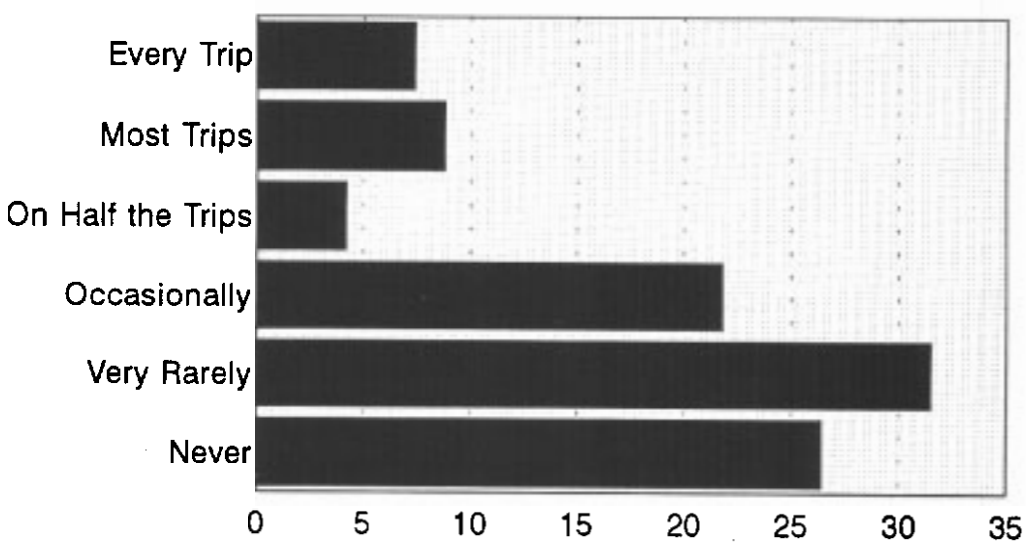
Most of the journeys undertaken by drivers in the last week started or finished in Queensland, although all mainland states were represented (see Figure 8). As with the results of geographic distribution of the last trip, this concentration in Queensland in part probably reflects the distribution of questionnaire around the country. More than two thirds of the trips involved drivers travelling in only one state (69.3%), with only 26% involving drivers travelling in two states, and only very few trips involving travel in 3 or more states (4.7%). This pattern is quite different to that found with truck drivers, who reported that the majority of trips involved travelling in two states (57.7%). The proportion of trips covering only one state is likely to be an underestimate, however. For many coach drivers a trip was conceived of as a round trip. Thus, when asked to report on trips done last week, some drivers reported

Figure 8: Start and Finish States for Trips Made Last Week



Start State	26.8	11.2	27.7	3.5	13.5	7.2
Finish State	28.7	10.9	36.2	4.4	13.8	6.7

Figure 9: Frequency of Breaking Work Hour Regulations



%	7.4	8.8	4.2	21.8	31.5	26.4

the same starting and finishing point, without revealing the number of states travelled in as part of the trip.

Breaking the rules

A number of questions were asked about drivers' experience of breaking work hour and road regulations in order to examine whether factors to do with fatigue play a role.

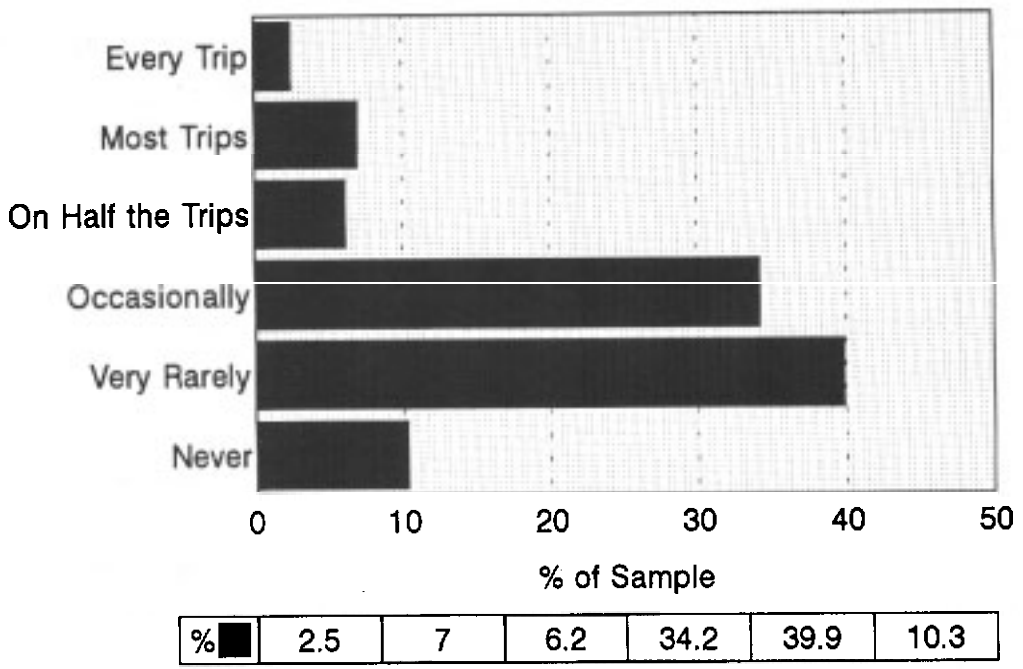
The majority of drivers reported that they very rarely fail to comply with the work hour regulations (see Figure 9). Only about one in five drivers break the work hour regulations on at least half of their trips (20.4%). These results are in sharp contrast to the findings with truck drivers, three times as many of whom reported that they contravened the working hours regulations on at least half their trips. When coach drivers did break the regulations, the most common reasons given for doing so were tight schedules (53.5%), breakdowns (48.7%) and late service connections (42%).

Experience of driver fatigue

Just over half of drivers reported feeling fatigued at least occasionally while driving (53.5%) (see Figure 10). A substantial proportion of drivers reported feeling fatigued only very rarely. Comparatively few drivers reported never feeling fatigued, with an equal proportion experiencing fatigue on most or every trip. This picture is markedly different to that for truck drivers, three quarters of whom reported feeling fatigued at least occasionally while driving and almost one third of whom reported fatigue on every trip.

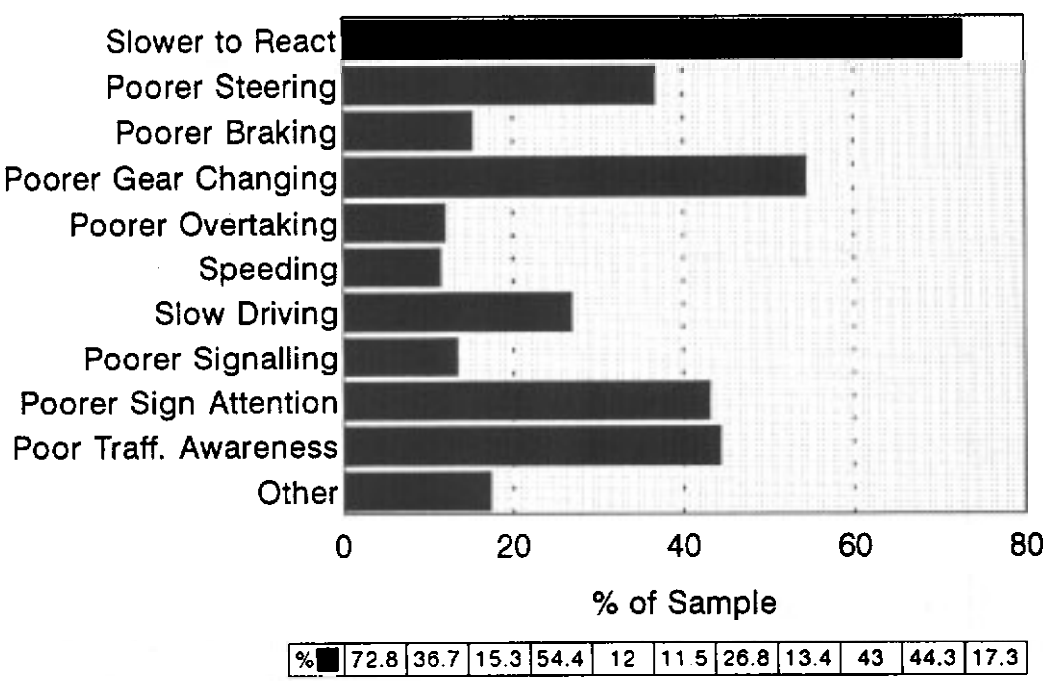
For the drivers who experienced fatigue, most experienced it before the 14th hour (93.6%). Current regulations

Figure 10: Frequency of Fatigue While Driving



%	2.5	7	6.2	34.2	39.9	10.3

Figure 11: Effects of Fatigue on Driving



%	72.8	36.7	15.3	54.4	12	11.5	26.8	13.4	43	44.3	17.3

specifying driving hours for coach drivers vary between 10 and 12 hours. The vast majority of drivers experienced fatigue before the 10th hour (79.1%), with average onset time being 8 hours (s.d. = 4.9). The distribution of when drivers typically experienced fatigue across the day mirrored the results reported for the last trip. The early hours of the morning was the most common time for drivers to experience fatigue, followed by the early hours of the afternoon. As discussed previously, these findings confirm expectations based on circadian functioning.

Drivers were asked to indicate which factors contribute to fatigue while driving, and from these also select the most important factors that contribute to their fatigue. The most common factors judged to contribute to driver fatigue were dawn driving, inadequate sleep before the trip, either due to personal factors or work factors, and long driving hours (Table 5). Each of these factors was nominated by more than half of the sample. The factors judged to be most important for most drivers revealed a somewhat different pattern of judgements. Two-up driving, while being rated as a contributing factor by only approximately one quarter of all drivers, showed the highest rate of judgement as the most important contributor. Approximately half of the drivers who indicated that two-up driving contributes to their driver fatigue rated it as among the most important (51.5%). Similarly, poor bus facilities, in the main referring to sleeping facilities, were rated by approximately one quarter of drivers as a contributing factor, but of these 39.3% rated it as the most important contributing factor. This was followed by inadequate sleep before the trip being among the most important contributors for 35.5% of drivers.

The majority of drivers reported that their driving was worse when they were fatigued (66.4%). Figure 11 shows

Table 5: Contributors to Driver Fatigue

Factor	% Of Drivers Reporting Factor as Contributor	% Of Those Rating Factor as Contributor Who Rate it an Inportant Contributor
Long Driving Hours	46.5	20.0
Insufficient Breaks	29.9	31.1
Scheduled Stops	4.6	0
Checking Tickets	9.3	9.7
Inadequate Meals	28.6	26.2
Passenger Dealings	22.5	29.3
Driving Two-up	19.7	50.3
Inadequate Exercise	27.1	17.0
Inadequate Sleep	45.8	34.3
Driving at Night	13.1	14.5
Driving at Dawn	46.7	24.0
Driving at Dusk	11.2	29.5

Table 5: Contributors to Driver Fatigue (continued)

Factor	% Of Drivers Reporting Factor as Contributor	% Of Those Rating Factor as Contributor Who Rate it an Inportant Contributor
Poor Road Conditions	38.0	38.4
Monotonous Route	42.2	23.4
Highway Traffic	13.1	14.5
City Traffic	14.6	6.2
Poor Weather	33.3	30.9
Poor Bus Facilities	38.5	34.0
Poor Bus Ventilation	24.8	30.2
Bus Vibration	9.9	23.2
Family Problems	11.3	12.4
Poor Eating	26.3	16.0
After-effects Drugs	1.0	50.0
Alcohol	2.8	17.9

the percentage of drivers reporting different effects of fatigue on driving performance. The most common signs of fatigue that drivers reported were being slower to react, poorer gear changing and poorer awareness of traffic signs and other traffic on the road. This reveals largely the same picture as for truck drivers. The proportion of coach drivers reporting that their driving was affected is slightly less than the proportion of truck drivers who reported that their driving deteriorated with fatigue (74.5%). This may well reflect differences in degree. Since fatigue appeared to be a problem less often for coach drivers it may be that they are able to maintain driving performance within what they consider to be reasonable limits to a greater degree than truck drivers. The main effects on driving were similar, revealing that both coach and truck drivers were describing a similar phenomenon. Indeed, it would be remarkable if this were not so. Clearly, fatigue could be expected to have a detrimental effect on the driving task in highly specific ways which is the same for all drivers.

The strategies that drivers use currently to overcome fatigue were also detailed. Drivers were asked to indicate which of a list of strategies they use, and then also to indicate which of these they found to be most helpful (see Table 6). There was considerable consistency in the strategies reported as being used at least sometimes. The most commonly used were listening to music or the radio, having a drink containing caffeine and eating while driving. These strategies were reported by more than three quarters of the sample. Drivers varied however, on which of the strategies they find to be most helpful. Using the CB radio, having a rest, eating while driving, listening to the radio or music and talking to another person were judged as most helpful most often, but each was only chosen by about one in five drivers.

