

# **The Electronic Workshop**

**David Cox**  
**Chairman, IRTE, UK**

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## THE ELECTRONIC WORKSHOP

### 1. Synopsis - Fleet Management Information

The old American saying that if you can't measure it you can't manage has never been more appropriate. The electronic systems now available have made access to information regarding Fleet Management and Fleet Operation much more accessible and much more accurate. This paper sets out the opportunities for information measurement and collection for modern fleet engineers and operators and their application.

2. **“If You Can’t Measure It - You Can’t Manage It!”**  
**(Or If you Don’t Measure It - You Won’t Manage It!)**

Accurate and timely information collection is the basis of modern fleet management and operation. With modern systems the opportunities to access worthwhile information are almost endless and it is possible for the modern fleet manager to have mind block from the weight of information which he can now access. The art is to concentrate on those details which do influence the operation of the vehicles and give the opportunity to save cost. The Road Transport Engineer will be interested in three types of information;

2.1 Design & Construction

This will cover those areas concerned with the build or specification of the vehicle and include;

- Vehicle Specification
- Vehicle Parts Details
- Vehicle Standard Job Times
- Vehicle Licensing Details
- Vehicle Modifications or Test Data.

In the majority of vehicles most of this information will not change during the life of the vehicle.

2.2 Operation & Performance

This will include the information generated as the vehicle is operated and will include;

- Mileage
- Fuel Used & Hence Consumption
- Maintenance Tasks Undertaken
- Parts Fitted & Replaced
- Vehicle History
- Availability
- Costs Associated With Above
- Projected Vehicle Maintenance Schedules.

2.3 Operational Standards

This is information against which the operation can be judged. It could include the following comparisons;

- By Vehicle Type
- By Operational Type
- By Vehicle Size
- By Fleet Centre.

It could be based on manufacturers information or industry standards such as the IRTE Vehicle Maintenance Reporting Standards (VMRS). Or against any performance standards which have been generated or developed in-house.

### 3. Designing The Information System

Before designing any Management Information System (MIS) the Fleet Engineer will need to consider a number of points covering the way in which his system will operate.

#### 3.1 What To Include?

Clearly the system will need to include in its design the base data referred to in 2.1 above. This will however require provision for some updating at regular intervals. The operational data set out in 2.2 will however require collection and input on a more regular basis.

#### 3.2 What To Measure?

The answer is anything useful which will aid the operation and the management of the fleet. Virtually all of the operational data arises on the vehicle. The measurement of the data does not signify that everything measured needs to be presented to the engineer, but clearly if the measurement is not taken at the time of the operation and stored, it cannot be generated at a later date.

#### 3.3 Where To Measure The Data?

Almost without exception this means on the vehicle. The information on maintenance will arise when the vehicle visits the workshop. Fuel data can be generated at the pump. The operational data such as mileage covered is a continuous process but once again it is appropriate to measure it when the vehicle visits the workshop.

Alternatively if information is required at shorter time intervals then it can be taken at each visit to the Fuel Pump or at the gateway of the operating centre.

#### 3.4 When To Measure The Data?

This also needs consideration and can only be based upon what is the most practical interval.

If the information is required monthly and if the vehicle is running high mileage and as a result visits the workshop every two weeks then the workshop is the place to take the information.

If on the other hand the vehicle is not intensively used and visits the garage every six months, then the workshop would not be an appropriate site to gather information which is needed over a shorter time scale.

### 3.5 How To Measure The Data?

By whatever means is the most practical, reliable and simple.

Examples are given below exploring the modern methods which are now available. Experience suggests that manual methods are not always reliable. Electronic methods do not need a reminder.

Two further points:

### 3.6 Accuracy

The old adage GIGO has never been truer. There is no point in recording the information if it is inaccurate and the most critical point of system design is to build in accurate methods of recording as far as is possible.

### 3.7 Mechanics Don't Write

As far as possible do not rely on the written or the keyed word. Modern electronic technology is everyday at home so why ask your staff to write? Attention to this area will aid accuracy in 2.5 above.

#### 4. The Information Revolution

Modern electronic systems present almost limitless opportunities for the Fleet Engineer to accurately input operating data and then to process it in an accessible way.

Any Electronic Management Information System will require two major components.

##### 4.1 Hardware

Modern systems are largely PC based. For multi-site operation these can be linked together to form either a Wide Area Network (WAN) or Local Area Network (LAN). Whilst the above systems give real-time access, the connection charges can be considerable.

