Preventing Juvenile Crime:
the Staffordshire Experience

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The Home Office Crime Prevention Unit was formed in 1983 to promote preventive action against crime. It has a particular responsibility to disseminate information on crime prevention topics. The object of the present series of occasional papers is to present analysis and research material in a way which should help and inform practitioners whose work can help reduce crime.

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Foreword

Many police officers, like members of other statutory and voluntary agencies, devote considerable time and effort to the organisation of holiday schemes for young people.

This report describes the operation of an outstanding scheme of this type – the Staffordshire Police Activity and Community Enterprise Programme (SPACE). The SPACE project is remarkable among other things for the large scale of its operation: in 1986 over 25,000 children and young people registered for the scheme.

The report considers the possible effects of the project on crime rates in the County, and its contribution to improved police/public relations. It concludes that the scheme is popular with the public and that there appears to be some evidence of a beneficial association between the introduction of the scheme and changes in the crime pattern during August.

J A CHILCOT
Deputy Under Secretary of State
Home Office, Police Department
July 1987

Acknowledgements

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The report could not have been produced without the additional help of Home Office colleagues, particularly Mr G Houghton and Miss K Bright of the Scientific Research and Development Branch who carried out the statistical analysis and produced a report and Mr T Benn and Mr R Aldritt of the Statistical Department who provided much of the crime data.

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Contents

Introduction

This report describes the Staffordshire Police Activity and Community Enterprise (SPACE) programme which aims to provide activities for young people in Staffordshire for part of July and the month of August, *i.e.* the school holiday period, with the primary intention of reducing crime, both in the short and longer term. The activities, which together make up the Staffordshire scheme, offer a way of passing time which might otherwise be spent getting into trouble. The total programme does not seek to reduce criminal opportunities, but to *increase* the type and number of *non*-criminal opportunities available to those at risk of offending. It also seeks to establish a close positive relationship between young people participating in the scheme and the adults (many of whom are police officers) running it.

There are a number of reasons why, in principle at least, the SPACE scheme could reduce crime. First, and most immediately, the peak age for offending is in the 14-16 range and there is a substantial overlap between young people within this age group and the 10-16 year olds which the scheme seeks to attract. Secondly, and looking to the longer term, success in diverting juveniles from delinquency in the early years may well reduce the number of developing career criminals. Finally, the SPACE scheme, by providing an opportunity for the police and young people to meet in non-confrontational situations, may have a positive effect on the attitudes of youngsters to police officers, and *vice versa.* This could reduce the amount of trivial offending and/or the police response to it.

A further and important aim of the scheme is an improvement in police/public relations within the force area. This might be assumed to follow as a result of the widely publicised involvement of the police and young people in positive and constructive joint activity. The work of the police for the young not only affects the youngsters directly but almost certainly would lead to an improvement in police/parent relations.

A number of police forces and other agencies, including the probation service, offer leisure facilities to children at holiday times similar to those found in the SPACE programme. What makes SPACE unique, and warranting investigation, is the extent of the scheme (over 25,000 children were involved in 1985) and the effort devoted to it on the part of the police and the community.

This report is divided into four sections: the scheme is described, as it developed and as it currently operates; the characteristics of the children are considered; the effect of the scheme on crime in the County is explored and, finally, the results are dicussed,

The Staffordshire Scheme

The Staffordshire scheme developed from an initiative in the Cannock Division in 1971 when, for two weeks during the main school holiday period, five-a-side football matches were arranged for around 300 children in 40 teams.

During the following years similar schemes were established in other parts of the force and the activities on the Cannock Division in particular were extended to include, for example, an adventure playground in the hope that it would attract the attention of children and so reduce vandalism.

The main expansion of what came to be known as the SPACE scheme took place in the early 1980's when, on some divisions, the activities became far more comprehensive. For example, in 1980, and following the earlier project, the Cannock Chase Anti-Vandalism Campaign was launched. This campaign involved local school children in eight targetted areas. Schools were visited by police officers and evening visits were made to local clubs. Several adult organisations became involved on a voluntary basis and grant aid was given by the Cannock Chase and South Staffordshire District Councils.

By 1982 all six divisions in the Staffordshire Police force area were offering a youth activities programme for the substantial part of August. The activities included horse-riding, canoeing, walking, swimming and competitive events. Sponsorship from local firms was obtained and there was a growing interest from the local press and radio who provided a considerable amount of free advertising of activities. Police officers, many of whom gave their own time in support of the scheme. involved members of the community in the planning and organisation of events.

The present County-wide scheme was launched in July 1983 by the Chief Constable. The programme in that year offered a greater diversity of activity than hitherto and catered for approximately 22,000 children.

Scope of the scheme

Ever since the County-wide scheme was launched the range of activities offered to young children has continued to grow. The centre pages of this report and Appendix 1 illustrate some of the options. The end of the programme is marked by a widely publicised and well attended fete.

Staffing and supervision

The SPACE scheme is organised by serving police officers and primarily managed by them. Assistance is also given, on a voluntary basis, by other organisations and individuals working in the leisure industry, Members of the public volunteer to assist in supervision, as do special constables and police civilian staff. Table 1 shows the number of staff involved in the scheme throughout the County during August 1985.

Table 1: Supervisory and other staff involved in the SPACE scheme — 1985

	Number
Public	943
Police staff	186
Civilian police staff	56
Special constables	75
Youth Training Scheme	43
TOTAL	1,303

Note: Members of the public and some uniformed and civilian police staff work on an unpaid, voluntary basis.

Registration

Youngsters wanting to join the scheme are required to register to take part in the programme. With the co-operation of the Education Authority registration can take place at either a local school or police station. A registration fee of £1 is charged for the total programme and registration cards are issued. These cards enable the holder to take advantage of the special concessionary bus travel arrangements throughout Staffordshire and to attend the activities either free of charge or at greatly reduced rates.

Advance notice of the scheme is circulated throughout the schools from May. In 1985, 75,000 notices were issued by the police directly or through schools and over 25,000 children in the age range 10-16 subsequently registered for the scheme. It is difficult to estimate what proportion of the total number of eligible children in Staffordshire this constitutes because of the way in which the census data is collected, but Table 2 gives an indication of the scale of this from children in the 10-14 age range.

Table 2: Percentage of 10-14 Population Registered on SPACE 1985

District Council Area	Approx. Population 10-14 (a)	% of Total Population of the Area	Approx. No. Registered 10-14 SPACE Scheme 1985 (b)	% of 10-14 Population Registered
Staffs. Moorlands (Leek)	7,200	7.5	1,670	23.1
Newcastle	8,500	7.1	1,650	19.4
Stoke-on-Trent	17,500	6.9	5,225	29.8
Stafford	8,600	7.3	2,320	27.0
East Staffs. (Burton)	7,000	7.3	1,705	24.4
South Staffs. (Wombourne)	7,800	8.0	1,180	15.1
Cannock Chase	6,700	7.9	1,970	29.4
Lichfield	7,500	8.4	2,025	27.0
Tamworth	5,700	8.7	1,195	21.0
Staffordshire	76,500	7.5	18,940	24.8

Notes: (a) Population based on registrar generals mid-year estimates for 1984 — latest available accurate figures.
(b) Figures for children aged 10-14 registered on SPACE scheme in 1985, estimated as a proportion of those registering aged 10–16.

Table 2 shows that the scheme is attracting between 15 and 30% of the eligible youngsters in the 10-14 age range across the County and that, therefore, a substantial proportion of the County's children at the peak age of offending are registering for the scheme.

Funding and resources

The scheme is financed in a number of ways. In 1985, the Police Authority authorised £1,000 expenditure from the police budget directly. In addition, the registration fees from each child involved on the scheme provides of the order of £20,000 (in case of hardship the fee is waived). There is also a considerable amount of sponsorship by local and national firms which donate money, prizes or facilities. Grant aid from the Jubilee Trusts and Urban Aid is applied for annually, sometimes successfully. The Manpower Services Commission also plays an active part funding the full-time civilian co-ordinator at Police Headquarters and the six civilian assistants working from each police division.

Some events have to be paid for by those participating, for example, visits to commercial leisure centres, although the rates are reduced for children participating in SPACE activities.

An indication of the income and expenditure for 1985 is shown in Table 3.