Table 6: Strategies Currently Used to Deal With Driver Fatigue

	% Using Strategy at Least Sometimes	% Of Those Using Strategy Who Rate It as Most Helpful
Sleep	6.0	2.0
Rest	35.7	9.9
Stopping for Meal	28.8	4.1
Eating While Driving	59.1	18.2
Caffeine Drink	64.4	14.8
Non-Caffeine Drink	36.4	4.6
Smoking	26.5	7.7
Drugs	4.8	0
Exercise in Breaks	35.1	2.7
Shower	11.2	0.9
Talking to Other Person	58.3	14.1
Music/Radio	66.9	19.1
CB Radio	49.3	14.6
Singing	14.4	1.9
Adjusting Ventilation	61.9	9.5

There are a number of noteworthy features of these data. First, and perhaps foremost, very few drivers reported stopping to sleep as a fatigue reduction strategy even sometimes. Stopping to rest was significantly more often reported as a strategy used, but still far less often than other strategies. While rest, when it was used, was among the strategies most commonly judged to be helpful, this was still only the case for approximately one fifth of drivers reporting using rest at least sometimes. The lack of prominence of sleep and rest as strategies that drivers use and find helpful to combat fatigue may well reflect the lack of availability of suitable opportunities for these strategies, and, where they do exist, their limited benefits.

In comparison, although sleep and rest were not the most common strategies reported by truck drivers, most truck drivers reported sleep and rest as a common strategy (78.2% for sleep and 70.2% for rest). Only about one in ten coach drivers reported using sleep even sometimes, and just on half reported using rest. Sleep was also more prominent in the strategies reported by truck drivers to be helpful, with almost half of drivers using sleep finding it helpful, compared with only about one fifth of coach drivers using sleep. To some extent, this probably reflects the operational differences of the two groups with respect to the availability of rest and sleep on demand. Only two-up operations in the coach sector, with the option of changing drivers being available, have the same potential for rest and sleep on demand for coach drivers. Listening to the radio or music and having a drink containing caffeine were common strategies in both groups, but for truck drivers these more temporary fatigue management strategies, perhaps better described as alertness prolonging strategies, did not feature among the strategies judged to be most helpful. This may again reflect the availability of suitable rest and sleep options for coach drivers.

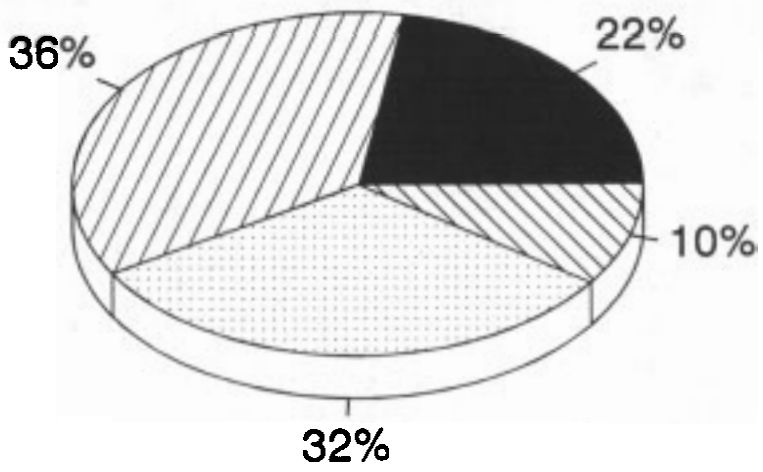
The other noteworthy feature of the present data is the virtual absence of reporting of stay awake drugs by coach drivers as a fatigue management strategy, or as a helpful strategy for those handful of drivers who reported using them sometimes. Again, this is in contrast to reports by truck drivers. A substantial minority of truck drivers reported using stay awake drugs. Moreover, for those truck drivers who used them, almost half said they found them among the most helpful of current strategies. This difference may well reflect that the pressures on truck drivers to keep going beyond the limits of alertness are greater than for coach drivers. Certainly, the lower levels of fatigue reported by coach drivers would corroborate this interpretation.

Attitudes and solutions to driver fatigue

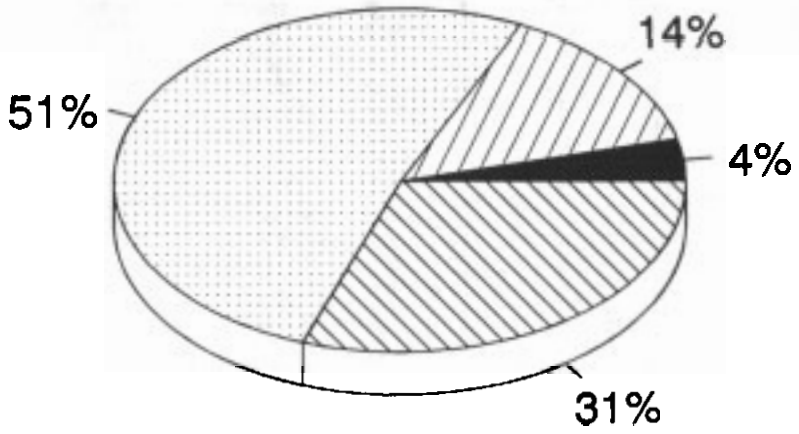
Drivers were asked to give their views of the extent to which fatigue is a problem for the industry and for them personally. Figure 12 shows that there were clear differences in drivers' perceptions of the industry and personal perspective. More than half of the drivers viewed fatigue as at least a substantial problem for the industry. Relatively few drivers judged that there was no problem for the industry. In contrast, when rating fatigue as a personal problem, the majority of drivers rated it as a minor problem with only 18% reporting it to be at least a substantial problem. A significant minority of drivers reported that fatigue was not a problem for them.

This overall pattern, with fatigue being rated as considerably less of a problem for drivers personally than for the industry, was similar to the pattern of responses for truck drivers. However, both from the

Figure 12: Drivers' Ratings of Extent to Which Fatigue is a Problem



Industry Problem



Personal Problem

Rating Categories

Major | Substantial | Minor | No Problem

industry perspective and from the personal perspective, substantially more truck drivers rated fatigue as a problem.

Drivers were also asked to make judgements about a range of existing and potential strategies that could be used to deal with driver fatigue in the long-distance coach industry. They were asked to rate each strategy in terms of how helpful they would find it in dealing with their driver fatigue, and, then to select which strategies they judged would be most helpful. As Table 7 shows, the strategies reported most often as very helpful were improvements to roads, industry self-regulation and staged driving. Interestingly, a substantial proportion of drivers also rated stricter policing of stay-awake drugs as very helpful (50.4%), and relatively few drivers rated provision of drugs by prescription as very helpful (12.4%). These results confirm the earlier finding that the use of drugs seems virtually nonexistent in this sector of the industry.

Of the strategies selected as very helpful, the ones judged by drivers to be most helpful revealed a somewhat different pattern. The most helpful strategies were judged to be improvements to roads (41.6%), easing tight schedules (35.1%) and greater flexibility in driving hour regulations (27.1%). Improvements to roads were common as the top strategy to both lists, that is those strategies that would be very helpful and those strategies that would be most helpful. Otherwise, the top strategies in the two lists differed, suggesting that those strategies which are considered to have the potential to be very helpful in the longer term only partially address the current top priority concerns.

Drivers were asked to suggest any other strategies that were not include in the questionnaire that may be useful in dealing with driver fatigue in the long distance bus

Table 7: Strategies That Could be Used to Deal with Driver Fatigue

	% Of Drivers Rating Strategy as Very Helpful	% Of Those Rating Strategy as Very Helpful Who rate it as Most Helpful
Education/Training	41.5	9.9
Policing Drugs	50.0	1.6
Drugs by Prescription	12.4	9.7
Stricter Hours	32.8	17.4
Stricter Enforcement	38.5	11.7
Work Time Regulation	39.2	13.3
Industry Regulation	66.4	6.0
Danger Hours Ban	3.2	12.5
Breaks	29.4	16.7
Two-up	30.1	21.9
Staged	58.2	14.8
Ease Schedules	50.9	32.0
Tighten Schedules	0.4	0
Improve Bus Design	42.4	16.3
Monitors	22.2	14.9
Better rest Facilities	46.9	10.4
Flexibility of Hours	42.4	25.0
Improve Roads	75.6	40.3

Table 8: Additional Fatigue Management Strategies Suggested by Drivers

	% Of Drivers Suggesting Strategy
Less Police/RTA Harassment	3.2
Remove Speed Limiters	4.5
Change to Logbook Procedures	< 1
Abolish Logbooks	< 1
Uniform Driving Hrs and Regs	1.6
Making Companies Accountable	6.4
Educating Public	1.9
Other	33.7

and coach industry. The majority of drivers (70%) suggested other strategies (see Table 8). A wide range of suggestions were made, such that about one third of them could not be classified. The most common strategies that drivers spontaneously suggested were making companies more accountable for the conditions imposed on drivers (6.4%), and removal of speed limiters (4.5%).

The strategies judged by drivers as least helpful were also examined. Drivers were extremely consistent in their judgements of strategies that would not be helpful. Most drivers nominated tightening schedules (91.8%), banning driving between the "danger hours" of 0200 and 0600 (89.5%), and providing drugs by prescription(72.6%) as strategies that would not be helpful.

There was considerable overlap between the strategies judged by coach drivers and those judged by truck drivers to be most helpful. Improvements to roads, flexibility of hours and scheduling issues raised by coach drivers were also among the most prominent for truck drivers. It seems that, despite quite obvious differences in operation and substantial differences reported in the size of the problem, some common industry-wide issues exist among the top priorities for fatigue management. The main exception to the overlap in top issues relates to stay-awake drugs. A substantial minority of truck drivers judged stay-awake drugs to be very helpful. Of these, a significant percentage judged provision of drugs as being the most helpful for them. In contrast, stay-awake drugs were not seen as a fatigue management strategy for coach drivers. In fact, approximately half of coach drivers considered that stricter policing of drugs would be very helpful.

THE INFLUENCE OF SECTORIAL DIFFERENCES WITHIN THE LONG-DISTANCE COACH INDUSTRY

While the preceding description of the overall results provide a description of the working situations of long-distance coach drivers as a group, different subgroups of drivers can be identified who may experience different pressures.

The effect of two main types of influences were investigated: the type of driving, tour or express, and the driving operation, single, two-up or staged. Both of these influences were thought likely to have a major impact on the way the work is done. In addition, the results for drivers with any experience of two-up and staged driving were examined separately for their views of the operations.

THE INFLUENCE OF DRIVING TYPE

The sample was divided into drivers for whom the last trip was an express trip and those for whom the last trip was a tour. For the vast majority of drivers in each group this trip was typical of the trip that they usually do.

Description of drivers doing each type of driving

Table 9 contrasts the characteristics of tour and express drivers. There were few differences between the two groups. Drivers were of similar age and equally likely to be married or in a defacto relationship. Tour drivers were somewhat less likely to have children, but when they

Table 9: Characteristics of Drivers by Driving Type

	Express (N = 171)	Tour (N = 79)
Mean Age (SD)	41.8 (9.4)	38.9 (9.5)
Family Status		
% Married or Defacto	74.1	73.9
% With Children	72.8	58.2
Mean No of Children (SD)	2.7 (1.3)	2.9 (1.2)
Driving Experience		
Median Yrs (Range)	9 (1-36)	7 (1-27)
% <= 10yrs	59.9	61.0
% >= 20yrs	13.4	15.6
No of Passengers Carried		
% <= 30	12.4	10.9
% > 30	87.6	89.0
Size of Company		
% <=50 Buses	17.5	19.6
% > 50 Buses	82.5	80.4
Type of Bus Driven		
Single Deck	41.2	44.1
Double Deck	2.9	1.3
Combination	55.9	53.8

did, they were likely to have a similar number of children to their express driver colleagues.

Tour drivers had, on average, slightly less experience in the coach industry than express drivers, with both groups having an average of more than five years experience. More than one third of both groups, nevertheless, had greater than ten years experience. Thus, both groups largely consist of experienced drivers.

The vast majority of drivers in both groups routinely carried more than 30 passengers (Table 9). No major differences were evident in type of coach usually driven.

Payment arrangements and driving type

Few differences distinguished the two groups in terms of type of payment received. The majority of drivers in both groups were paid an hourly rate (see Table 10), and the remainder were mostly paid on a weekly basis.

Amount of payment received did not vary substantially with driving type. The vast majority of drivers in both groups were paid at the award. When drivers were paid less than the award, this was more common among express drivers. Only very few drivers reported not knowing how their rate of pay compared with the award rate. For the minority of drivers who reported not knowing, it was again more common among express drivers. Overall, however, information about pay entitlements appear to be well known amongst all drivers.