Alternatively using a modem download system the PCs can be independent for most of the day and download overnight or at an off-peak spot in the working day.

Gigabytes are now as cheap as megabytes used to be. Data storage generally is now cheap and updating one's hard drives is the order of the day.

The use of a CD-Rom facility can expand the memory of the PC to almost limitless proportions and also gives a fast and accurate method of updating standard files.

##### 4.2 Programme

The use of "Windows" or a similar operating system has transformed the suitability of computers for vehicle workshop use. By using a cursor to "click" on to alternatives the need to key-in complicated numbers such as spare parts identifiers can be reduced to a minimum. It is also much more reliable in the Garage environment.

It is also important to reduce the risk of incorrect information being collected by the use of automated data collection where this is possible. Examples of these systems are;

##### 4.3 Bar Codes

The Bar Coding system which has transformed the Supermarket is very accurate giving something like 5 mis-reads in 2<sup>1</sup>/<sub>2</sub> million operations. It can be used to assist in the identification and keying of parts data and also for Workshop management, replacing job cards or time sheets.

Surprisingly there is no universal bar code used by the motor industry but PCs can be programmed to read whatever code you wish or a multitude of codes.

Additionally bar codes are not limited to a simple code but, in the case of parts could include not just the identifier, but details of price and cost, manufacturer, source, material, etc. These can be accessed by the use of automatic look-up tables.

Bar Codes can also be used to physically put the "thing" in the "place". The substitution of a numeric fleet number on the vehicle by a bar code means that the vehicle has to visit the workshop to generate a work sheet. An aid to eliminating "paper" safety checks!

#### 4.4 Radio Scanning

By the use of radio it is possible to transmit information automatically from vehicles to a collection point and hence automatically into the computer. A "Black Box" on the vehicle can be used to continuously monitor such things as Mileage and Fuel use. It can also monitor driver performance or vehicle operation as discussed later.

The black box transmits the information continuously and the download takes place when the vehicle passes the receiver. This receiver can be placed in the workshop, or the fuel pumps or more usually at the Gateway to the operating centre.

#### 4.5 Reporting By Exception

The system can be programmed to take action if data is not received.

An example is the vehicle due for servicing or inspection on a certain day. If details of a transaction including the vehicle identification number at one of the garages is not received during the 24 hour period then the central computer will automatically "tell" the operating centre with a reminder that the vehicle is overdue. It can be programmed to repeat this process at whatever fixed interval is decided upon until the details of a transaction involving the particular vehicle are received.

This can lead to operators being knee deep in faxes. A condition known as the "Mad Faxman!"



5.

## Types Of Information

What information should we be storing or looking for;

### 5.1 Details Of The Maintenance & Repair & Vehicle Improvement Activities

The maintenance and repair activity can be described in another way. It consists of four components;

- To Prevent Deterioration, eg Lubrication
- To Measure The Deterioration Which Has Occurred, eg Brake liner thickness measurement
- To Restore The Equipment To Its Original Condition, eg Fit new brake liners

and finally;

- To Carry Out Improvement Activities, eg Fit longer life liners.

All of the above components must be carried out against a known standard. Otherwise the manager is shooting in the dark. Secondly the recording of the activity can be used to form a future basis of comparison or measurement eg VMRS

### 5.2 Against A Known Standards - What Standard?

It is common place for the Fleet Management computer to carry the details of a vehicle. This information is usually superficial only ie Fleet Number, Registration or Licence Number, Chassis Number, Engine Number, Tyre Size, Transmission Type and so on.

However, modern vehicles are more than this. They are an assembly of known parts, each specifically identified, each carrying a parts identification number. These are as specific to the vehicle as a finger print.

If the vehicle identifier used by the computer gave access to the build spare part detail, the mechanic could choose parts data using a cursor and generate automatically a faxed order to the stores or local dealer? This data could include the Manufacturers or Parts Suppliers Cost Price so that cost data is generated simultaneously. A similar system could be used for an in-house store operation with inventory information also being generated.

The ICME or Manufacturers standards can also provide information for job times for all repair tasks at standard performance and against which actual workshop staff productivity can be judged. It also makes the forward planning of maintenance timetables and workshop loadings much easier.

Once again specific times for the particular build of vehicles can be accessed using the vehicle identifier.