Table 3: Breakdown of Income/Expenditure SPACE 1985

Income	£
Events	621
Donations/grants	34,537
Registrations	26,329
Transport/trips	75,109
Fund raising	10,330
Sale of merchandise/refreshments	18,925
Miscellaneous	533
Balance carried forward from 1984	13,068
TOTAL	179,452
Expenditure	£
Merchandise/refreshments	24,287
Transport/trips	105,552
Hire of educational premises	6,042
Prizes/gifts	4,225
Hire and purchase of equipment	6,416
Tuition fees	2,297
Insurance	250
Administration/publicity	5,025
Petrol/diesel	1,417
Expenses	4,139
Repairs/damage	366
Donations	3,792
Bank charges	19
TOTAL	163,827
Balance for 1986	15,625

The local authority supports the scheme in making available school premises and equipment, although some facilities have to be hired, for example, the local swimming pool. Bus companies provide reduced price travel to card holders and special coaches are provided for transport to events at reduced rates.

Finally, and this is a factor of some significance to the success of the programme, the local media provide free advertising on local radio, television and in the press. This is particularly valuable in advertising specific local events throughout the period of August.

Characteristics of those on the scheme

Given the primary aim of the scheme it is important that children known to be involved in crime or living in areas where crime is at its highest are involved. To this end, although all children are eligible for the scheme and it is widely advertised in the County, those known to the police and/or living in relatively high crime areas are particularly encouraged to join. The scheme seems to be successful in this, with the highest rate of registration for the 10-14 year olds, shown in Table 2, occurring in Stoke-on-Trent (at 29.8%) and Cannock (at 29.4%) which are the most industrialised areas of the County (1). The lowest rate, South Staffordshire (at 15.1%), is a rural area in the south of the County. Although this is not to suggest that 'urban' children are criminal children, it is certainly true that there are far more opportunities for criminal and delinquent behaviour in the urban environment and it is therefore appropriate that the SPACE programme should be at its most active there.

The more direct indication of the possible delinquent involvement of those in the scheme was made by taking an approximately 10% random sample of those registered in 1985 and checking criminal records. The results of this are shown in Table 4. (See next page).

As the Table shows, between 7.5 and 17.0% of those checked were traced in police records; the majority had been given a police caution at some time.

In 1985, to encourage the involvement in the scheme of those known to the police, most juveniles given a police caution were, together with their parents, provided with literature on the SPACE scheme at the time of their caution (only those children considered particularly disruptive were excluded). These children were then followed up to determine how many subsequently registered. The results are shown in Table 5 and indicate that only on the Cannock Division were a substantial number of children not advised of the scheme and that, throughout the County, the response was of the order of 25% registering of those advised.

(l) Registration on the scheme is, of course, an imperfect measure of participation in it. The figures do demonstrate, however, that the scheme was not merely drawing support from young people living in low crime areas.

Table 4: CRO checks of 10% sample of juveniles registering for SPACE

	Total Registered	Total Checked	Cautioned	Cautioned and Conviction	Conviction	% Trace
Stafford	1,990	300	19	5	7	10.33
Stone	800	80	2	2	4	10.00
Leek	870	80	5	—	1	7.50
Biddulph	380	35	2	2	—	11.42
Cheadle	870	80	4	2	—	7.50
Lichfield	1,400	200	16	3	1	10.00
Tamworth	1,600	450	36	12	1	10.88
Chasetown	1,300	100	5	2	1	8.00
Burton	1,140	370	31	10	1	11.35
Barton	715	70	6	2	—	8.75
Stoke	970	100	15	1	1	17.00
Longton	1,430	150	11	—	1	8.00
Kidsgrove/Tunstall	1,540	150	13	1	2	10.66
Burslem	1,025	250	26	—	2	11.20

Table 5: Proportion of cautioned juveniles registering for SPACE

Division	Total Number cautioned	Juveniles advised of SPACE	Juveniles registered with SPACE	% Registered following caution and advice
Cannock	41	26	8	30.7
Leek	95	95	26	27.4
Lichfield	76	70	11	15.7
Stafford	105	105	32	30.5
Stoke North	256	204	53	26.0
Stoke South	80	80	17	21.2
TOTALS	653	580	147	25.0

In addition to the daily activities programme the police offer some residential courses, or camps, lasting for about one week on which they are particularly keen to see the participation of children previously involved in crime. A CRO check of the youngsters joining these activities is shown in Table 6.

Table 6: CRO checks of all juveniles attending residential SPACE activities

Event	Total registered	Total checked	Cautioned	Cautioned and Conviction	Conviction	% Trace
Harlech	44	44	4	5	2	25
Paris Longboat	24	24	3	5	2	42
Wetton	8	8	2	1	—	38
Wales	23	23	2	1	—	13
Consall	28	28	9	6	2	61
Roaches	71	71	6	—	—	9
Hales View	66	66	9	1	2	18

As is clear from the Table there are far more children in this sample, all of whom were checked with criminal records, with a police caution or conviction. The Consall activities, held at the police cadet camp, are particularly useful in bringing together a vulnerable group of young people (over 60% of whom were known to the police) *on a voluntary basis,* with a group of police cadets of a not vastly dissimilar age.

Effect on crime

While much of the justification for the investment of police time and resources in the Staffordshire scheme relates to the more intangible and longer term payoff in improvements in police / public relations, the study upon which this report is based concentrates upon the impact of SPACE on recorded crime. It appears, at first sight, that the scheme has had an effect since crime rates in the County for the month of August are less than other months. In order to investigate the extent of this a series of comparisons were carried out with three neighbouring forces of similar size and demographic characteristics — Cheshire, Leicestershire and West Mercia.

The offences chosen for analysis were those considered to have the more substantial involvement of juveniles — burglary, theft of and from motor vehicles (including taking and driving away) shop crime and criminal damage.

The time period for the analysis of data from the individual forces was divided into two five year periods October 1976 — September 1981 and October 1981 — September 1986 (i.e. before and after the SPACE scheme went 'force wide') (2).

(2) The data for criminal damage for the period October – December 1976 was not available. The 10 year period ran, therefore, from January 1977 – December 1986. As a consequence the analysis of these data were completed some months after the earlier work.

The analyses of the Staffordshire data, details of which are given in a full Statistical Appendix to this report (3), are consistent with the view that the SPACE scheme had an effect on crime, at least in its earlier years (1982 and 1983). All crimes except theft of motor vehicles showed a reduction, relative to other months, during the post-SPACE period. However, the reductions did not reach a level of statistical significance and, contrary to expectation, the pattern of theft of motor vehicles in August rose post-SPACE. In the comparison force areas Cheshire also shows a consistent reduction in August crime figures but for the other forces there are no systematic changes from the pattern of the earlier five year period, indeed in most cases the crime has risen. This is illustrated in Table 7 which shows, for each force and each offence, the percentage by which crime rose or fell on average, in August compared to other months, for the five year period following the introduction of the SPACE scheme when compared with the five year period before the scheme was introduced.

Table 7: Comparison of pre and post SPACE figures for the month of August — Summary of results

Force Area	Burglary	Theft from motor vehs.	Theft of motor vehs.	Shop theft	Criminal damage
Staffordshire	10% down	14% down	6% up	17% down	4% down
Cheshire	4% down	7% down	3% down	3% down	2% down
Leicestershire	3% up	3% up	6% up	3% up	9% up
West Mercia	1% down	no change	2% up	2% up	1% up

It is important to stress that the percentage changes illustrated in Table 7 are not changes in the raw crime figures but are the percentage changes in August in comparison with other months.

There is, however, an important caveat to this overall encouraging result. Detailed analysis suggests that the measurable effects stem from the data for the years 1982-84, and that for most offences the effect had either reduced or disappeared by 1985/86. This is discussed further in the full Statistical Appendix and is considered again below.

Discussion

SPACE is clearly attracting young people, many of whom come from parts of the County where crime rates are comparatively high and a substantial proportion of whom are known to the police. To this extent the scheme is proving successful.

It also seems reasonable to suggest that the scheme is playing a constructive role in the context of police/public relations. The extensive involvement of the

(3) The full statistical appendix is available from Mrs E Morris. Home Office Crime Prevention Unit. 50 Queen Anne's Gate, London SW1H 9AT. A summary is appended to this report.

Staffordshire community in donating to the scheme their time, money and resources on a substantial scale supports this view, as does the considerable and positive contribution of the media. The Staffordshire Police have recently been awarded a Home Office grant to investigate more systematically the effects of the scheme on police/public attitudes; this work will hopefully be carried out over the next two years.