Table 10: Payment Details by Driving Type

	Express	Tour
Payment Type		
% Hourly Rate	62.6	69.6
% Daily/Daily + Overtime	1.2	3.8
% Weekly/Weekly + Overtime	24.0	22.8
% Per Km	5.8	1.3
% Other	6.4	2.5
Payment Rate		
% Award	85.3	87.3
% > Award	1.8	8.9
% < Award	8.8	2.5
% Not Knowing Award Rate	4.1	1.3

Table 11: Details of Work Last Week by Driving Type for Drivers Reporting Long-distance Trips

	Express	Tour
% With Long-distance Trips	85.2	46.5
Hours Worked		
Mean (SD)	56.8 (22.8)	64.6 (72.7)
% <= 38hrs	15.3	42.9
% > 72hrs	18.5	21.4
Mean No Nights Worked (SD)	3.6 (1.4)	1.7 (0.9)

Weekly working conditions and driving type

There was considerable divergence when weekly schedules of work for the two groups were examined. The vast majority of express drivers reported doing long-distance trips in the working week prior to the last trip, compared with just under half of the tour drivers (see Table 11). For those drivers in each group doing long distance trips, the average number of hours worked in the past week were somewhat similar for both groups, although vastly more variable for the tour drivers. Detailed examination of the distribution of hours worked in the previous week revealed that approximately equal proportions of both groups worked longer hours, with about one fifth of each group working more than 72 hours. In contrast, the groups differed in the number of drivers who worked shorter hours. Nearly three times as many tour drivers as express drivers worked less than 38 hours in the previous week, that is essentially "office hours".

The differences between the groups were not confined to the number of hours worked. The times of day when the hours were worked differed also. Express drivers reported working twice as many nights in the previous week as tour drivers.

Last trip and driving type

Tables 12 and 13 show details of the last trip for drivers in each driving type group.

Trip length and duration

The distances covered and the time taken for the last trip varied considerably between and within the two

Table 12: Details of Last Trip by Driving Type

	Express	Tour
Trip Length		
Mean in Kms (SD)	1479.5 (1576.8)	2928.3 (3478.7)
% Driving > 1500 Kms	27.3	38.7
Trip Duration		
Mean in Hrs (SD)	28.4 (32.6)	129 (190.2)
% Whose Trip was >= 12 Hrs	48.7	87.2
% Whose Trip was >= 30 Hrs	24.7	58.5
Cruising Speed		
% Travelling <= Speed Limit	84.4	94.7
% Travelling > Speed Limit	15.6	5.3
Driving Operation		
% Driving Single Driver	54.5	92.0
% Driving Two-up	24.6	4.0
% Driving Staged	21.0	1.3
Starting Time		
% 0000 - 0559	8.9	13.5
% 0600 - 1159	42.0	81.1
% 1200 - 1795	29.0	4.1
% 1800 - 2359	20.1	1.4

Table 13: Breaks, Fatigue, and Pre-trip Activities on Last Trip by Driving Type

	Express	Tour
Mean No of Breaks >= 15mins (SD)	2.8 (2.3)	5.27 (2.0)
Mean Time Spent on Breaks as % of Trip Time (SD)	22.5 (38.7)	31.9 (64.9)
% Reporting Fatigue on Last trip	35.7	31.1
Mean Sleep/Rest Hrs in 10 Hrs Before Trip	9.0 (1.7)	8.9 (1.2)
Reasons for Breaks		
% Sleep/Rest	9.6	3.7
% Work, e.g. Scheduled Stops	33.6	57.4
% Personal Comfort	11.1	12.7
% Combination Including Work	42.2	24.2
% Combination Not Including Work	3.6	2.0
Loading and Other Non-driving Activities		
% Required to Work Other Duties	90.7	76.1
Mean Hrs Spent on Other Duties (SD)	2.1 (1.9)	44.2 (68.2)

groups. Essentially, however, tour drivers covered much longer distances and took far more hours to complete the trip than express drivers (Table 12). However the relationship between distance travelled and time taken was not a proportional one. On average, tour drivers travelled twice as far as express drivers, but took four times as long to cover the distance. This finding probably reflects that trips for tour drivers included overnight stops. While the average trip length and duration showed considerable variation within each group, it is quite clear from examination of the distributions for trip length and trip duration that more tour drivers were doing longer trips. More than half of the tour drivers, compared with one quarter of the express drivers, did trips of 30 hours or more (see Table 12). Similarly, more than one third of tour drivers reported trips covering more than 1500 km, compared with just over one quarter of express drivers. These findings are hardly surprising, given the nature of touring on the open road compared with the commuter focus of express operations.

The cruising speed on the open road reported by the majority of drivers was at or below the speed limit. For the small minority of drivers who reported travelling above the speed limit, it was more common among express drivers than tour drivers. This again probably reflects differences between touring and commuting operations, with the latter likely to demand more rigid adherence to schedules.

Type of driving operation

For both tour and express drivers, single driving was the most common driving operation (Table 12). This was particularly the case for tour drivers, virtually all of whom operated in this manner. Two-up was slightly more common than staged operations among express drivers. Two-up and staged operations each accounted for about one

quarter and one fifth of operations respectively for express drivers.

Timing of the trip

As Table 12 shows, express and tour drivers differed in the starting times for their last trip. The majority of both groups started their trips during the day, between 6.00am and 6.00pm. Although the most common starting time for both groups was between 0600 and 1159, this was the case for more than three quarters of tour drivers compared with less than half of express drivers. Express drivers were much more likely to start their trips at night than tour drivers. Almost one third of express drivers reported starting their trips between 6.00pm and 6.00am, compared with only 15% of tour drivers. A minority of both groups started their trips in the midnight to dawn hours. This minority was slightly larger for tour drivers.

Breaks in the last trip

The number of breaks longer than 15 minutes that drivers reported taking on their last trip varied by type of driving in much the same proportion as trip length (Table 13). Tour drivers drove an average of twice as far as express drivers, and they also took approximately twice as many breaks of 15 minutes or longer.

Tour drivers also spent a greater proportion of their trip in breaks, indicating that break length was also longer for them. For the majority of tour drivers trip duration was 30 hours or greater, while for the majority of express drivers trip duration was 12 hours or less. It could be expected that trips lasting longer than a 24 hour period would be more likely to involve longer periods of sleep, thereby increasing the proportion of total time spent in breaks for tour drivers. Tour drivers

did indeed report more longer breaks than express drivers. Only 8.8% of breaks were shorter than one hour for tour drivers, compared with 50.9% of breaks for express drivers being shorter than one hour.

It should be noted that these data are likely to represent an underestimate of the time tour drivers spent in breaks. Just under one quarter of tour drivers (24.1%) reported that their work currently involves overnight work compared with three quarters of express drivers (74.9%). These data confirm the expectation that tour driving involves overnight stops. Overnight stops for tour drivers were not however, included in reporting of breaks taken during the trip. Rather, tour drivers reported on breaks involved in a day's driving.

Although express drivers spent less time proportionable in breaks and took fewer long breaks than tour drivers, the two groups did not differ substantially in terms of the proportion of drivers who reported experiencing fatigue on the last trip (Table 13). About one third of drivers in each group reported experiencing fatigue on the last trip. The fact that express drivers made shorter trips and worked shorter hours than tour drivers may have compensated for less access to breaks. Tour drivers on the other hand, were likely to be compensated for their longer trips by access to overnight rest. Therefore, the finding that the groups were similar with respect to the proportion of drivers who were fatigued on the last trip indicates that each driving type seems to have characteristics which offset the factors that could be expected to result in fatigue.

The activity during breaks is also likely to be important for fatigue management. Examination of the activity during breaks revealed that in the last trip breaks dedicated to sleep and rest was the least common category for both groups (Table 13). However, express drivers were

slightly more likely to have such dedicated rest breaks. In addition, express drivers were also much more likely to have breaks which were a combination of work and rest, compared with tour drivers. For tour drivers on the other hand, the most common reason for a break was work. Again, overnight rest available to tour drivers is not represented in these data. Overnight rest may have offset any fatigue that tour drivers experienced due to less access to designated rest breaks during a day's driving.

The groups were also similar in terms of rest obtained immediately prior to the trip. It can be seen from Table 13 that drivers in both groups were well rested before the trip. All drivers reported getting an average of 9 hours sleep and/or rest in the 10 hours prior to the trip.

Driver involvement in other duties

The majority of drivers in both groups were involved in loading and/or other non-driving work at some point in the trip (Table 13). These activities included refuelling, coach maintenance and setting up camp in tour operations. Involvement in such activities overall was more common among express drivers than tour drivers. Tour drivers, however, spent proportionally more of their trip time involved in these activities. The average time spent by tour drivers was 22.1% (s.d. = 18.2) of the total trip time whereas this proportion was approximately 9.6% (s.d. = 6.1) for express drivers. The greater proportion of time involved in such activities reported by tour drivers was mainly due to non-maintenance activities such as setting up camp. The groups were in fact quite similar in the amount of time spent on maintenance and refuelling activities. Express drivers spent an average of 0.9 hours (s.d. = 1.2) and tour drivers spent an average of 1.7 hours (s.d. = 3.0). As could be expected, time spent on coach maintenance was roughly proportional to distance

travelled. Tour drivers travelled approximately twice as far as express drivers, and spent about twice as much time involved in such activities.

The fact that tour drivers spent almost one quarter of the trip time in non-driving activities may be another characteristic of touring work which offsets the fatigue that could be expected to occur due to the long trips done by these drivers. One of the aspects of the driving task which is known to contribute to fatigue is that it involves long hours of constant attention and prolonged inactivity in a monotonous environment. The high level of involvement in non-driving activities may help tour drivers stave off fatigue by interspersing other activities with the monotony of driving.

Breaking the rules

A minority of all drivers reported breaking the work hour regulations, with approximately one quarter of drivers in both groups reporting breaking these rules on at least half their trips (Table 14). The reasons given for needing to break the work hours regulations only differed slightly by driving type. The most common reasons given by express drivers were breakdowns, followed by late connections and tight schedules. The pattern was largely similar for tour drivers who reported that passenger problems were the most common reason for needing to break the work hours regulations, followed by tight schedules and breakdowns. The differences in primary reason are hardly surprising, clearly reflecting differences in operational conditions distinguishing tour and express driving. Express operations focus on transporting passengers quickly and efficiently, and are therefore more likely to be critically affected by factors that delay departure and arrival. Tour operations, in

Table 14: Adherence to Work Hour Regulations and Road Rules by Driving Type

	Express	Tour
% Breaking Work Hr Regs >= Half Trips	24.3	26.5
Most Common Reasons Why		
1st	Breakdowns (72.4%)	Passenger Problems (41.9%)
2nd	Late Service Connections (61.2%)	Tight Schedules (39.5%)
3rd	Tight Schedule (58.6%)	Breakdowns (38.1%)
% Breaking Road Rules >= Half Trips	18	19
Most Common Reasons Why		
1st	Late Service Connections (52.4%)	Tight Schedule (38.1%)
2nd	Tight Schedule (52%)	Passenger Problems (25.6%)
3rd	Breakdowns (49.2%)	Return Home (18.6%)

contrast, are concerned with travelling rather than commuting, and are therefore more likely to involve time spent with passengers and to be affected by individual passenger demands.

Breaking the road rules was even less common than breaking the work hour regulations and again only differed slightly with driving type (Table 14). Less than one fifth of drivers in each group reported breaking the road rules on at least half their trips. The common reasons given were virtually identical to those given for breaking the work hour regulations. Express drivers reported late service connections, tight schedules and breakdowns as the most common reasons. For tour drivers tight schedules and passenger problems were again at the top of the list.

Attitudes to and experience of fatigue

Attitudes to and effects of driver fatigue

Table 15 shows details of attitudes to fatigue and effects of the problem for drivers doing each type of driving. The majority of drivers in both groups believe fatigue to be at least a substantial problem for the industry, with a slightly higher proportion of tour drivers believing this to be the case. The two groups differed more in their ratings of fatigue as a personal problem. While a minority of drivers in both groups believed that fatigue is at least a substantial problem for them personally, the belief was more common among express drivers than tour drivers.