The Glasses organisation provide data base information for both parts and for ICME job time information. Job information is also available from the manufacturer. The specific build codes for the vehicle can be identified via the VIN plate.

Finally the vehicle costs can be compared against either the in-house fleet standards or those provided by the manufacturer. VMRS provides a coding system which can be converted to a database to provide such standards.

### 5.3 What Can This Data Be Used For?

- Instant Repair Cost Estimates fully priced and specific to customer, as the computer is able to identify the customer and allocate hourly labour rate and parts mark-up.
- Job sheets covering full repair cost and carrying the repair time in the form of a bar code. If Repair staff then swipe onto each of their activities individually each repair can be costed extremely accurately. Examples are attached as Appendices. The bar code system can even be used to generate time sheets for pay!
- Finally and most importantly to develop accurate cost and revenue information for; vehicle, garage, operating centre or fleet. Once again examples are shown in the attached appendices.

### 5.4 Operating Statistics

These cover the usual measures;

- Mileage

This can be via a manual input from the fuel pump or a fuel card. Both can suffer from inaccuracies.

More accurate is an electronic download direct from the vehicle at the Garage of fuel pump.

- Fuel & Lub Issues

A bar code fleet number of the vehicle could be used to open the pump and to assign any fuel issued.

A similar system can be used for lub oil top-up if it is in-house. It is more difficult to provide this information accurately for en-route top-up.

- Tyre Wear

Manual tyre wear measurement is usually quite accurate but new systems which read tyre profiles like a bar code are now being developed. These have the advantage of not only measuring wear but also showing tyre damage. The equipment is about the same size as a portable weighbridge and so can fit into the boot of a car. It could even be used by the Police at a roadside lay-by. The potential is frightening!!

## 5.5 Performance Statistics

The development of on-board black boxes gives the opportunity to monitor the performance of the unit when it is on the road and earning revenue. These systems can operate from transducers which microwave the information to receivers at the pump or in the workshop.

The information which can be covered is;

- Driver Performance

Programmes are available which give details of the way in which the vehicle is driven and covering maximum speed, engine overspeeds, time in each gear and so on.

- Wear Monitoring

Although expensive the use of wear monitors has been reliably demonstrated in Grand Prix Races and is the way ahead. The use of these devices in the future will allow our current preventative maintenance techniques to give way to predictive maintenance, where workshop activity matches the need and not just the need to monitor condition.

- Load Statistics

Using on-board weighing systems accurate load readings can be obtained and recorded in the black box together with off-load by

drop statistics. It is also possible to monitor the number of times and the time in the duty when the load access doors or the curtains have been opened.

- Breakdown/Adjustments

Once again covered in the black box as a diagram of use.

- Collision Damage

The Trace Company of Coventry UK has now produced a system in conjunction with 3M which records the damage to vehicles.

A small tape in which two filaments are separated by foam rubber is fitted to the vehicle at strategic points. These can include curtain or box van side, or rear under run-bars or front bumpers, etc.

When the vehicle suffers even a minor collision the two filaments touch and the signal generated is recorded in the on-board black box.

Apart from its use in everyday traffic this is of considerable potential to those fleets which close park large numbers of trailers on their operating sites. Normally in these circumstances damage occurs without the time of the incident or culprit being known. The black box system would accurately record the time of the incident and thus point the finger at the person responsible.

6. **Driver Involvement**

One device which is not part of the electronic revolution but which is under utilised is the driver.

For too long - "You bust 'em, We fix 'em" - mentality has existed between Engineers and Operators.

Four advantages spring from driver development.

- They are the first line of maintenance
- They can be the source of improvements because they live with the vehicle
- They can be receptive to new attitudes and better skills by training and education
- The above lead on to give lower cost and better reliability.