Turning to the more ambitious aim of reducing crime, the results should be treated with caution. Evaluation of the effect of any crime prevention project is a difficult enterprise; the police statistics on recorded crime are invariably affected by many factors including unforeseen changes in reporting and recording practices, changes in the surrounding environment and natural variations over time. Only full scale experimental designs can attempt to allow for such factors and then not always successfully. There are, however, signs of an effect on crime in Staffordshire and the results, while far from conclusive, are encouraging enough to warrant closer study.

There are a number of points to be made in relation to the effects on crime. Offending during the month of August is relatively low for most of the offences considered in Staffordshire, *and* in the three comparison forces, when compared with other months throughout the year. The apparent effect in Staffordshire has, therefore, to be measured against a background set of already depressed figures (4). With that in mind, and with the exception of theft of vehicles, the remaining offences show changes during the post-SPACE period in the expected direction although only the offence of shop theft approaches statistical significance. The fall in shop theft could be explained by the fact that the SPACE scheme is designed to affect the behaviour of juveniles, and juveniles are heavily involved in shop theft. However, a comparable degree of involvement is probably associated with criminal damage and here there was no noticeable fall. An alternative explanation is that shop theft is particularly sensitive to proactive policing as the figures for the December period in Staffordshire show; there is a regular police effort to combat shop crime at Christmas and this is reflected in the statistics. It is at least possible that the police maintain this proactive approach throughout the year — albeit at a lower level — with the exception of August when the manpower requirements of the SPACE scheme makes it impossible; as a result the level of recorded shop theft falls. (In contrast, over 90% of criminal damage incidents are reported by the public and are thus less prone to this possible 'policing' effect.)

This brings us to the question of the cause of the observed changes in the pattern of crime. There are a number of possible explanations. First, that potential offenders are 'otherwise engaged' on the SPACE scheme during a large part of the Summer holiday period and, as a direct result, crime is reduced. If this is the case we are left with the need to explain why the effect is becoming less marked in 1985 and 1986. One

(4) These depressed August figures are interesting in themselves. They call into question the view that crime is higher during the school holiday period – a popular belief, often expressed although never proved.

possibility here is that the young people are becoming bored with what is on offer, although rising registration figures do not support this view. Alternatively they may be becoming more selective in their use of the facilities, choosing what they like to do best but retaining sufficient free time to commit offences. In this case it would require constant new ideas and advertising to keep crime down. Some attempt to gauge 'customer' satisfaction might also be helpful and perhaps participants known to the police or those judged as being at risk by the social service departments could be targetted for special attention in this.

A more compelling explanation for the lessening effect, is that in a sense the scheme has become a victim of its own 'success'. As the number of children participating rises, then almost necessarily their feeling, and to some extent the reality of the extent to which they are supervised, will decrease. As this happens the opportunity to 'sneak off' and behave anti-socially will be more likely to be both perceived and taken. One way of avoiding this is to maintain the scheme very much at the local level so that it *appears* small and tightly supervised, even though it may actually be force-wide and extensive in the scope of its activities.

On a different course it might be argued that the observed reductions in crime should not be attributed to the SPACE programme but to changes in police recording practices. It is possible that the police discretion on recording particular offences erred on the side of not recording during August. While there is no empirical evidence on this point the possibility of a substantial recording effect seems slight. First it would require a considerable logistical exercise to introduce a system of under-reporting across the whole force area and to maintain it year to year. Furthermore, if under-reporting took place, even by default, as a result of officers being away from their stations, then the effect should have grown as the scheme has grown. In practice the effect has lessened.

A more plausible explanation arises from the absence of the police from their police stations to a considerably greater extent than was normal (quite a possibility bearing in mind the extent of police involvement on the scheme). The backlog of paperwork, including the recording of crime, would then have to be dealt with during early September. Offences committed in August would appear in the September figures *i.e.* recording would be delayed rather than suppressed. During the period 1980-1986 a number of changes were, in fact, made to the way in which force crime statistics in Staffordshire were collected. For the most part none of these would have affected the crime patterns shown in the analysis; indeed during this period the procedures followed by the Staffordshire police ruled out the allocation of crimes from one period to the next. The only exception to this situation occurred during the period July 1982 to April 1983 when in the course of administrative changes it was possible that some crimes reported to the police as occurring in one month were recorded within the following month's figures. However the number of crimes falling into this category was extremely small and it is most unlikely to have influenced the trends apparent from the analysis.

The approach taken here to the investigation of the effect of the scheme on crime is only one of many. It has led to the suggestion that there may have been an effect but it is not conclusive. It does suggest, however, that alternative methods might usefully be employed to look more closely at the individuals involved (for example a cohort of SPACE attenders might be followed up). Although such a study would be time consuming and expensive on resources, it is arguably justified in view of the effort being put into the present operation, not only by the police but by the many other individuals and agencies involved.

To sum up; there is little doubt that the SPACE scheme is extremely successful in attracting young people in Staffordshire. It is also popular with the public and is making a positive contribution to the relations between police and public. There appears to be some evidence of an association between the introduction of the scheme and changes in the crime pattern, changes which probably came about for a number of reasons possibly including the impact of the SPACE scheme.

PC Tim Ford at a 'Drop-in Centre' activity at Stafford (1984)

Youngsters participating in the SPACE Carnival Day, Staffordshire County Showground (1986)

A SPACE 'Sports Day Out' at Burslem with the Lord Mayor of Stoke-onTrent, Councillor Harry Oakes, and Chief Inspector John Gifford (1986)

PC Chris Middleton with some of his 'friends' at the SPACE Carnival Day, Staffordshire County Showground (1985)

Appendix 1

Entry Form for Trips **Reg. No.**

Date	Dep./Ret.	Event and Venue	Cost	Deposit
30/7	9.30/6.00	Peak District Walk	80p	50p
31/7	9.00/6.00	Alton Towers	£2.50	50p
1/8	9.45/4.00	Chatterley Whitfield Mining Museum	£1.80	50p
2/8	10.15/2.30	Birmingham City Football Club	50p	10p
5/8	10.00/4.00	Whittington Barracks	50p	10p
5/8	10.30/3.30	Aston Villa Football Club	50p	10p
6/8	11.45/4.30	Ice Skating	£1.00	50p
7/8	9.45/4.30	Severn Valley Railway—Bewdley	£2.50	50p
8/8	9.30/6.00	Peak District Walk	80p	50p
8/8	10.30/3.30	Fishing—Borrowpit Lake	Nil	Nil
9/8	10.00/4.00	Whittington Barracks	50p	10p
9/8	10.15/2.30	Birmingham City Football Club	50p	10p
12/8	9.30/6.00	Peak District Walk	80p	50p
13/8	9.30/4.30	National T/way Museum—Derbyshire	£1.50	50p
14/8	11.45/4.30	Ice Skating	£1.00	50p
14/8	10.30/3.30	Aston Villa Football Club	50p	10p
15/8	9.00/6.00	Alton Towers	£2.50	50p
16/8	10.00/4.00	Whittington Barracks	50p	10p
16/8	10.15/2.39	Birmingham City Football Club	50p	10p
16/8	10.00/4.00	Fishing Trip—Lichfield	Nil	Nil
19/8		Young Detective Comp. Tamworth Police Station	Nil	Nil
20/8	10.00/4.00	Sports Day—Rawlett & Belgrave	Nil	Nil
21/8	9.45/6.00	Carnival Day—Stafford	20p	Nil
22/8	8.45/7.00	S/stars, Cheadle—Competitors Only	Nil	Nil
22/8	10.30/3.30	Fishing—Borrowpit Lake	Nil	Nil
23/8	10.00/4.00	Whittington Barracks	50p	10p
Hourly Swimming Sessions—Belgrave—15p			Total Deposit	

KEEP AS YOUR OWN PERSONAL RECORD

Summary of Statistical Appendix

The full statistical appendix, which was prepared by Mr G R Houghton and Miss K Bright of the Home Office Scientific Research and Development Branch is available from:

Mrs E Morris
Home Office Crime Prevention Unit,
50 Queen Anne's Gate
London SW1H 9AT

The following text and figures, also prepared by Mr Houghton and Miss Bright, serve as examples of the time series analysis. They cover the analyses of burglary and shop theft for Staffordshire and Cheshire, one of the comparison forces.

Evaluation of Staffordshire 'SPACE' Scheme — Summary of Statistical Appendix

1. Method of Approach

A Time Series decomposition method was used. This assumes that each crime figure depends on three different components — these being the trend/cycle, seasonal factors and some randomness (Figure 1).