Express drivers also reported experiencing fatigue slightly more often than tour drivers (Table 15). Again, however, only a minority of drivers in each group

Table 15: Details of Fatigue Experience by Driving Type

	Express	Tour
Is Fatigue a Substantial Problem?		
% Who Say it is for Industry	56.9	62.0
% Who Say it is Personally	20.6	12.7
% Who Report Fatigue >= Half Trips	17.2	12.1
Onset of Fatigue		
Mean Hrs After Starting Work (SD)	8.2 (5.7)	7.6 (2.7)
Timing of Fatigue		
% Reporting Fatigue Between 0000 - 0559	50.6	4.0
% Reporting Fatigue Between 0600 - 1159	19.3	24.0
% Reporting Fatigue Between 1200 - 1759	13.3	52.0
% Reporting Fatigue Between 1800 - 2359	16.8	20.0

Table 15: Details of Fatigue Experience by Driving Type (continued)

	Express	Tour
Adverse Effects of Fatigue on Driving		
% Reporting Adverse Effects	71.7	55.1
Most Common Adverse Effects		
1st	Slower to React (78.2%)	Slower to React (56.4%)
2nd	Poorer Gear Changing (56.8%)	Poorer Awareness Other Traff. (48.7%)
3rd	**Poor Attention to Traff. signs (43.7%)**	**Poorer Gear Changing (47.5%)**
Most Common Contributirs to Fatigue		
1st	Driving at Dawn (50.7%)	Monotonous Route (42.9%)
2nd	Inadequate Sleep before Trip (49.0%) 13.3	Long Driving Hours (40.6%)
3rd	Long Driving Hours (48.0%)	Inadequate Sleep before Trip (38.5%)
Most Important Contributors to Fatigue*		
1st	Two-up Driving (51.5%)	Poor Road Conditions (59.0%)
2nd	Poor Bus Facilities (39.0%)	Dealing with Passengers (33.3%)
3rd	**Inadequate Sleep before Trip (35.1%)**	Inadequate Sleep before Trip (31.9%)

* Only contributors nominated as 'most common contributor' by at least 10% of drivers have been included

reported experiencing fatigue on at least half their trips. The proportion of drivers in each group reporting fatigue on at least half their trips mirrored the proportion considering it a substantial problem. Clearly, these results indicate that the perception of the problem reflects experience of the problem. More express drivers experience fatigue, they experience it more often and, therefore, they consider it more of a problem than their tour driver colleagues.

The findings for overall fatigue were not entirely consistent with findings of fatigue for the last trip. Express drivers were not higher reporters of fatigue on the last trip than tour drivers. Yet, they reported fatigue as more of a problem for them than did tour drivers. Part of the explanation most probably lies in the fact that asking drivers for an overview of their experiences of fatigue in their work, rather than about a single specific occasion probably means that they have to take other factors into account. One such factor may have been the effects of cumulative fatigue. From earlier results, it was seen that express drivers were more likely to experience cumulative fatigue than tour drivers. Express drivers were far more likely to have driven long distance trips in the previous week, and far more likely to have worked nights in the past week. Thus, while the groups reported being equally able to deal with fatigue of a single trip, express drivers may be more susceptible to cumulative fatigue. The occurrence of cumulative fatigue may have prompted express drivers to judge fatigue as more of a problem for them than tour drivers.

The groups did not differ with respect to how many hours they were able to work before experiencing fatigue. Both groups reported that, in general, they experience fatigue within seven to eight hours of starting work (Table 15). It must be noted that this is well short of the

permissible working hours regulations which allow 10 to 12 hours of working.

The most common time of the day for usually experiencing fatigue did, however, differ for the two driving types. For express drivers the most common period for experiencing fatigue was in the early hours of the morning (Table 15). For tour drivers, in contrast, the most common time, reported by an approximately equal proportion of drivers, was in the afternoon hours. This finding is entirely consistent with expectations based on operational conditions in the two sectors and also on principles of circadian functioning. The two peak times for fatigue that would be expected on the basis of changes in alertness related to circadian rhythms would be in the early hours of the morning and in the afternoon hours. From earlier results, it was clear that express drivers were more likely to be doing their trips overnight, while tour drivers were more likely to be doing their trips during the day. As discussed earlier, these differences in the pattern of working hours reflect the differences in focus of the two operations, a commuter operation on the one hand for express drivers, and a tourist operation for tour drivers on the other hand. For each group, the peak fatigue period coincided with the expected circadian peak which occurs during their regular working hours.

Moreover, it would also be expected on the basis of circadian functioning that fatigue occurring during the midnight to dawn peak, as it does for express drivers, is more debilitating than fatigue occurring during the afternoon peak. This is entirely consistent with the finding that fatigue was reported as a problem by more express drivers than tour drivers. As described earlier, express drivers were more likely to start their last trip during the night. These hours are more prone to result in fatigue than the daylight hours. The majority of tour

drivers reported starting their last trip during the day. These differences in work hours may be one reason why express drivers are higher reporters of fatigue than tour drivers.

The majority of drivers in both groups reported that their driving was adversely affected when they felt fatigued (Table 15). This was much more so for express drivers than for tour drivers. It is unlikely that this difference reflects any real difference in the phenomenon of fatigue. Rather, it most likely reflects that the degree of fatigue experienced by tour drivers is less and therefore is less detrimental to driving. As discussed above, tour drivers are less likely to drive at the time of the day when human beings are most prone to fatigue, the midnight to dawn hours, and, consequently, less likely to experience driver fatigue during that time. The degree of fatigue experienced at other times of the day is likely to be less debilitating, although similar in nature. This interpretation is supported by the finding that both groups reported similar adverse effects of fatigue on driving. The most common effects reported were being slower to react, poorer gear changing and poorer attention to traffic signs. As discussed earlier, it is expected that there are quite specific ways in which fatigue affects the driving task and these would not be expected to vary with type of driving.

The two groups only partially overlapped in the factors judged to be contributors to fatigue, indicating that while some universal contributors to fatigue probably exist, there are also some operationally-specific factors (see Table 15). The most common factors reported by express drivers were dawn driving, inadequate sleep before the trip and long driving hours. Of the factors judged to contribute to fatigue, those judged to contribute most for express drivers were two-up driving, poor bus facilities, in the main referring to the sleeper

bunk, and inadequate sleep before the trip. For tour drivers, in contrast, monotonous driving routes were included at the top of the list of contributors to fatigue, in addition to long driving hours and inadequate sleep before the trip. The factors considered to contribute most for tour drivers were poor roads, inadequate sleep before the trip and dealing with passenger problems. The constellation of factors that were reported as contributing to fatigue for each group seems to reflect, in part, the operational conditions for each driving type. Express drivers are more likely to drive during the night and they are also much more likely to work two-up operations, than tour drivers. These operationally-specific factors were highlighted in the factors nominated as contributors to fatigue. Long monotonous stretches of driving are likely to be less common in touring than express operations; it is therefore somewhat surprising that tour drivers nominated such conditions as contributing to their fatigue. Tour operations are more likely to involve scenic routes, and interspersing of other activities with driving. The fact that tour drivers reported monotonous stretches of driving as among the most important contributors may indicate that because such monotony is rare for them, when it does occur it is found particularly taxing.

It is noteworthy that two-up driving, while nominated as a factor for only one quarter of express drivers, was the worst factor for half of those drivers. The fact that the facilities for rest in these operations were also highlighted by drivers as one of the factors contributing most to fatigue provides a possible reason for the difficulties drivers experience with the two-up system. Selecting poor rest facilities may also simply be another way for drivers to nominate two-up driving as a contributing factor to fatigue. The influence of experience of two-up driving on drivers' views of it are

further explored a later section of discussion of the results (see page 114).

The overlap between the groups with respect to some of the prominent contributors to fatigue probably indicates that, despite operational differences, there are some universal contributors to fatigue. The nomination of long driving hours by both groups is consistent with the finding that both groups reported that the onset of fatigue usually occurred within seven to eight hours after starting work. This time period is shorter than the permissible daily working hours. The finding that fatigue onset precedes work hour limits may underlie drivers' nomination of long hours as a contributor to fatigue.

Both groups also reported inadequate sleep before trips as a common contributor to fatigue. Since all drivers were well-rested before the trip, they may simply have been flagging that when it occurs, inadequate sleep before the trip is particularly detrimental. Alternatively, the source of the inadequate rest may differ. It may refer to accumulated fatigue in the longer term before the trip rather than rest immediately before the trip. Express drivers were more likely to have accumulated fatigue in the previous week through more long-distance overnight trips compared with tour drivers. Tour drivers, on the other hand, worked less often in the previous week, but may not have taken advantage of the recovery time or they may have been involved in work other than long distance driving, resulting in them not being adequately rested before the trip. However, the apparent universality of inadequate rest before the trip as a reported contributor to fatigue suggests that amount of recovery time between periods of work, and what is done during recovery time, should be targets for better fatigue management.

Solutions currently used to combat driver fatigue

There was considerable overlap between the groups, and considerable consistency within the groups, in terms of the most common strategies used currently by drivers to combat fatigue (see Table 16). Using the radio and having a drink containing caffeine was common to both groups. Eating while driving was also among the most commonly used strategies for express drivers and talking to someone was among the commonly used strategies for tour drivers. Each of these strategies was reported by more than three quarters of drivers in each group.

There was much less consistency regarding the strategies found to be most helpful (see Table 16). For express drivers, eating while driving was found to be helpful by about one quarter of drivers who reported commonly using the strategy. Using the CB radio and smoking was found helpful by just over one fifth of drivers using these strategies. For tour drivers, among the more commonly used strategies, singing was found helpful by about one quarter of drivers using the strategy, having a rest by approximately one fifth of tour drivers, and listening to the radio or music by an even smaller minority of drivers (15.9%). The use of stay awake drugs was reported by one tour driver, and for this one driver it was found to be one of the most helpful strategies.

Type of driving did not by and large influence the main finding of this section. The strategies used most often and found to be helpful most often were essentially superficial ones designed to deal with the symptoms of fatigue, rather than ones more likely to promote recovery from fatigue. Specifically, sleep and rest were not among the most commonly used strategies in either group. While rest was among the most helpful strategies for tour drivers, only a minority of drivers found it to be helpful and, largely, not more helpful than other more

Table 16: Details of Fatigue Management by Driving Type

	Express	Tour
Current Fatigue Management Strategies		
Most Commonly Used		
1st	Listening to Music/Radio (86.0%)	Listening to Music/Radio (78.6%)
2nd	Caffeine Drink (79.1%)	Caffeine Drink (77.8%)
3rd	Eating While Driving (77.4%)	Talking to Someone (76.4%)
Most Helpful of Those Used *#		
1st	Eating While Driving (23.6%)	Singing (25%)
2nd	Using CB (22.9%)	Stopping to Rest (21.9%)
3rd	Smoking (22.5%)	Listening to Music/Radio (15.9%)
Strategies That Could be Used		
Most Commonly Selected		
1st	Improving Roads (78.6%)	Improving Roads (69.2%)
2nd	Industry Self-regulation (67.9%)	Industry Self-regulation (67.5%)
3rd	Staged Driving (63.9%)	Policing Drugs (46.8%)
Most Helpful of Those Selected *#		
1st	Improving Roads (37.9%)	Improving Roads (44.4%)
2nd	Easing Schedules (34.8%)	Flexible Driving Hour Regs (35.7%)
3rd	Two-up Driver (25.5%)	Easing Schedules (24.3%)

* Denominator for 'most helpful' contributors is the number of drivers who actually nominated the factor, not all drivers.

Only strategies nominated as 'most commonly used' by at least 10 % of drivers have been included.

superficial strategies such as singing and listening to the radio. It appears that type of driving does not substantially influence the choice of more permanent solutions to fatigue, such as rest and sleep, over more temporary ways of dealing with the symptoms of the problem. As discussed before, this may simply reflect that operational constraints prevent access to rest on demand across the coach sector.

Possible solutions to driver fatigue

Tables 16 and 17 show the results for each driving type for the section asking drivers to rate possible strategies which could be introduced to help manage fatigue. Type of driving appeared to have very little influence on the ranking of drivers' views of the list of strategies, suggesting an apparent universality of issues which overwhelms the obvious and considerable operational differences in the two types of driving.

For both groups, improving roads was the most common strategy. Industry self-regulation was also viewed as very helpful by the majority of drivers in each group. Staged driving was the third most common strategy for express drivers, whereas for tour drivers policing drugs was among the top strategies rated as very helpful. An almost equal proportion of tour drivers rated staged driving as very helpful (see Table 17). However, staged driving was judged as very helpful by significantly fewer tour drivers than express drivers. This probably indicates that staged driving is seen as a less suitable option for tour operations.

There were few differences between the groups in terms of the strategies that were rated as most helpful for reducing fatigue from among those that were commonly selected as very helpful. The groups differed only in the ordering of the strategies, and one of the top three.