7. New Attitudes

<b>The Received Tradition</b>	<b>The New Operating Philosophy</b>
<b>1. It Costs Money To Use Quality Maintenance</b>	<b>1. Quality Is Free</b>
<b>2. Engineers And Managers Are experts; Mechanics And Drivers Serve Their Dictates</b>	<b>2. Mechanics And Drivers Are Experts; Managers And Engineers Serve Them</b>
<b>3. Mistakes Are Inevitable And Have To Be Inspected Out</b>	<b>3. Mistakes Are Treasures, The Study Of Which Leads To Process Improvement</b>
<b>4. Inventory Is Useful - It Keeps The Fleet Rolling Along</b>	<b>4. Inventory Is Evil - It Hides Problems That Should Be Surfaced</b>
<b>5. Automation Is Valued Because It Drives Labour Out Of The Operation</b>	<b>5. Automation Is Valued Because It Facilitates Quality</b>
<b>6. Cost Reduction Comes By Driving Labour Out Of The Operation And By High Machine Utilisation</b>	<b>6. Cost Reduction Comes By Speeding The Operation Without Wasted Motion, etc</b>
<b>7. Machines Are Sprinters, And Pulled Hamstrings Are To Be Expected</b>	<b>7. Machines Are Marathon Runners, Slow But Steady And Able To Run</b>
<b>8. Procure From Multiple Vendors</b>	<b>8. Procure From A Single Vendor</b>
<b>9. Expediting And Work-Around Are Ways Of Life</b>	<b>9. Expediting And Work-Around Are Sins</b>
<b>10. Quick And Dirty Often Has To Be "Good Enough"</b>	<b>10. Do It Right The First Time - You Don't Have Time To Do It Over</b>

APPENDIX 1.

**PowerFleet Services**

**Vehicle Job Sheet**

**Job No.** JK209383

**Customer** STACE002  
**Vehicle ID** M495RAU  
**Vehicle Make/Model** VAUXHALL Corsa Without PAS 1389 cc 111hac  
**Mileage**

**Start Date** 21/01/1998  
**Start Time**  
**End Date**  
**End Time**

Task	Description	Standard	Actual
MENU SS01	1600 cc Major menu service	1.60	
S42	R&R Lamps exterior--headlamp assy	0.50	
XXX 00	REPLACED O/SF SEAT BELT PRETENSIONER	1.50	

**Repair Class** 01  Scheduled Repair  
**Repair Cause** 15  Normal Wear & Tear

**Notes**  
 ROBERTA EXT 2835

**Mechanics Comments**

Part	Quantity	Description
MENU SS03	1.00	Major service kit incl. Oil
ELE	1.00	O/S HEADLAMP
BOD	1.00	WHEEL RIM
BOD 01	1.00	O/SF SEAT BELT PRE TENSIONER
DISCOUNT	1.00	DISCOUNT

Event	Quantity	Description
MISC	2.00	2 TYRES 16S6STR14 DUNLOP

**Signature**



APPENDIX 1A.

Timesheet Report at Garage EK2 for Pete Carrm  
From 19/01/1998 to 25/01/1998 inclusive

Chargeable Logged Timesheet Entries			
Code	Description	Date	Total hours
JOB JK209496		Mon 19/01/1998	1.61
JOB JK209647		Mon 19/01/1998	1.69
JOB JK209439		Mon 19/01/1998	0.77
JOB JK209493		Tue 20/01/1998	2.22
JOB JK209522		Tue 20/01/1998	2.29
JOB JK209768		Wed 21/01/1998	0.71
JOB JK209715		Wed 21/01/1998	1.63
JOB JK206347		Wed 21/01/1998	1.58
JOB JK209524		Thu 22/01/1998	1.50
JOB JK209580		Thu 22/01/1998	2.09
JOB JK209784		Fri 23/01/1998	2.66
JOB JK209438		Fri 23/01/1998	1.95
JOB JK209507		Fri 23/01/1998	1.83

Chargeable Entries Summary		
Code	Description	Total hours
JOB JK209496		1.61
JOB JK209647		1.69
JOB JK209439		0.77
JOB JK209493		2.22
JOB JK209522		2.29
JOB JK209768		0.71
JOB JK209715		1.63
JOB JK206347		1.58
JOB JK209524		1.50
JOB JK209580		2.09
JOB JK209784		2.66
JOB JK209438		1.95
JOB JK209507		1.83
Total:		22.56



APPENDIX 2.