The trend/cycle provides information on the changes in trend and the average level of a series at any point. It also shows the basic trend pattern, which can be extended to form the basis for any trend projections (forecasts).

The seasonal factors show the short-term changes in the level of the series due to the time of year (month). They give a measure of the relative amount of crime, on average, occurring at different times during the year.

Randomness accounts for any unexplained or irregular events, which are completely unpredictable and which remain after trend/cycle and seasonal fluctuations have been removed.

The decomposition method splits the series of figures into these three components. Trend is eliminated from the data leaving the individual seasonal ratios for each month. These seasonal ratios are then averaged over the period to remove any randomness and to produce an overall seasonal ratio for each month.

The programme used for the decomposition has been derived from the Census II Decomposition Method[1]. This is a computer-based system for analysing data series. A variety of graphical and tabular reports are produced from the computer; examples of those reports relevant to the identification and analysis of seasonal patterns are shown in Figures 2.1—2.4 (average seasonal ratios) and 3.1—3.4 (grouped seasonal ratios). An explanation of each graph type is given in Section 3.

2. Data

Data was available, by month, over a 10 year period (October 1976 — September 1986) for four forces (Staffordshire, Cheshire, Leicestershire, West Mercia) and for four different crime categories (burglary, theft from motor vehicles, theft of motor vehicles, shop theft)[2]. All four forces are of similar size and demographic features.

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[1] Makridakis S. & Wheelwright S., "Forecasting Methods and Applications", Ch. 4 pp 106-138.

[2] An additional analysis of criminal damage was also carried out for the same forces but over a slightly different timescale. The results of this were comparable to those for the other four offences and are reported in the full statistical appendix. The remainder of this appendix refers only to the data on burglary, theft of and from motor vehicles and shop theft.

As the scheme was started on a small scale in 1981, becoming county-wide in 1983, the data for each force was split into two series — October 1976 to September 1981 (representing the period before the scheme was started) and October 1981 to September 1986 (representing the period over which the scheme has been running).

3. Results of the Analysis

The Decomposition Program was run 8 times, for each of the 4 forces (4 crime categories pre-October 1981 and 4 crime categories post-October 1981) giving a total of 32 runs. The following results are exemplars of each run:

3.1 Average Seasonal Ratios

(Figures 2.1a — 2.4a pre-SPACE)
(Figures 2.1b — 2.4b post-SPACE)

The seasonal ratios show, on average, how much crime occurs at different times of the year. If there were no seasonality in the data the average for each month would be represented by a ratio of 100. However, if seasonality exists, the seasonal ratios for the various months may be greater or less than 100.

Some months may have seasonal ratios higher than 100 indicating that the particular month has an above average level of crime, and some months may have ratios below 100, indicating a below average level of crime in that particular month. Note that the sum of the ratios above 100 equal (and therefore cancel out) the sum of the ratios below 100. The seasonal ratio is therefore a relative measure of the average level of crime occurring in the various months of the year.

For example, Figure 2.1b shows seasonal ratios for burglaries in Staffordshire, calculated from crime data covering the period October 1981 — September 1986. The seasonal ratio for August (from the graph) gives a figure of 84 implying that burglaries in August are 16% (84-100) less than the average across the year. Similarly, the March seasonal ratio (Figure 2.1b) for Staffordshire burglaries, is 110 indicating that burglaries during March occur 10% (110-100) more than the average across the year.

For a 5 year period there will be 5 individual seasonal ratios for each calendar month *(ie* 5 Augusts', 5 Septembers' etc.). The single overall seasonal ratio for each month is calculated by averaging these 5 figures. This is shown as the central rectangular point for each month on the graph of average seasonal ratios (eg Figure 2.1a). Since the individual seasonal ratios for any month are unlikely to be the same from year to year some indication must be given as to how representative the average seasonal ratio is of the individual seasonal ratios. The range of seasonal ratios around the average is shown by the 2 triangular points (above and below the average for each month) on the graph of average seasonal ratios (eg Figure 2.1a). The closer these 2 points are to each other *(ie* less vertical distance) the better the average ratio (rectangular point on the graph) represents the individual season ratios. If the 2 triangular points are very far apart in a particular month then there can be little indication that the average represents a true seasonal effect for that month.

The plot of seasonal ratios is used to determine where seasonality exists, if any. If the upper and lower triangular points are both above or both below the 100% average line then seasonality is evident.

For there to be a significant difference between the two series (pre-SPACE series — Figures 2.1a—2.4a; and post-SPACE series — Figures 2.1b—2.4b) the range of seasonal ratios for corresponding months in the two series should not overlap.

For example, in Figure 2.1a the average seasonal ratio, for August during the pre-SPACE period, is 94 with an upper limit of 98 and a lower limit of 91. Figure 2.1b shows the average seasonal ratios for the post-SPACE period. The average seasonal ratio for August has been reduced to 84 but with an upper limit of 98 and a lower limit of 70. There has been a drop in the average seasonal ratio over the two periods but it is not statistically significant as the upper and lower limits overlap each other for the pre-SPACE and post-SPACE periods.

2.13.2 Grouped Seasonal Ratios (Figures 3.1a — 3.4a pre-SPACE)
(Figures 3.1b — 3.4b post-SPACE)

Grouped seasonal ratios show the individual seasonal ratios calculated for each month of each year used in the analysis. They are grouped together by month so, for example, the first point in Figure 3.1b is the seasonal ratio for October 1981, the second for October 1982 etc; the sixth point is for November 1981, the seventh point for November 1982 etc. Points are plotted similarly for the other months. Average seasonal ratios, for each month, are calculated from these figures. (The average seasonal ratios are shown in Figures 2.1—2 .4.)

The grouped seasonal ratio, for each month, shows how stable the seasonality is from year to year. These figures can help to explain the plot of the average seasonal ratios.

For example, Figure 3.1b shows grouped seasonal ratios for Staffordshire burglaries between October 1981 and September 1986. Figures for August show that there was a drop in burglaries in August 1983 and 1984 (second and third points plotted for August) but a sharp rise in 1985 and again in 1986 (fourth and fifth points plotted for August). The drop in crime for August 1983 and 1984 will bring down the average seasonal ratio for August, as shown in Figure 2.1, but the higher values for August 1985 and 1986 will increase the range of seasonal ratios, as indicated by the wide separation of the triangular points for August in Figure 2.1b.

4. Interpretation of the Results

4.1 Staffordshire

For three of the four crime categories — burglary, theft from cars and shop theft — the average seasonal ratio in August for the post-SPACE period is lower than the

corresponding seasonal ratio in August for the pre-SPACE period. However, in each case, the range of ratios for August (the difference between the upper and lower triangular points) has increased in the post-SPACE period, overlapping the range of ratios for August in the pre-SPACE period. This indicates that the drop in August is not statistically significant, although for the category 'shop theft' the decrease is almost significant[3]. For the remaining category — theft of vehicles — there is a slight (and again, not significant) rise in the August figure for the post-SPACE period.

The graphs of the grouped seasonal ratios for Staffordshire provide an explanation for this rise in the range of ratios in August during the post-SPACE period.

Figures 3.1b and 3.2b show that the 2nd and 3rd points for August (1983 & 1984) are much lower than the figures for 1985 & 1986 (4th and 5th points). The effect of this is to lower the average seasonal ratio (as discussed above) but to increase the spread of ratios. However the reduction in 1983/1984 appears to occur for all crime classifications (with the exception of shop theft in 1984) and provides evidence that the drop during August 1983/1984 in Staffordshire was a real decrease and not simply due to random variations in the data.

4.2 Comparison to other Forces

Average seasonal ratios for the other three forces (Cheshire, Leicestershire and West Mercia) during August have not significantly changed over the 10 year period.

Most grouped seasonal ratios, for the three forces, are similar when compared between the two periods (pre-SPACE and post-SPACE) for August. There are variations between the pre-SPACE and post-SPACE periods for all three forces but these are not as consistent or as significant as the differences between the two periods for Staffordshire. This provides more evidence for a 'real' drop in the Staffordshire crime rates during 1983/84.

5. Summary

Seasonal ratios for August in Staffordshire have dropped since the scheme has been running. However, the spread of the seasonal ratios has increased implying that the drop is not statistically significant.