Table 17: Possible Fatigue Reduction Strategies by Driving Type

	Express	Tour
Information/Training	43.1 (11.1)	37.9 (6.7)
Preventing Drugs	51.5 (0)	46.8 (5.6)
Drugs by Prescription	14.0 (8.7)	9.1 (14.3)
Stricter Driving Hrs	37.5 (19.1)	22.8 (11.1)
Enforcement of Current Hrs	37.9 (12.7)	39.7 (9.7)
Regulation of Work Time	47.1 (16.2)	30.8 (4.2)
Regulation by Industry	67.9 (5.3)	67.5 (7.7)
Driving Ban 2am - 6am	2.4 (0)	5.2 (25)
Effective Use of Breaks	35.3 (18.6)	16.7 (7.7)
Two-up driving	28.3 (25.5)	33.8 (15.4)
Staged Driving	63.9 (14.2)	46.2 (16.7)
Easing Schedules	54.8 (34.8)	42.3 (24.2)
Tightening Schedules	0	0
Better Vehicle Design	48.5 (19.8)	29.5 (4.3)
Fatigue Monitors	25.9 (16.3)	14.1 (9.1)
Better Rest Facilities	50.0 (13.3)	39.7 (3.2)
More Flexibility in Hrs	45.8 (21.1)	35.4 (35.7)
Improving Roads	78.6 (37.9)	69.2 (44.4)

Note 1: The % of drivers rating strategy as very helpful is shown without brackets.
Note 2: Driver's rating of strategy as 'most helpful' is expressed as a percentage of those rating it very helpful and is shown with brackets.

Both groups, ranked improvements to roads most often as the most helpful. The proportion of drivers in each group who held this view was also quite similar. Easing schedules was also judged among the most helpful strategies for both groups. For express drivers, two-up driving was also highlighted, while for tour drivers more flexible driving hours was included among the most helpful strategies.

It is noteworthy that a little more than one quarter of express drivers rated two-up operations as very helpful, with one quarter of these judging two-up driving to be most helpful. This appears to contradict the earlier finding that a similar proportion of drivers rated two-up as a common contributor to fatigue, with more than half of them rating two-up as among the most important contributors. This may mean that the particular way that two-up is currently realised is not considered helpful by some drivers, but that its potential for fatigue management is appreciated. Alternatively, it may mean that express drivers are divided on the issue of two-up driving. For those drivers who find it helpful, it is rated very highly and conversely for those drivers who find it unhelpful, it is found to be a major cause of fatigue. There is some support for this latter account, as 55.4 % of express drivers judged two-up driving to be not helpful. In other words, drivers appeared to be polarised on the issue of two-up driving.

One further aspect of judgements about two-up driving was investigated. The state of origin of express drivers may have influenced the views held about two-up driving. Drivers' views might, in part, reflect the preponderance of Queensland drivers in the sample, Queensland being the state where two-up operations are illegal. In fact, two-up driving was most unpopular among N.S.W. express drivers, with 69.4% of drivers rating the operation as not helpful. The proportions of drivers from Queensland,

Western Australia and Victoria were quite alike (55.8%, 54.5% and 44.4%, respectively). South Australian drivers were the major exception to the general pattern of these findings. Among South Australian drivers, the majority (76.9) found two-up to be very helpful, and only 7.7% rated it as not helpful. Thus, with the exception of those from South Australia, express drivers nationally appeared to be in agreement in their views of two-up driving. Overall, a majority of express drivers judged two-up operations to be not helpful, and a substantial minority judged the operation to be very helpful.

THE INFLUENCE OF DRIVING OPERATION

The sample was also divided on the basis of the type of operation driven on the last trip. Single, two-up and staged operations provide quite different working situations for drivers. Type of operation is thus another of the important possible influences on drivers' attitudes to and experiences of fatigue.

Figure 5 shows the distribution of drivers dong each type of operation. Single driving was by far the most common operation on the last trip, accounting for 160 drivers. Of the remainder, 41 drivers reported doing two-up and 35 drivers reported doing staged driving on the last trip. Single driving operations included both tour (43.1%) and express (56.9%) drivers. In fact, all tour drivers reported on single driving operations. In contrast, all drivers who reported on two-up and staged operations were involved in express driving.

Description of drivers undertaking each type of operation

Table 18 contrasts the characteristics of drivers undertaking each type of operation on the last trip. There are several differences evident in these data. Drivers in each group were of similar age. Two-up drivers were less likely to be married or living in a de facto relationship and considerably less likely to have children than the other two groups. There were no differences however in the number of children.

Overall, each group largely consisted of experienced drivers, although two-up drivers were, on average, slightly less experienced than drivers in the other two groups (Table 18). The range of experience in all groups was quite broad. The proportion of two-up drivers at the upper extreme of the distribution was slightly less than for the other two groups (Table 18). However, similar proportions of drivers in each group reported experience levels at the lower end of the distribution. Twenty-five percent of two-up drivers had 5 or less years experience, compared with 25% of staged and 30.5% of single drivers.

Most drivers in each group worked for companies with more than 50 coaches (Table 18). The proportion of single drivers who worked for companies with fewer than 50 coaches however, was greater than the proportion of either two-up or staged drivers. Largely this reflects that the organisational and cost demands of two-up and staged operations are probably prohibitive among the smaller companies.

Table 18: Characteristics of Drivers by Driving Operation

	Single (N = 160)	Two-up (N = 41)	Staged (N = 35)
Mean Age (SD)	40.1 (12.9)	40.3 (11.6)	41.1 (8.3)
Family Status			
% Married or Defacto	76.9	65.9	71.4
% With Children	73.6	43.2	62.9
Mean No of Children (SD)	2.0	1.9	2.1
Driving Experience			
Median Yrs (Range)	11.4 (1-36)	6.0 (1-26)	10.0 (2-32)
% <= 10yrs	60.5	63.9	56.3
% >= 20yrs	14.0	8.3	15.6
No of Passengers Carried			
% <= 30	14.3	7.3	17.1
% > 30	85.7	92.7	82.9
Size of Company			
% <=50 Buses	26.4	7.3	8.6
% > 50 Buses)	73.6	92.7	91.4
Type of Bus Driven			
Single Deck	41.8	47.7	27.8
Double Deck	1.9	2.3	5.3
Combination	56.3	50.0	63.2

Payment arrangements of driving operation

Approximately two thirds of drivers in each group were paid an hourly rate (see Table 19). Some differences were evident in the distribution of the remaining one third of drivers in each group across the various payment types. Payment of a weekly rate was the second main method of payment among single drivers and staged driver, with the former mainly receiving this as a flat rate and the latter receiving the rate with overtime. In contrast, few two-up drivers were paid a weekly rate, with or without overtime. The second most common way for these drivers to be paid was by the km, and this payment type was virtually exclusive to two-up drivers. Two-up drivers also reported being paid in ways other than those specified, mostly referring to a combination of the payment types specified.

Amount of payment also varied across the different types of driving operation. Drivers undertaking staged and single operations were almost all paid at the award rate (Table 19). While the majority of two-up drivers were also paid at the award rate, a substantial minority of these drivers reported receiving under the award rates of pay. A significant number of two-up drivers also reported not knowing how their rate of pay compared with the award rate.

Weekly working conditions and driving operation

There were clear differences between the groups for the weekly working hours they reported (see Table 20). While a majority of drivers in each group reported doing some long-distance trips in the previous week, it was much more likely for staged drivers to have done so and least

Table 19: Payment Details by Driving Operation

	Single	Two-up	Staged
Payment Type			
% Hourly Rate	66.8	61.4	61.1
% Daily/Daily + Overtime	1.9	2.3	5.6
% Weekly/Weekly + Overtime	26.3	9.1	30.6
% Per Km	3.1	13.6	0
% Other	1.9	13.6	5.6
Payment Rate			
% Award	90.0	65.9	91.7
% > Award	5.6	0	0
% < Award	3.8	18.2	5.6
% Not Knowing Award Rate	0.6	13.6	2.8

Table 20: Details of Work Last Week by Driving Operation for Drivers Reporting Long-distance Trips

	Single	Two-up	Staged
% With Long-distance Trips	63.8	87.2	100
Hours Worked			
Mean (SD)	54.8 (14.2)	77.6 (28.7)	54.6 (13.9)
% <= 38hrs	29.5	6.5	7.1
% > 72hrs	8.0	58.1	7.1
Mean No Nights Worked (SD)	2.45 (1.1)	3.9 (1.4)	3.8 (1.7)

likely for single drivers to have done so. Two-up drivers reported the longest weekly working hours, followed by staged drivers, with single drivers reporting the shortest weekly hours. Most drivers in each group reported working longer than the average working week of 38 hours. However, these shorter hours were much more common among single drivers than among drivers in the other two groups. Working very long weekly hours was common only among two-up drivers. Over half of two-up drivers reported working more than 72 hours per week compared with less than 10% of drivers in the other two groups. The groups also differed in the number of nights worked. Single drivers worked fewer nights than the drivers in the other two groups.

In summary, it appears that single drivers differed from two-up and staged drivers in their hours of work. Single drivers worked shorter hours and fewer nights as part of their weekly schedule than did staged and two-up drivers. Two-up and staged drivers also differed. Two-up drivers were far more likely to work longer weekly hours, but no more likely to work at night than staged drivers.

Last trip and driving operation

Tables 21 and 22 show details of the last trip for drivers doing each type of driving operation.

Trip length and duration

The duration and length of the trip differed markedly between types of driving operation (see Table 21). Overall, staged drivers reported by far the shortest trips in terms of both time taken and distances covered, while two-up drivers reported the longest trips. On average, it appeared that two-up drivers reported trips

Table 21: Details of Last Trip by Driving Operation

	Single	Two-up	Staged
Trip Length			
Mean in Kms (SD)	1334.1 (1897.8)	4057.8 (1662.9)	1025 (992.6)
% Driving > 1500 Kms	16.7	92.5	12.1
Trip Duration			
Mean in Hrs (SD)	62.2 (134.7)	58.1 (33.6)	19.0 (23.2)
% Whose Trip was >= 12 Hrs	72.9	97.5	30.3
% Whose Trip was >= 30 Hrs	29.9	72.5	12.1
Cruising Speed			
% Travelling <= Speed Limit	86.5	82.9	81.8
% Travelling > Speed Limit	13.5	17.1	18.2
Starting Time			
% 0000 - 0559	12.0	0	14.3
% 0600 - 1159	67.1	19.5	28.6
% 1200 - 1795	11.4	56.1	28.6
% 1800 - 2359	9.5	24.4	28.6

of similar duration to those reported by single drivers. However, as the standard deviations indicate, the average distance travelled was highly variable, particularly among the single drivers. Examination of the distribution of trip duration revealed that for approximately three quarters of staged drivers trip duration was less than 12 hours, for approximately three quarters of single drivers trip duration was longer than 12 hours but less than 30 hours, and for approximately three quarters of two-up drivers trips lasted longer than 30 hours (see Table 21). Brief trips of less than 12 hours were virtually nonexistent among two-up drivers. This is only to be expected as one of the main perceived advantages of two-up driving is that by having two drivers and promoting continuous driving, the coach can be driven further. The results clearly show that this potential advantage of two-up is more than fully utilised since two-up drivers reported trips that covered, on average, more than three times the distance of single trips and close to four times the distance of staged trips.

The cruising speed reported by drivers for their last trip was not influenced by type of operation. The vast majority of all drivers reported travelling at or below the speed limit.

Timing of the trip

Table 21 shows that starting time was a distinguishing feature of the different types of operation. Single drivers were distinguished by starting in the morning, and two-up drivers by starting in the afternoon, whereas staged drivers were equally likely to start any time from 6.00 am to midnight. Close to half of staged drivers reported starting their trips in the night hours between 6.00 pm and 6.00 am, compared with only one quarter of the single and two-up drivers.

Breaks in the last trip

The number of breaks longer than 15 minutes that drivers reported taking on their last trip varied by type of operation (see Table 22). In general, the number of breaks taken was related to trip length. Thus, two-up drivers took the most breaks but, as shown earlier, they also did the longest trips. Similarly, staged drivers took the fewest breaks but they also typically did the shortest trips. However, the relationship between the number of breaks taken and trip length was not a proportional one. On average, two-up drivers covered approximately four times the distance that staged drivers did, but reported an average of only two and a half times as many breaks.

The relationship between trip length and number of breaks taken is not reflected in the amount of time spent in breaks by drivers in each group. Despite vast differences in distances covered, the proportion of trip time spent in breaks hardly varied at all. That is, on average a driver doing any of the three operations spent about one quarter of the total trip time in breaks, irrespective of distance covered. It should be noted that this might seem somewhat surprising in the case of two-up drivers because two-up drivers could be expected to share the driving. The fact that on average two-up driver report taking breaks for about the same proportion of the trip as other operations, and that this accounts for only about one quarter of trip time, suggests that not all non-driving time is viewed as being a break by two-up drivers..