Timesheet Report at Garage EK2 for Pete Camm  
From 19/01/1998 to 23/01/1998 inclusive

NON - Chargeable Logged Timesheet Entries			
Code	Description	Date	Total hours
ACT 00000000	START DAY	Mon 19/01/1998	0.14
ACT 00000005	CLEANING GARAGE/TOOLS	Mon 19/01/1998	3.38
ACT 00000009	VEHICLE COLLECT/DELIVER	Mon 19/01/1998	0.45
ACT 00000000	START DAY	Tue 20/01/1998	0.06
ACT 00000005	CLEANING GARAGE/TOOLS	Tue 20/01/1998	0.11
ACT 00000009	VEHICLE COLLECT/DELIVER	Tue 20/01/1998	0.59
ACT 00000000	START DAY	Wed 21/01/1998	0.24
ACT 00000017	COLLECT & DELIVER COPPICERD	Wed 21/01/1998	2.95
ACT 00000009	VEHICLE COLLECT/DELIVER	Wed 21/01/1998	1.12
ACT 00000000	START DAY	Thu 22/01/1998	0.15
ACT 00000014	MEDICAL TREATMENT	Thu 22/01/1998	4.48
ACT 00000000	START DAY	Fri 23/01/1998	0.04
ACT 00000005	CLEANING GARAGE/TOOLS	Fri 23/01/1998	1.08
ACT 00000003	ADMINISTRATION	Fri 23/01/1998	0.49

NON - Chargeable Entries Summary		
Code	Description	Total hours
ACT 00000000	START DAY	0.64
ACT 00000005	CLEANING GARAGE/TOOLS	4.57
ACT 00000009	VEHICLE COLLECT/DELIVER	2.16
ACT 00000017	COLLECT & DELIVER COPPICERD	2.95
ACT 00000014	MEDICAL TREATMENT	4.48
ACT 00000003	ADMINISTRATION	0.49
Total		15.28

APPENDIX 3.

Timesheet Report for Garage EK3  
From 19/01/1998 to 25/01/1998 inclusive

Chargeable Logged TimeSheet Entries			
Code	Description	Date	Total hours
JOB JK209358		Mon 19/01/1998	3.68
JOB JK209487		Mon 19/01/1998	1.36
JOB JK209436		Mon 19/01/1998	1.87
JOB JK209496		Mon 19/01/1998	1.61
JOB JK209746		Mon 19/01/1998	3.73
JOB JK209703		Mon 19/01/1998	2.46
JOB JK209406		Mon 19/01/1998	3.93
JOB JK209498		Mon 19/01/1998	1.53
JOB JK209647		Mon 19/01/1998	1.69
JOB JK209439		Mon 19/01/1998	3.21
JOB JK209341		Mon 19/01/1998	4.14
JOB JK209716		Tue 20/01/1998	0.45
JOB JK209576		Tue 20/01/1998	0.83
JOB JK209493		Tue 20/01/1998	2.22
JOB JK209752		Tue 20/01/1998	3.30
JOB JK209437		Tue 20/01/1998	2.16
JOB JK209514		Tue 20/01/1998	4.32
JOB JK209499		Tue 20/01/1998	3.34
JOB JK209492		Tue 20/01/1998	4.99
JOB JK209522		Tue 20/01/1998	2.29
JOB JK209722		Tue 20/01/1998	0.40
JOB JK208919		Tue 20/01/1998	1.10
JOB JK209756		Tue 20/01/1998	4.23
JOB JK209587		Tue 20/01/1998	2.11
JOB JK209751		Wed 21/01/1998	2.23
JOB JK209762		Wed 21/01/1998	0.13
JOB JK209572		Wed 21/01/1998	2.79
JOB JK209521		Wed 21/01/1998	4.04
JOB JK209766		Wed 21/01/1998	0.71
JOB JK209764		Wed 21/01/1998	4.08
JOB JK209382		Wed 21/01/1998	0.92
JOB JK209715		Wed 21/01/1998	1.65
JOB JK209756		Wed 21/01/1998	1.72
JOB JK209769		Wed 21/01/1998	1.79
JOB JK209547		Wed 21/01/1998	1.38
JOB JK209463		Wed 21/01/1998	0.33
JOB JK209513		Wed 21/01/1998	0.03
JOB JK209694		Thu 22/01/1998	0.82
JOB JK209753		Thu 22/01/1998	1.82
JOB JK209463		Thu 22/01/1998	3.48
JOB JK209524		Thu 22/01/1998	1.36
JOB JK209515		Thu 22/01/1998	3.30
JOB JK209579		Thu 22/01/1998	1.24
JOB JK209580		Thu 22/01/1998	2.09
JOB JK209775		Thu 22/01/1998	2.74
JOB JK209501		Thu 22/01/1998	4.01
JOB JK209738		Thu 22/01/1998	1.20
JOB JK209785		Fri 23/01/1998	0.40
JOB JK209774		Fri 23/01/1998	1.21
JOB JK209786		Fri 23/01/1998	1.35
JOB JK209769		Fri 23/01/1998	4.27