Results from other forces show no similar change in the seasonal ratio indicating that the Staffordshire results may be due to a 'real' reduction in crime, for a least some of the 5 year period examined, rather than due to spurious changes in the data. This applies particularly for burglary, theft from motor vehicles and shop theft.

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[3]Calculated at the 90% significance level.

The seasonal ratios for Staffordshire in August 1983 and 1984 for all crime categories are much lower than the other years in the post-SPACE period. This will reduce the average seasonal ratio but increases the spread of the ratios.

A 5 year span is a small sample to analyse and it is generally very difficult to show statistically significant changes in any set of crime figures since there can be considerable variation within such data. However, there is some indication (although not statistical proof) that for three crime categories — burglary, theft from motor vehicles and shop theft — there is some reduction in the crime figures. There is no indication of reduction in figures for theft of vehicles.

Figure 1

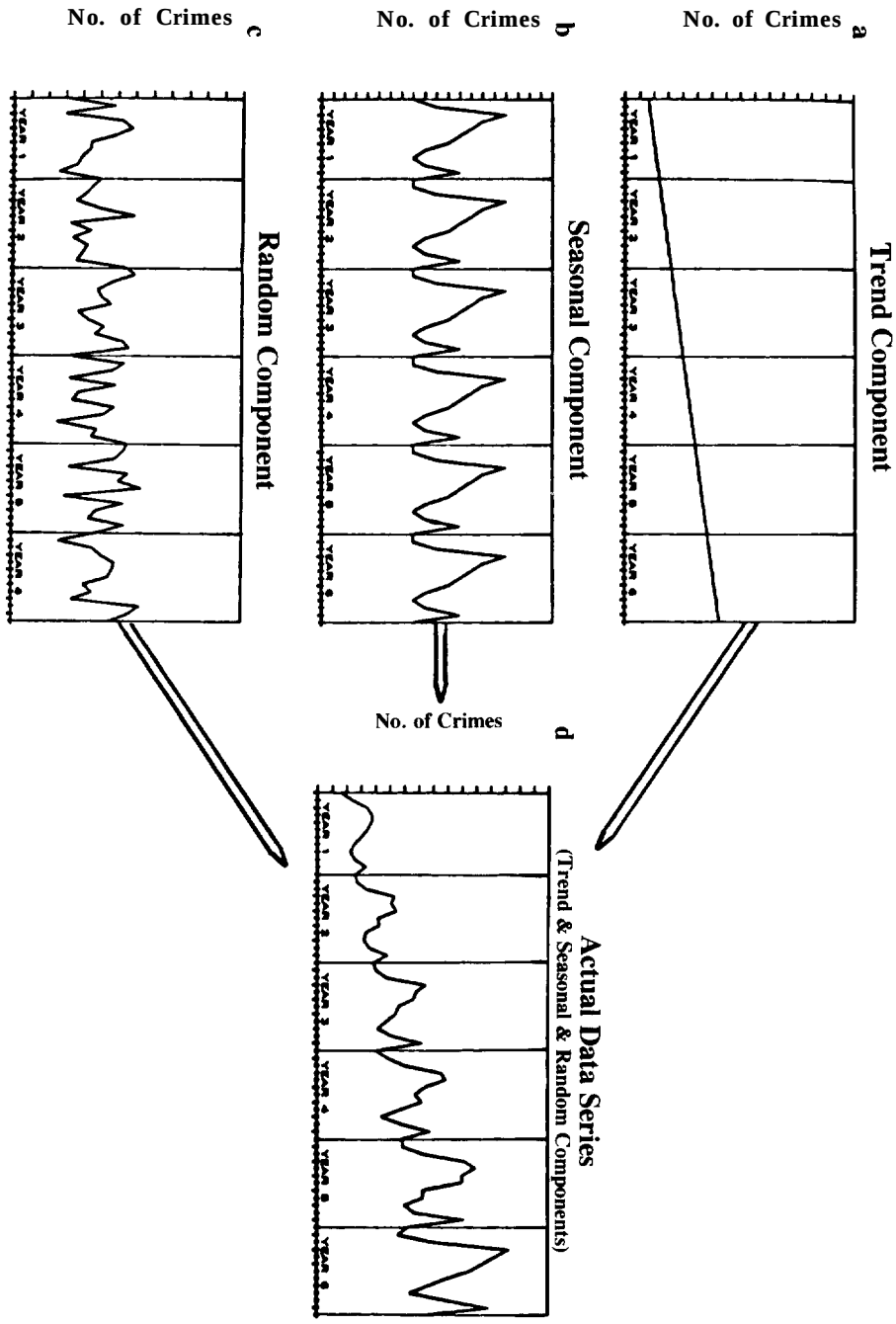

No. of Crimes
a
Trend Component
No. of Crimes
b
Seasonal Component
No. of Crimes
c
Random Component
No. of Crimes
d
Actual Data Series
(Trend & Seasonal & Random Components)

Fig. 2.1a Decomposition Program
Seasonal Ratios (76-81)

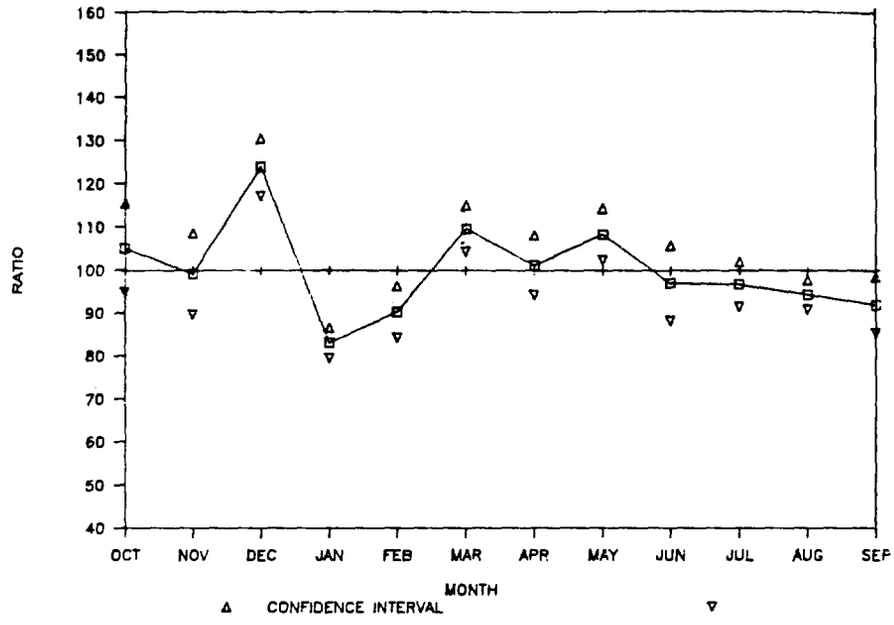
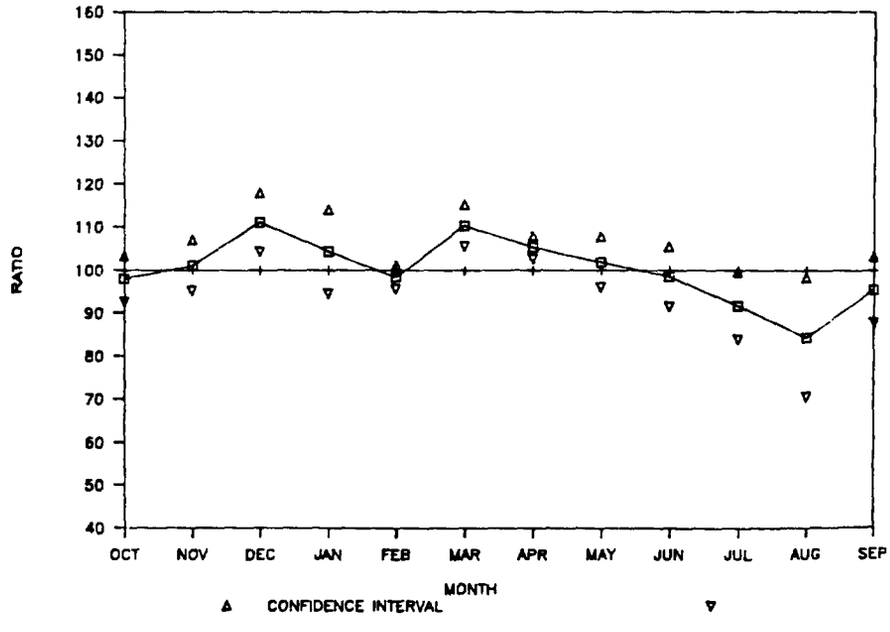