The fact that the proportion of time spent in breaks was so similar, despite the non-proportional relationship between number of breaks and trip length clearly indicates that average break length also varied with type of operation. Most breaks were shorter than 5 hours for the majority of single (76.5%) and staged (82.9%)

Table 22: Breaks, Fatigue, and Pre-trip Activities on Last Trip by Driving Operation

	Single	Two-up	Staged
Mean No of Breaks >= 15mins (SD)	2.6 (1.4)	3.6 (1.8)	1.5 (0.8)
Mean Time Spent on Breaks as % of Trip Time (SD)	24.5 (32.0)	29.1 (30.0)	27.3 (58.5)
% Reporting Fatigue on Last trip	27.8	51.3	40.0
Mean Sleep/Rest Hrs in 10 Hrs Before Trip (SD)	9.1 (1.1)	8.3 (2.8)	9.1 (1.4)
Reasons for Breaks			
% Sleep/Rest	6.1	12.6	10.1
% Scheduled Stops	45.2	24.2	36.2
% Personal Comfort	11.6	8.8	15.9
% Work Combination	34.1	51.1	31.9
% Non-work Combination	3.0	3.3	5.9
Loading and Other Non-driving Activities			
% Required to Work Other Duties	83.9	93.7	91.4
Mean Hrs Spent on Other Duties	22.2 (32.1)	3.0 (2.8)	1.4 (0.4)

drivers. For two-up drivers, in contrast, most breaks were longer than 5 hours for the majority of drivers (68.3%). In fact, breaks of 1 hour or less were relatively rare among two-up drivers (7.3%), but accounted for a substantial proportion of breaks for single (37.3%) and staged (37.1%) drivers. The finding that two-up drivers were more likely to take longer rather than shorter breaks is probably due to the facility of changing drivers which meant that two-up drivers incorporated all their sleeping time into their trips.

In general, driving operation did not influence the reasons for breaks. As Table 22 shows, breaks most commonly involved at least some work for all groups. Overall, staged drivers were slightly more likely to take breaks that did not involve work (31.9% of breaks), compared to two-up (24% of breaks) and single (20.7% of breaks) drivers.

The highest reporting of fatigue on the last trip was among two-up drivers. This is not surprising, since they did the longest trips. It appears that the access to longer rest breaks that these drivers reported did not mitigate against the length of their trips. The lowest reporting of fatigue was among the single drivers. The fact that substantially fewer single drivers than staged drivers reported fatigue on the last trip is unexpected since single drivers did longer trips and worked longer hours. However, staged drivers were more likely to start their trips in the night and to work overnight than single drivers. Working those hours is likely to have contributed to their fatigue.

Single drivers may also have been lower reporters of fatigue than staged drivers because they were better rested at the outset of the trip. All drivers were well rested immediately before the trip, reporting an average

of between 8 and 9 hours rest in the 10 hours prior to the trip (Table 22). However, single drivers were much less likely to have done long distance trips in the previous week, and when they did they reported working fewer nights than staged drivers. This may have meant that single drivers were less prone to accumulated fatigue. Fatigue accumulated from their weekly working schedule would certainly have exacerbated the level of fatigue experienced by staged drivers on the last trip.

Driver involvement in other duties

The vast majority of drivers in each group were involved in loading and/or other non-driving work at some point in the trip (Table 22). It was slightly more common among two-up and staged drivers. Single drivers spent proportionally the most time involved in non-driving duties, with an average of almost one fifth of trip time (17.3% s.d. = 12.3) spent on such activities. In comparison, two-up drivers spent an average of 6.1% (s.d. = 4.9) and staged an average of 10.8% (s.d. = 5.6) of total trip time involved in such activities. As discussed before relief from the monotony of driving through proportionally greater involvement in non-driving duties may also have contributed to single drivers being lower reporters of fatigue.

Breaking the rules

A minority of all drivers reported breaking the work hour regulations (see Table 23). More two-up drivers reported breaking the work hour regulations than drivers in the other driving operations, although breaking the regulations on at least half their trips was still reported by only just over one quarter of two-up drivers. This may reflect nothing more than that the trips for

Table 23: Adherence to Work Hour Regulations and Road Rules by Driving Operation

	Single	Two-up	Staged
% Breaking Work Hr Regs > Half Trips	13.9	28.9	14.7
3 Most Common Reasons Why			
1st	Breakdowns (65.1%)	Breakdowns (72.7%)	Breakdowns (76.7%)
2nd	Tight Schedules (46.5%)	Late Service Connections (66.7%)	Tight Schedules (66.7%)
3rd	Passenger Problems (40.2%)	Tight Schedules (58.8%)	Late Service Connections (63.3%)
% Breaking Road Rules > = Half Trips	9.6	20	14.7
3 Most Common Reasons Why			
1st	Late Service Connections (50.8)	Tight Schedules (54.5)	Tight Schedule (74.1)
2nd	Breakdowns (44.3)	Breakdowns (51.5)	Breakdowns (57.1)
3rd	Tight Schedules (37.7)	Late Service Connections (51.5)	Late Service Connections (53.6)

two-up drivers are so much longer that the needs for catching up with lost time and the like present themselves more often in each trip. The main reasons given for breaking the work hour regulations were virtually identical across the groups, with slight variations in the ordering being the only difference. Breakdowns, late service connections and tight schedules were the reasons given by drivers involved in two-up and staged operations. Single drivers reported almost the same reasons, with the inclusion of passenger problems instead of late connections. The reasons suggest that the pressures faced by drivers which force them to break the rules are universal across the coach sector, and are related to provision of the service offered by long distance coach travel.

As in previous results, breaking the road rules was even more rare than breaking the work hour regulations (Table 23). Again it was slightly more common among two-up drivers, but still only reported as occurring on at least half their trips by one fifth of two-up drivers. The main reasons given for breaking the road regulations were identical to those given for breaking the working hours regulations, with the exception of some changes in the order of the reasons. Tight schedules, breakdowns and late connections were the main reasons for needing to break the road regulations.

Attitudes to and experience of fatigue

Details of fatigue experience and management for drivers from each type of driving operation are shown in Tables 24 and 25.

Table 24: Details of Fatigue Experience by Driving Operation

	Single	Two-up	Staged
Is Fatigue a Substantial Problem?			
% Who Say it is for Industry	56.3	52.5	76.5
% Who Say it is Personally	14.4	7.3	51.4
% Who Report Fatigue >= Half Trips	13.6	17.0	25.7
Onset of Fatigue			
Mean Hrs After Starting Work (SD)	6.5 (3.2)	12.4 (8.1)	6.2 (2.2)
Timing of Fatigue			
% Reporting Fatigue Between 0000 - 0559	36.0	56.2	60.0
% Reporting Fatigue Between 0600 - 1159	24.0	25.0	15.0
% Reporting Fatigue Between 1200 - 1759	20.0	6.2	15.0
% Reporting Fatigue Between 1800 - 2359	20.0	12.5	10.0

Table 24: Details of Fatigue Experience by Driving Operation (continued)

	Single	Two-up	Staged
Adverse Effects of Fatigue on Driving			
% Reporting Adverse Effects	68.6	55.1	86.6
Most Common Adverse Effects			
1st	Slower to	Slower to	Slower to
	React (74.1%)	React (82.1%)	React (80.6%)
2nd	Poorer Gear	Poorer Attention to	Poorer Gear
	Changing (53.4%)	Traffic Signs (64.3%)	Changing (63.3%)
3rd	Poorer Attention to	Poorer Gear	Poorer Awareness of
	Traffic Signs (39.7%)	Changing (53.6%)	Other Traffic (48.4%)
Most Common Contributors to Fatigue			
1st	Inadequate Sleep	Poor Bus	Inadequate Sleep
	before Trip (44.9%)	Facilities (60.5%)	before Trip (69.7%)
2nd	Driving at	Driving at	Long Driving
	Dawn (44.1%)	Dawn(55.3%)	Hours (61.8%)
3rd	Long Driving	Long Drving Hours &	Insufficient
	Hours (42.3%)	Monotonous Route (50.0%)	Rest Breaks (52.9%)
Most Important Contributors to Fatigue*			
1st	Two-up	Poor Road	Poor Weather
	Driving (61.4%)	Conditions (59.0%)	Conditions (54.7%)
2nd	Poor Road	Dealing with	Poor Road
	Conditions (38.5%)	Passengers (33.3%)	Conditions (40.0%)
3rd	Driving at Dusk & Dealing	Inadequate Sleep	Inadequate Sleep
	with Passengers (33.3%)	before Trip (31.9%)	before Trip (39.2%)

* Only contributors nominated as 'most common contributor' by at least 10% of drivers have been included

Table 25: Details of Fatigue Management by Driving Operation

	Single	Two-up	Staged
Current Fatigue Management Strategies			
Most Commonly Used			
1st	Listening to Music/Radio (81.3%)	Listening to Music/Radio (86.1%)	Listening to Music/Radio (96.7%)
2nd	Talking to Someone (74%)	Caffeine Drink (82.9%)	Eating While Driving (96.7%)
3rd	Caffeine Drink (73.7%)	Adjusting Ventilation (72.7%)	Caffeine Drink (92.6%)
Most Helpful of Those Used*#			
1st	Smoking (20.1%)	Caffeine Drink (31%)	Stopping to Rest (46.2%)
2nd	Singing (20.0%)	Eating While Driving (26.9%)	Using CB (40.0%)
3rd	Eating While Driving (18.4%)	Talking to Someone (24.0%)	Adjusting Ventilation (31.6%)
Strategies That Could be Used			
Most Commonly Selected			
1st	Improving Roads (76.4%)	Improving Roads (70.5%)	Staged Driving (94.3%)
2nd	Industry Self-regulation (69.9%)	Two-up Driving (70.5%)	Improving Roads (80.0%)
3rd	Staged Driving (53.6%)	Industry Self-regulation (68.2%)	Easing Schedules (71.4%)
Most Helpful of Those Selected *#			
1st	Improving Roads (43.3%)	Easing Schedules (36.4%)	Easing Schedules (40.1%)
2nd	Easing Schedules (29.2%)	Effective Use of Breaks (35.2%)	Flexible Work Hr Regs (35.8%)
3rd	Two-up Driving (27.7%)	Work Time Regulation (33.3%)	Improving Roads (28.5%)

* Denominator for 'most helpful' contributors is the numer of drivers who actually nominated the factor, not all drivers.

Only strategies nominated as 'most commonly used' by at least 10 % of drivers have been included.

Attitudes to and effects of fatigue

A majority of drivers in each group considered fatigue to be at least a substantial problem in the industry (Table 24). This view was considerably more common among staged drivers than among drivers in the other operations. The groups diverged more obviously in their reports of fatigue as a personal problem. All groups reported fatigue as a personal problem less often than they had reported it as a problem for the industry. Staged drivers reported fatigue as a personal problem far more often than drivers in the other two groups. In fact more than half of staged drivers considered fatigue to be at least a substantial problem for them. In contrast, relatively few single and even fewer two-up drivers considered fatigue to be problem for them.

The frequency of experiencing fatigued largely followed the pattern of results for fatigue as a personal problem. However, the variation between the groups was considerably narrowed. Staged drivers most often reported experiencing fatigue on at least half their trips (see Table 24). In reverse to the results of fatigue as a personal problem, slightly more two-up drivers than single drivers reported fatigue on at least half their trips.

The results describing views of the problem and experience of it in general, only partially mirror experience of fatigue on the last trip. Single drivers were the lowest reporters of fatigue on the last trip. Accordingly, they reported fatigue as less of a problem for them and occurring less frequently than drivers in the other groups. Staged drivers were higher reporters of fatigue on the last trip, and, correspondingly, more commonly considered fatigue to be a problem and reported it occurring more frequently. Surprisingly, two-up drivers, who were the highest reporters of fatigue on the

last trip, considered fatigue less of a problem than any other group and reported it as occurring considerably less frequently than staged drivers. The apparent discrepancy between two-up drivers' views of the problem of fatigue in general, and their specific experience of it on their last trip may simply reflect different perceptions about the various aspects of the problem. Given the long distances covered by these drivers, they are likely to be aware of the differences between the type of fatigue that results from short periods at the wheel and fatigue experienced after long periods of time without sufficient sleep. It may be, that in order to be able to cover the distances that they do, two-up drivers mainly consider or recognise the latter as a problem. Alternatively, the results may reflect that two-up drivers feel that their fatigue is managed successfully, perhaps due to the option of having access to a relief driver. The perception of successful management of the problem may be real or apparent. Elements of both of these explanations may, of course, be correct.