Fig. 2.1b Decomposition Program
Seasonal Ratios (81-86)



Staffordshire – Shop Theft Fig 2.2

Fig. 2.2a Decomposition Program
Seasonal Ratios (76-81)

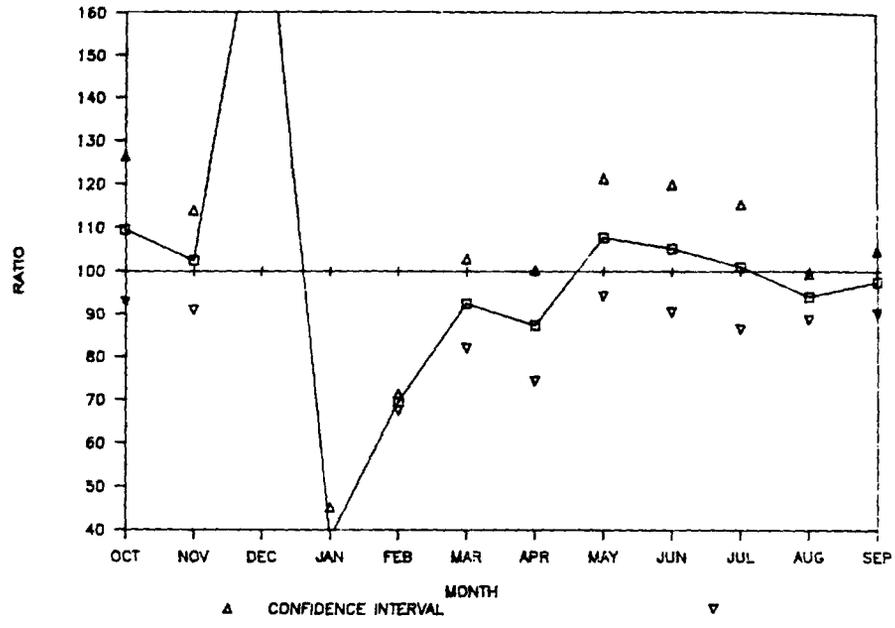
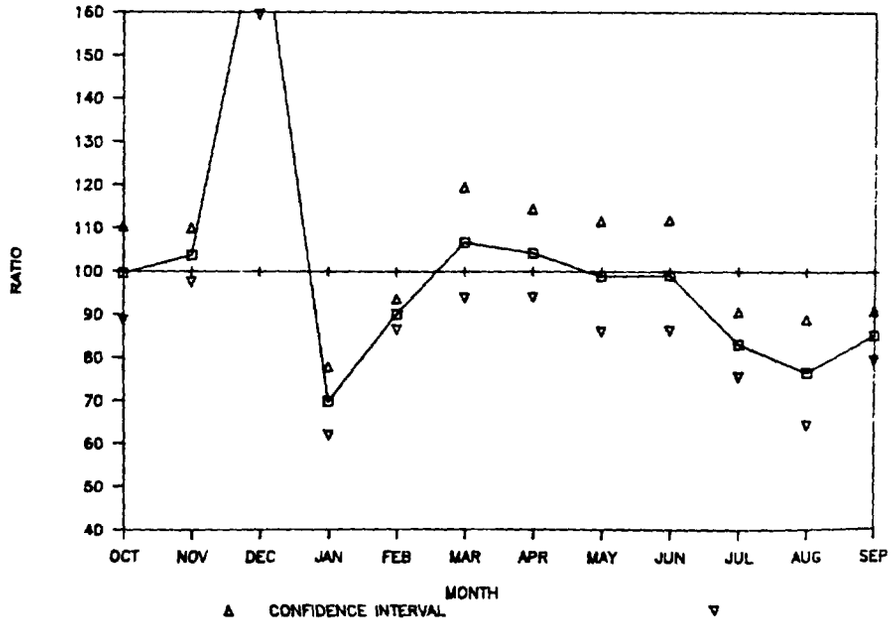


Fig. 2.2b Decomposition Program
Seasonal Ratios (81-86)



Cheshire — Burglary **Fig. 2.3**

Fig. 2.3a Decomposition Program
Seasonal Ratios (76-81)

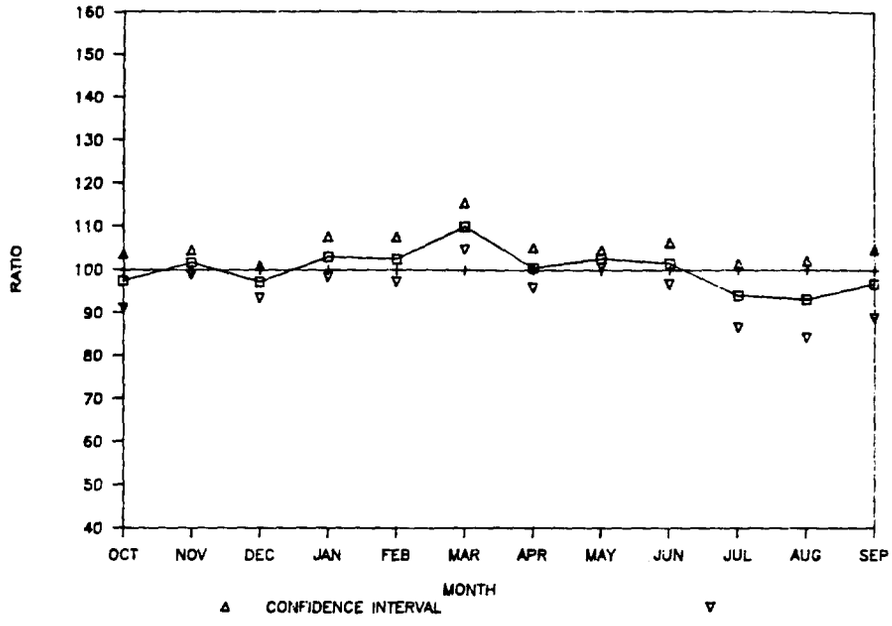
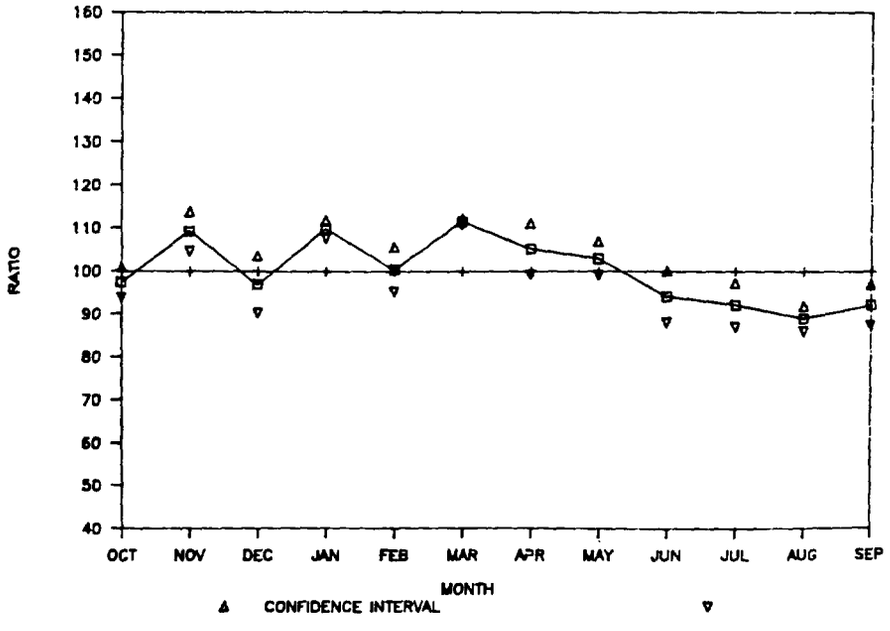


Fig. 2.3b Decomposition Program
Seasonal Ratios (81-86)



Cheshire – Shop Theft

Fig 2.4

Fig. 2.4a Decomposition Program
Seasonal Ratios (76-81)