When asked about how long they were able to work before experiencing fatigue, the pattern of drivers' responses only partly corroborated their view of the problem. Staged drivers, who most commonly considered fatigue a personal problem, also reported becoming fatigued the earliest. Single drivers, however, far fewer of whom considered fatigue a personal problem, nevertheless reported experiencing fatigue after only slightly longer periods than staged drivers. These results may indicate that, regardless of the extent of the problem, a minimum period of work exists after which most drivers experience fatigue. Two-up drivers, in contrast, did not appear to be affected by such a lower limit. Few two-up drivers considered fatigue to be a personal problem, and they reported being able to work for much longer periods before experiencing fatigue than either of the other two groups. These results again suggest that the perception

about what is meant by fatigue may be different in the different operations. As discussed above, several explanations either alone or in combination, are likely to account for the different perceptions. It may be that two-up drivers attempt to ignore the early effects of fatigue, in order to be able to cover the vast distances that they drive. It may also be that the perception of reasonably free access to rest due to the availability of the relief driver gives two-up drivers a feeling of control over fatigue, which in turn lessens its perceived impact. Alternatively, it is possible that two-up drivers are better able to stave off fatigue because their operation allows better management of the problem.

Irrespective of how long drivers reported being able to work before experiencing fatigue, or how often they experienced it, there was considerable consistency in the time of day when fatigue was most likely to occur. For all groups, the most common time was in the early hours of the morning, between 0000 and 0559 (see Table 24). As discussed earlier, this would be expected on the basis of circadian functioning. The pattern of fatigue experience across the day also clearly reflects the earlier results describing the times of the day when drivers in each operation were most likely to be working. Far greater proportions of two-up and staged drivers reported experiencing fatigue during the early hours of the morning. These drivers were far more likely to be working during the night hours than single drivers. On the other hand, more single drivers reported fatigue during the day, the time of day when they were more likely to be working.

At least two thirds of drivers in each group reported that their driving was worse when they were fatigued (Table 24). Drivers were also consistent in their reports of the most common effects of fatigue on their driving. Slowed reactions, poorer gear changing and poorer

awareness of other traffic or traffic signs were reported by all groups as the most common effects of fatigue. The effects of fatigue on driving are clearly highly specific and immune to the considerable differences between driving operations.

Driving operation was, however, related to the factors drivers reported as contributing to fatigue, although some overlap was evident, particularly between single and staged drivers (Table 24). For single and staged drivers, inadequate sleep before the trip was the most commonly reported contributing factor. Since all drivers reported being well rested immediately before the last trip, this may refer to cumulative fatigue from a longer period prior to the trip. Staged drivers were the most likely to have done long distance trips, and done them at night, in the previous week. This work regime could easily have resulted in chronic, rather than acute, sleep deprivation before the trip. In contrast, single drivers were much less likely to have done long distance trips and when they did do them less likely to have worked at night. Yet single drivers also reported inadequate sleep before the trip as a contributing factor. For these drivers, other work or leisure activities in the period prior to the trip may have resulted in cumulative fatigue. Alternatively, as discussed before, drivers may simply have been highlighting that they were aware that, in general, inadequate sleep before the trip was likely to contribute to fatigue.

Long driving hours were also a common contributor to fatigue for both staged and single drivers. This is somewhat surprising since staged drivers did by far the shortest trips. They were more likely, however, to work longer weekly hours than single drivers. Thus, both cumulative fatigue across the working week and acute fatigue across a trip may be reflected in the selection of this contributor. Previous results suggested that

staged and single drivers were similarly sensitive to hours worked, despite differences in the hours worked. Single and staged drivers reported being able to work a similar number of hours before experiencing fatigue, and these hours were far shorter hours than those reported by two-up drivers.

Single and staged drivers differed on the other contributor most commonly reported. For single drivers dawn driving was among the most common contributors, while for staged drivers insufficient rest breaks were commonly reported. These contributors are entirely consistent with aspects of the two operations. Single drivers were most likely to start their trips in the morning hours. Although they might be expected to be freshest at the start of their trip, many of the morning starts would have been at sunrise. Driving at that time of day, irrespective of where the driver may be in the trip, coincides with part of the period when alertness is at its lowest levels, and considerable effort would be required to maintain driving performance. Staged drivers, while they spent a slightly greater proportion of their trip time in breaks, also reported the highest proportion of shorter breaks. Since they were more likely to drive during the midnight to dawn hours, a time when physiologically speaking alertness is at its lowest ebb, the shorter rest breaks available to them may be insufficient for restorative rest.

The list of the common contributors to fatigue reported by two-up drivers differed markedly from the other two-operations. Two-up drivers most commonly reported bus facilities, in the main referring to the sleeping bunk, as contributing to their fatigue. This clearly reflects a unique feature of the two-up operation, and provides a highly specific operational target for improved fatigue management. Two-up drivers also commonly reported dawn driving, monotonous driving routes and long driving hours

as common contributors to fatigue. Given the duration of their trips, and that they frequently reported starting their trips at night, two-up drivers are likely to encounter dawn driving. Clearly, the difficulties of driving at that time of the day, as discussed earlier, are a problem for this group. Monotonous driving is also clearly a part of the two-up operation given the distances that they cover. Two-up drivers reported doing the longest hours on all of the measures of hours worked, both for the last trip and on a weekly basis. The inclusion of long hours as a contributor to fatigue, is, therefore, hardly surprising.

The contributors to fatigue that drivers regarded as most important also distinguished the groups (Table 24). Single drivers highlighted two-up driving. While only a small proportion of single drivers selected two-up driving as contributing to their fatigue (13.2%), for those drivers the majority found it to be among the most important. Poor roads were also judged by both single and staged drivers as being among the most important contributors. For staged drivers, however, weather conditions were more often selected as being among the most important contributors to fatigue. In contrast to the more general contributors nominated by staged and single drivers, two-up drivers again highlighted operationally specific contributors to fatigue. The most important contributors to fatigue reported by two-up drivers were insufficient rest breaks and poor facilities in which to take those rest breaks were highlighted. While earlier results showed that two-up drivers were taking proportionable more of the trip time in breaks than the other operations, and more of those as longer breaks, clearly, aspects of rest for two-up drivers were still major contributors to fatigue.

Solutions currently used to combat driver fatigue

There was considerable consistency within and across the driving operations in terms of the strategies drivers reported they currently used to deal with driver fatigue (see Table 25), with more than three quarters of each group nominating each strategy. The majority of drivers in all groups used listening to the radio or music, and having a drink containing caffeine to combat fatigue. Single drivers also reported commonly using talking to someone, two-up drivers also reported using adjustments to the ventilation, and eating while driving was also reported by staged drivers. These strategies are noteworthy in that they are all strategies which deal with the symptoms of fatigue temporarily rather than more permanent solutions dealing with the problem.

Drivers also indicated which of the strategies they used often they found to be most helpful in reducing fatigue. These data showed a somewhat different and less consistent pattern. Rest was among the most helpful solutions for staged drivers but not for single or two-up drivers (Table 25). The remaining strategies selected as most helpful from those commonly used varied across the groups, but again all were temporary solutions. None of the strategies selected as most helpful were nominated by more than half of the drivers using them.

There are several remarkable features of these data. First, the factors that are likely to have a longer lasting effect on fatigue such as sleep and rest, are not commonly used by drivers in any group. Staged drivers, however, did judge that rest, a more permanent solution to fatigue, was more helpful than solutions which temporarily alleviate the symptoms of fatigue. Sleep was not a common strategy for either group, never being reported by staged drivers, and reported by fewer than one in ten of single drivers. This is perhaps not

There was also some overlap between the groups in the strategies selected as being most helpful, however, the pattern was much less consistent within the groups, with each strategy being selected by less than half of each group. Easing tight schedules and improvements to roads were nominated as being amongst the most helpful strategies by drivers in all groups. The strategies on which groups differed largely reflect the pressures on them. Staged drivers selected more flexible driving hours, probably reflecting that although they drive the shortest hours they are likely to drive at the most unsuitable times of the day and be under the most pressure to make their pre-arranged connections, given that the next driver is waiting. Two-up drivers selected more effective use of breaks and regulation of work time. This confirms earlier results that they do not find rest helpful, and they find that aspects of their rest facilities contribute to fatigue. Single drivers selected two-up driving, suggesting that these drivers appreciate the potential benefits of sharing the driving given that they nominated long driving hours as a major contributor to fatigue. However, a much larger proportion of single drivers judged two-up to be not helpful.

THE INTERACTION OF DRIVING TYPE AND DRIVING OPERATION

One factor that became obvious during the analysis of sectorial influences in the data was that driving type and driving operation were correlated. Specifically, all tour drivers reported on the basis of working in single operations, while express drivers were distributed across the types of operations. Approximately half of express drivers were in the single driver category, one quarter of them were in the two-up category and one fifth of them were in the staged category. The group of drivers in the

single driver category consisted of tour and express drivers in almost equal proportions. Analysis of the impact of driving type revealed that tour and express work represent two very distinctly different types of driving. In order to ascertain the impact of driving type on the views of drivers in the single driving operation, the results of single drivers were examined separately for tour drivers and express drivers.

Table 27 shows the results for single tour and single express drivers on some of the key variables analysed previously. Clearly, as earlier results had shown, single express drivers reported doing shorter trips and taking shorter hours for the trips. In fact, they were in the range for trip length and duration reported by staged express drivers. In contrast, single tour drivers reported the very long trips, both in terms of duration and length, that are the hallmark of their work. These differences were obviously the reason for the extreme variability in the overall single operation trip length and duration results (compare with Table 21).

Single drivers as a whole were least likely to start their trips at night. When the results were separated by driving type, single tour drivers were less likely than single express drivers to start their trips at night, confirming the earlier findings for driving type. However, single express drivers were still less likely to start their trips at night than their staged express colleagues (compare with Table 21).

Differences between single express and single tour drivers were also evident in the proportion of time spent in non-driving activities. As Table 27 shows, single tour drivers spent approximately twice the proportion of time as single express drivers. This difference clearly explains the considerable variation in these data for the whole single drivers category (compare with Table 22).

Table 27: Comparisons of Single Express and Single Tour Drivers

	Single Express	Single Tour
Mean Trip Length (SD)	686.0 (434.9)	2646.3 (3383.9)
Mean Trip Duration (SD)	18.0 (26.8)	126.1 (191.2)
Starting Time		
% 0000 - 0559	11.0	13.2
% 0600 - 1159	55.6	82.4
% 1200 - 1759	17.8	2.9
% 1800 - 2359	15.6	1.5
Time Spent in Other Duties		
Mean as % of Trip Time (SD)	12.4 (6.0)	22.2 (18.5)
Fatigue		
% Reported on Last Trip	27.8	30.4
% Who Say it is Industry Problem	51.7	62.3
% Who Say it is Personal Problem	14.4	14.5
Strategies That Could be Used Against Fatigue		
Most Commonly Selected		
1st	Improving Roads (79.7%)	Improving Roads (72.1%)
2nd	Industry Self-regulation (74.2%)	Industry Self-regulation (64.2%)
3rd	Staged Driving (61.5%)	Easing Schedules (45.6%)
Most Helpful of Those Selected		
1st	Improving Roads (93.7%)	Flexibility in Work Hours (46.3%)
2nd	Two-up Driving (42.9%)	Improving Roads (42.9%)
3rd	Easing Schedules (31.8%)	Easing Schedules (25.9%)

However, single express drivers spent somewhat more of their time involved in non-driving duties than staged express drivers, and considerably more time than two-up express drivers.

The sub-groups within the single driver category did not differ substantially in their reported levels of fatigue, either in terms of the frequency of reported fatigue on the last trip or in terms estimation of the size of the problem (Table 27). Comparing the results of single express drivers with those of two-up and staged express drivers, those drivers in single operations were lower reporters of fatigue.

Since the nature of their work differs, single express drivers and single tour drivers could also be expected to differ in their views of strategies that could be used to reduce fatigue. As Table 27 shows, the major difference lies in the nomination of staged and two-up operations as possible ways to reduce fatigue. These alternatives were nominated by single express drivers only as being among those that would be very or most helpful. Thus, the provision of a relief driver, either at a changeover point or sharing the driving, is seen as a helpful alternative only for express drivers, not for tour drivers.

THE INFLUENCE OF TWO-UP AND STAGED DRIVING

Two-up and staged driving are two strategies currently in use in sectors of the industry to combat driver fatigue. Additional questions about these strategies were included in order to obtain information about their usefulness for reducing driver fatigue from drivers with experience of their use.

Only drivers with experience of two-up and staged driving completed these sections. The two-up driving section was completed by 46.4% of drivers and the staged driving section by 48.4% of drivers. These drivers provided their views of the two methods of driving based on their personal experience of them.

Two-up driving

The majority of drivers in the group responding to the questions on two-up driving had considerable experience of driving two-up. More than half of the drivers completing the section reported having driven two-up more than 50 times (59.5%). Only a small proportion of drivers completing the section reported limited experience of two-up driving, with 8.6% having driven it fewer than 5 times. For the majority of drivers reporting in this section, their experience was quite recent, with almost two thirds having driven two-up in the last year (63.5%).