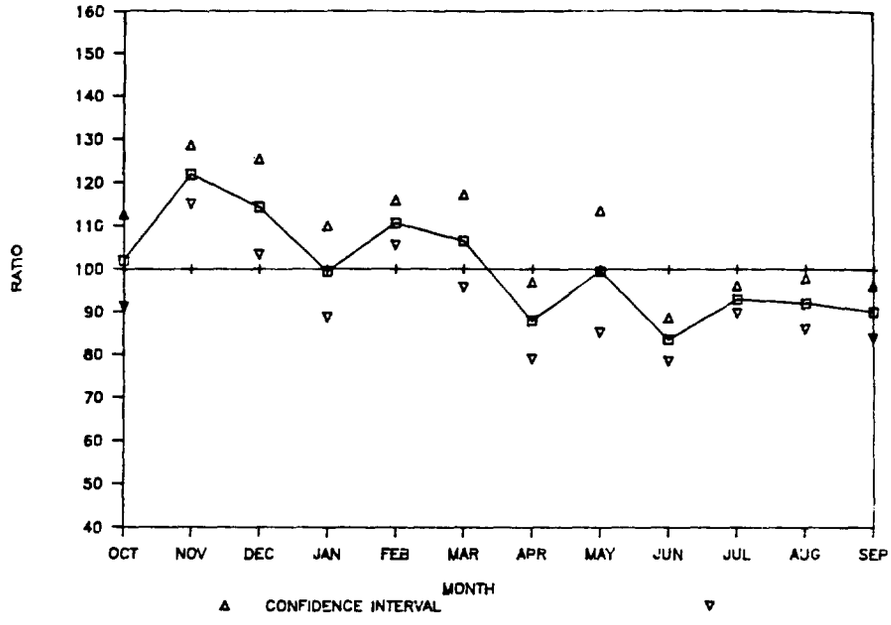


Fig. 2.4b Decomposition Program
Seasonal Ratios (81-86)

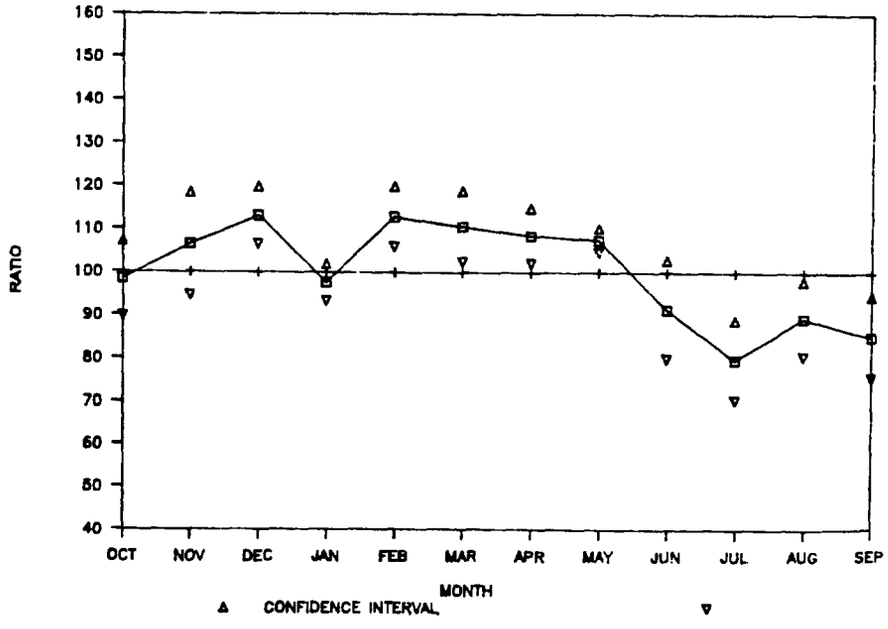


Fig. 3.1a Decomposition Program
Seasonal Ratios Grouped by Month (76-81)

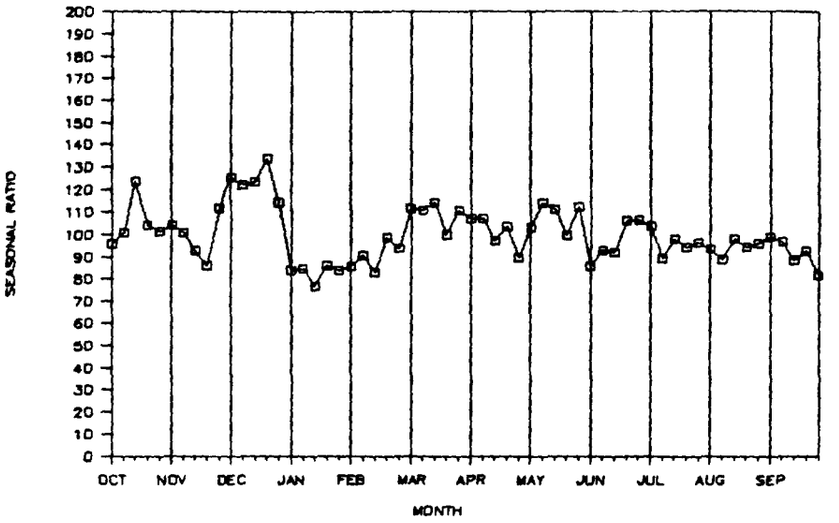


Fig. 3.1b Decomposition Program
Seasonal Ratios Grouped by Month (81-86)

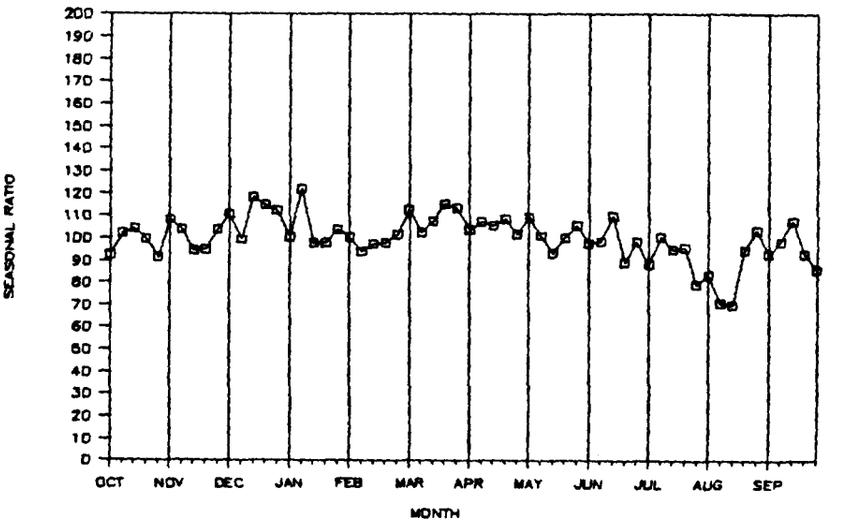


Fig. 3.2a Decomposition Program
Seasonal Ratios Grouped by Month (76-81)

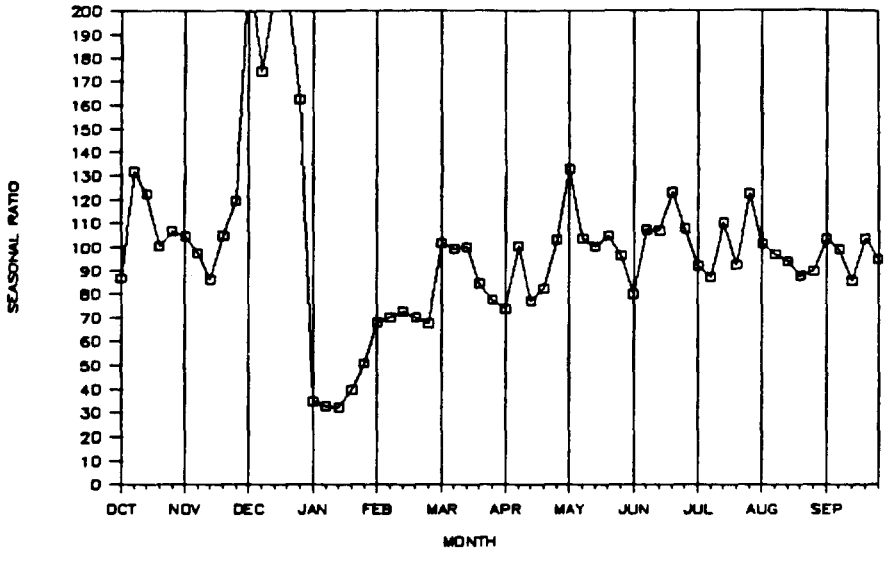


Fig. 3.2b Decomposition Program
Seasonal Ratios Grouped by Month (81-86)