Preferences for two-up

Table 28 shows drivers' preferences for two-up or single driving and the reasons for the preferences. Only a minority of drivers with experience of two-up driving preferred it to single driving, or judged the two methods to be the same. The majority of drivers provided reasons for their preference (56.8%). The most common reason for preferring two-up driving was that it provided better working conditions which resulted in less fatigue. The reason for preferring single driving was similarly consistent. Two thirds of drivers reported that they preferred single driving because it provided opportunities for better quality sleep than two-up driving.

When asked whether two-up or single driving was more fatiguing, more than half of drivers reported that they

Table 28: Drivers' Preference for Two-up Driving

% Drivers Preferring Two-up	30.4
% Drivers Preferring Single	51.3
% Drivers with No Preference	17.4
Most Common Reason For Preferring Two-up	Less Fatiguing (73.7%)
Most Common Reasons for Preferring Single	Better Sleep Quality (66.7%)
% Drivers rating Two-up More Fatiguing	54.5
% Drivers rating Single More Fatiguing	28.2
% Drivers Rating Equally Fatiguing	26.3
Most Common Reasons Why Two-up More Fatiguing	Poorer Sleep Quality (71.9%)
Most Common Reason Why Single More Fatiguing	Poorer Working Conditions (73.3%)

Table 29: Drivers' Preference for Staged Driving

% Drivers Preferring Staged	53.1
% Drivers Preferring Single	15.0
% Drivers with No Preference	31.9
Most Common Reason For Preferring Staged	Better Sleep Quality (64.3%)
Most Common Reason for Preferring Single	Better Sleep Quality (25.0%)
% Drivers Rating Staged More Fatiguing	10.9
% Drivers Rating Single More Fatiguing	15.8
% Drivers Rating Equally Fatiguing	72.3
Most Common Reason Why Staged More Fatiguing	Poorer Working Conditions (75.0%)
Most Common Reason Why Single More Fatiguing	Poorer Working Conditions (83.3%)

found two-up more fatiguing. A minority of drivers found single driving more fatiguing or reported that the two operations were the same. Again, there was considerable consistency among the reasons given by drivers expressing a preference. The main reason that drivers gave for finding two-up more fatiguing was that poorer sleep quality could be obtained in the moving vehicle. The most common reason given for judging single driving as more fatiguing was that the working conditions were worse than those for two-up drivers.

Influence of recency of two-up experience

Preferences for two-up were directly related to how recently drivers had driven two-up. Drivers with the most recent experience were most likely to prefer it to working as a single driver (see Table 30). More than half of drivers who had done two-up in the last month preferred it, compared with quarter of drivers who had driven two-up in the last year, and less than one in ten drivers who had driven it longer than one year ago. The opposite trend was apparent for preference for single driving, while non-preference for either type of driving remained reasonably constant. Recency of experience was not however, related to the reasons for preference. Irrespective of when two-up was last driven, the most common reason for preferring two-up for all drivers was that the operation provided better working conditions. The reason for preferring single driving also remained constant, with the better quality of sleep offered by single driving being the most common reason.

The relationship between recency of experience was similarly related to drivers' ratings of which operation was more fatiguing. As the time since last doing two-up increased, so to did the proportion of drivers rating it as more fatiguing than single operations (see Table 30). When experience was recent (less than one month) 19.5% of

Table 30: Influence of Recency of Two-up Driving Experience on Attitudes to Two-up Driving

	< 1 Month Since Last Drove Two-up	1 Month - < 1 Year Since Last Drove Two-up	> 1 Year Since Last Drove Two-up
Driving Preference			
% Two-up	57.1	26.7	7.3
% Single	23.8	63.3	70.7
% No Preference	19.1	10.0	22.0
Most Common Reason for Preference			
Two-up	Better Working Conditions (73.3%)	Better Working Conditions (100%)	Better Working Conditions (50.0%)
Single	Better Sleep Quality (62.5%)	Better Sleep Quality (50%)	Better Sleep Quality (78.6%)
Which is More Fatiguing?			
% Two-up	19.5	51.7	67.5
% Single	56.1	17.2	7.5
% Both Equal	24.4	31.0	25.0
Most Common Reason More Fatiguing			
Two-up	Poorer Sleep Quality (40.0%)	Poorer Sleep Quality (71.4%)	Poorer Sleep Quality (80.0%)
Single	poorer Working Conditions (72.7%)	Poorer Working Conditions (66.7%)	Poorer Working Conditions (100%)
Two-up as a Fatigue Reducer			
% Rating it V. Helpful	57.1	16.7	21.3
% Rating it M. Helpful	19.0	10.0	3.0

Note: All percentages express proportions of the total number of drivers at the recency level in which they are shown.

drivers rated two-up as more fatiguing, compared with 67.5% of drivers who had last driven two-up longer than one year ago. Again the complimentary trend was evident for ratings of single driving being more fatiguing. More than half of drivers who had driven two-up in the last month rated single driving as more fatiguing than two-up driving, compared with only 7.5% of drivers having driven two-up more than one year ago. The proportion of drivers judging that there was no difference between the two operations remained reasonably constant across recency of experience of two-up driving. The reason for judging two-up or single driving as more fatiguing also remained constant across recency of experience of two-up. The most common reason for finding two-up more fatiguing was the quality of sleep that could be obtained. The most common reason for judging single as being more fatiguing was that working conditions when doing single driving were considered to be worse.

Recency of experience of two-up driving also influenced drivers' ratings of two-up driving as a possible strategy for reducing fatigue. The majority of drivers with recent experience of two-up driving judged it to be very helpful, and of them, approximately one fifth judged it to be among the most helpful strategies. In contrast, for drivers with less recent experience of two-up, one fifth or less judged two-up to be very helpful, and of them, only a very small proportion judged it to be amongst the most helpful.

Thus, it seems that only drivers with current or very recent experience of two-up (36.5%) actually show a preference for it. In fact, there was very little support for two-up driving from all other drivers who had experienced it. These results suggest that two-up drivers are likely to be a self-selected group. The reasons for preferences revealed that the drivers who continue to do two-up driving do so because they prefer the working

conditions. Overall, however, this self-selected group seemed to be quite small, with the majority of drivers who have had experience of two-up preferring single driving. This pattern of results mirrors the findings for truck drivers.

Staged driving

As with the group of drivers responding to questions about two-up driving, the majority of drivers in the group responding to the questions on staged driving had considerable experience of staged driving. More than half of the drivers completing the section reported having driven in staged operations more than 50 times (86.8%). Only a small proportion of drivers completing the section reported limited experience of staged driving, with less than 10% having driven it fewer than 20 times. For the majority of drivers reporting in this section, their experience was quite recent, with more than three quarters having driven in a staged operation in the last year (78.7%).

Preference for staged driving

More than half of the drivers with experience of staged driving preferred it to single driving (see Table 29). The main reason for preferring staged driving was that better quality sleep was obtained in staged operations. The reasons for preferring single operations were less consistent, with better sleep quality being the most common reason again but only representing one quarter of drivers preferring single operations.

Very few drivers reported finding staged driving more fatiguing than single driving. In fact, most drivers reported that the two operations were equally fatiguing. For the drivers who found staged driving more fatiguing, the main reason given was that working conditions were

worse than for single drivers. Similarly, drivers who found single driving more fatiguing, in the main, reported that this was due to worse working conditions for single drivers.

The influence of recency of experience of staged driving

The relationship between recency of experience of staged driving and preference for it showed that almost two thirds of the drivers who had done staged driving in the last month preferred it to single operations (see Table 31). Preference for staged driving did decrease somewhat with increased time since it had last been driven. Nevertheless, preference for staged driving remained relatively high irrespective of recency of experience. Almost half of the drivers who had done staged more than one year ago still preferred it to single driving. Conversely, while there was a tendency for preference for single driving to increase with time since staged was last driven, this increase was relatively small, with no more than just over one quarter of drivers preferring single driving at any time. Sleep quality was the most common reason for preferring staged driving. A number of reasons were given for preferring single driving. Drivers with most recent experience cited better sleep quality in single operations. Drivers who had driven a staged operation more than one month ago cited that preference for single driving depended on specific trip related situations, such as destination, or that single operations were less fatiguing.

The results for questions asking about which operation was more fatiguing supported the results for drivers' preferences. Few drivers rated staged driving as more fatiguing than single driving, irrespective of recency of experience. The percentage of drivers judging staged operations to be more fatiguing only increased slightly

Table 31: Influence of Recency of Staged Driving Experience on Attitudes to Staged Driving

	< 1 Month Since Last Drove Staged	1 Month - < 1 Year Since Last Drove Staged	> 1 Year Since Last Drove Staged
Driving Preference			
% Staged	62.8	25.0	48.0
% Single	10.0	25.0	24.0
% No Preference	27.2	50.0	28.0
Most Common Reason for Preference			
Staged	Better Sleep Quality (61.1%)	Better Sleep Quality (50%)	Better Sleep Quality (50%)
Single	Better Sleep Quality (33.3%)	Better Driving Situation (25.o%)	Less Fatiguing (100%)
Which is More Fatiguing?			
% Staged	10.8	11.1	13.6
% Single	12.3	22.1	18.2
% Both Equal	76.9	66.7	63.6
Most Common Reason More Fatiguing			
Staged	Poorer Working Conditions (66.7%)	None Given	Better Sleep Quality (80.0%)
Single	Poorer Working Conditions (100%)	Better Working Conditions (100%)	Better Working Conditions (100%)
Staged as a Fatigue Reducer			
% Rating it V. Helpful	67.5	50.0	36.5
% Rating it M. Helpful	14.3	11.1	27.0

Note: All percentages express a proportion of the total number of drivers at the level of recency in which they are shown.

as recency of experience decreased and did not exceed the percentage of drivers rating single driving as more fatiguing at any point. The percentage of drivers rating single and staged driving as equally fatiguing remained uniformly high irrespective of recency of experience of staged driving. At all times, the majority of drivers rated the two operations as equally fatiguing. For the few drivers who reported that either staged or single driving was more fatiguing, working conditions was the main reason given.

Recency of experience of staged driving had considerable influence on drivers' judgements of staged driving as potential strategy for reducing driver fatigue. Approximately two thirds of drivers who had recently done staged driving judged that the operation was very helpful. The proportion of drivers judging staged driving to be very helpful decreased as experience of staged driving became more remote. Thus, for drivers who had last driven staged operations more than one year ago, only just over one third judged it to be very helpful. The proportion of drivers judging staged to be most helpful remained quite small. The apparent increase for drivers with the most distant experience of staged driving is an artifact of the small cell sizes by that point in the analysis. The fact that few drivers judged staged driving to be among the most helpful strategies for reducing fatigue is supported by the finding above that drivers mostly found staged and single operations equally fatiguing.

These results indicate that there was considerable support for staged driving among drivers who had experience of the operation. The level of support was highest among drivers who had recent experience of staged driving. However, a substantial percentage of those who had not driven it for more than a year also preferred it. Indeed, the preference for staged driving never fell

below the preference for single driving. Overall, then, drivers with experience of staged operations like it and find such operations helpful in managing fatigue. Despite this support, however, few drivers considered staged driving to be among the most helpful strategies for reducing fatigue. These results mirror the pattern of findings obtained in the truck drivers survey.

THE INFLUENCE OF DATA COLLECTION METHOD

Two collection methods were used. Just under one third of questionnaires were administered by interview (see Table 32). The remainder were self-administered. Examination of the results of each collection method showed that there were very few differences. In the main, the differences reflect the types of driver that could be contacted by each method. The interviews were all performed at company depots, whereas self-administered questionnaires were obtained through distribution by companies and direct distribution to drivers at a transit centre. Because of their schedules, staged drivers were rarely available at company depots during normal working hours when interviews took place. Staged drivers were therefore mainly surveyed through self-administration, rather than interviewed. Staged drivers were however represented in both those self-administered surveys that were distributed by companies and those that were distributed at the transit centre.

There were no major differences in the results of the two collection methods in terms of the details of the last trip, details of fatigue experience or the strategies that drivers judged would be helpful to reduce fatigue. The differences that were found were quantitative, rather than qualitative. Specifically, there was less missing data for the surveys obtained by interview. This is hardly surprising, and is obviously due to method itself. In an interview, the researcher strived for complete and

Table 32: Data Collection Method

	Self Administered	Interview
% Total Sample	68.0	32.0
Driving Type		
% Express	71.3	28.7
% Tour	60.8	39.2
Driving Operation		
% Single	61.2	38.8
% Two-up	65.9	34.1
% Staged	91.7	8.3

comprehensive answers to all questions. Given that the results did not differ for the two administration methods, however, the level of completeness achieved by self-report did not in any way affect the results. Therefore, the results from the two methods of administration were amalgamated.