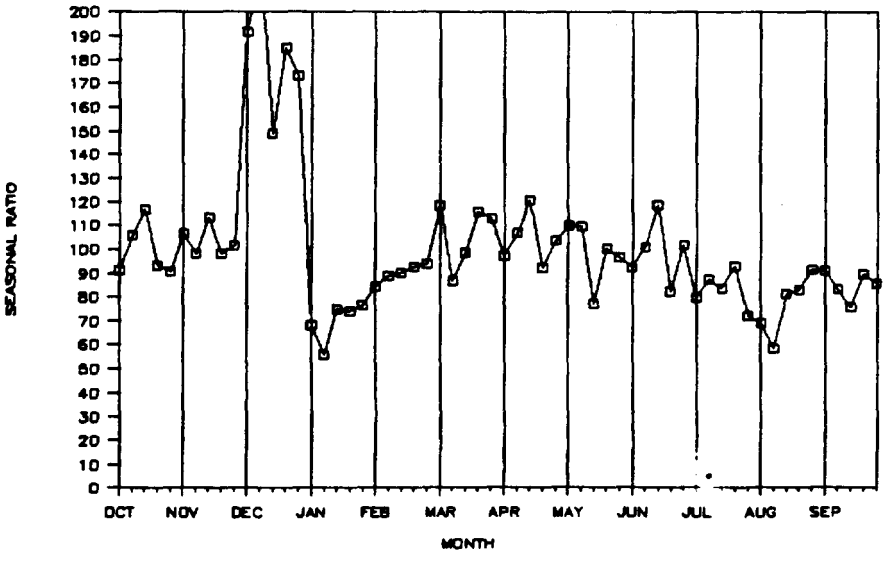


Fig. 3.3a Decomposition Program
Seasonal Ratios Grouped by Month (76-81)

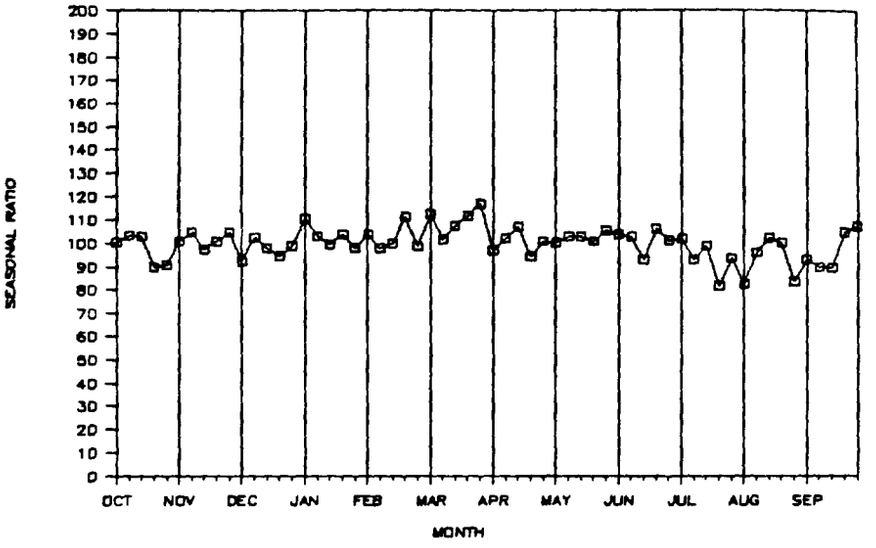


Fig. 3.3b Decomposition Program
Seasonal Ratios Grouped by Month (81-86)

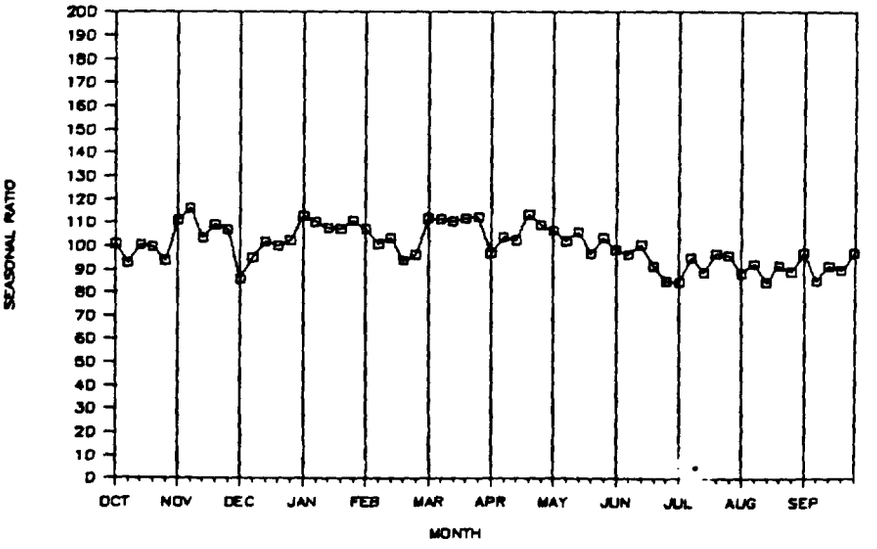


Fig. 3.4a Decomposition Program
Seasonal Ratios Grouped by Month (76-81)

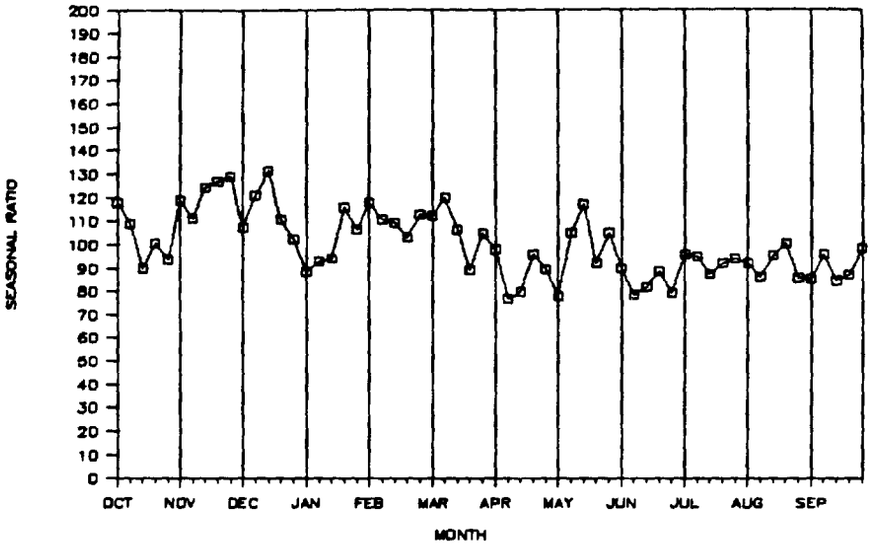
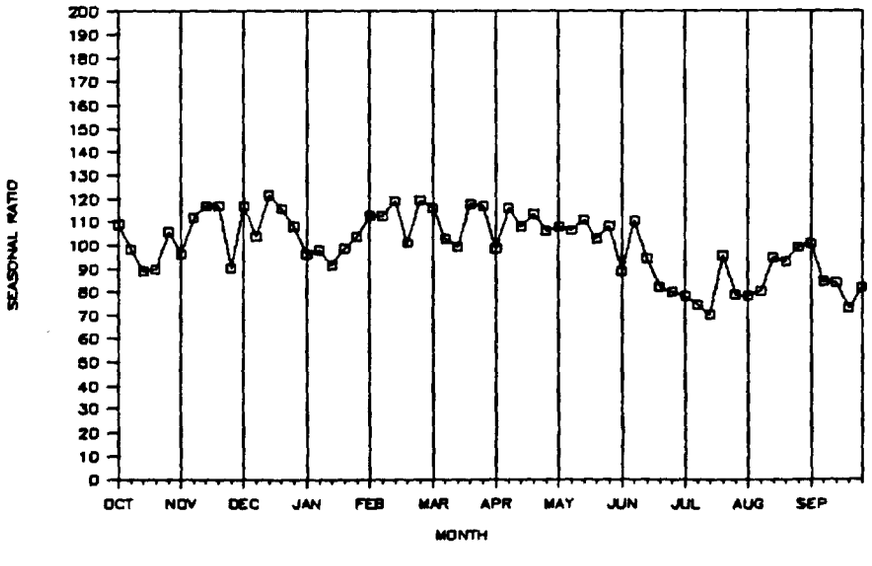


Fig. 3.4b Decomposition Program
Seasonal Ratios Grouped by Month (81-86)



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