APPENDIX 3i

Timesheet Report for Garage EK2  
 From 19/01/1998 to 25/01/1998 inclusive

Chargeable Logged TimeSheet Entries (continued)

Code	Description	Date	Total hours
JOB JK209711		Fri 23/01/1998	1.79
JOB JK209742		Fri 23/01/1998	4.69
JOB JK209463		Fri 23/01/1998	2.02
JOB JK209784		Fri 23/01/1998	2.66
JOB JK209772		Fri 23/01/1998	1.99
JOB JK208540		Fri 23/01/1998	2.04
JOB JK209438		Fri 23/01/1998	1.95
JOB JK209698		Fri 23/01/1998	0.73
JOB JK209507		Fri 23/01/1998	1.83

Chargeable Entries Summary

Code	Description	Total hours
JOB JK209558		3.68
JOB JK209487		1.36
JOB JK209436		1.87
JOB JK209496		1.61
JOB JK209746		3.73
JOB JK209705		2.46
JOB JK209406		3.93
JOB JK209498		1.53
JOB JK209647		1.69
JOB JK209439		3.21
JOB JK209341		4.14
JOB JK209716		0.45
JOB JK209576		0.85
JOB JK209493		2.22
JOB JK209752		3.20
JOB JK209437		2.16
JOB JK209514		4.02
JOB JK209499		3.34
JOB JK209492		4.99
JOB JK209522		2.29
JOB JK209722		0.40
JOB JK208919		1.10
JOB JK209756		5.97
JOB JK209587		2.11
JOB JK209751		2.25
JOB JK209763		0.13
JOB JK209575		2.79
JOB JK209521		4.04
JOB JK209768		0.71
JOB JK209764		4.08
JOB JK209383		0.92
JOB JK209715		1.65

Timesheet Report for Garage EK2  
From 19/01/1998 to 25/01/1998 Inclusive

## Chargeable Entries Summary (continued)

Code	Description	Total hours
JOB JK209769		1.79
JOB JK206547		1.58
JOB JK209463		6.03
JOB JK209513		0.43
JOB JK209694		0.82
JOB JK209753		1.82
JOB JK209524		1.50
JOB JK209515		3.30
JOB JK209579		1.24
JOB JK209580		2.09
JOB JK209775		2.74
JOB JK209501		4.01
JOB JK209738		1.20
JOB JK209785		0.40
JOB JK209774		1.31
JOB JK209786		1.35
JOB JK209709		4.27
JOB JK209711		1.79
JOB JK209742		4.69
JOB JK209784		2.66
JOB JK209772		1.99
JOB JK208540		2.04
JOB JK209438		1.95
JOB JK209698		0.73
JOB JK209507		1.83
Total:		132.44

APPENDIX 3 iii

Timesheet Report for Garage EK2  
From 19/01/1998 to 25/01/1998 inclusive

NON - Chargeable Logged Timesheet Entries

Code	Description	Date	Total hours
ACT 00000000	START DAY	Mon 19/01/1998	0.81
ACT 00000003	ADMINISTRATION	Mon 19/01/1998	11.60
ACT 00000005	CLEANING GARAGE/TOOLS	Mon 19/01/1998	2.55
ACT 00000012	CUSTOMER CARE	Mon 19/01/1998	0.33
ACT 00000009	VEHICLE COLLECT/DELIVER	Mon 19/01/1998	1.60
ACT 00000002	PERSONAL/HYGIENE	Mon 19/01/1998	0.34
ACT 00000000	START DAY	Tue 20/01/1998	0.52
ACT 00000003	ADMINISTRATION	Tue 20/01/1998	11.50
ACT 00000005	CLEANING GARAGE/TOOLS	Tue 20/01/1998	0.24
ACT 00000009	VEHICLE COLLECT/DELIVER	Tue 20/01/1998	2.22
ACT 00000017	COLLECT & DELIVER COPPICE RD	Tue 20/01/1998	0.97
ACT 00000000	START DAY	Wed 21/01/1998	0.91
ACT 00000003	ADMINISTRATION	Wed 21/01/1998	11.25
ACT 00000005	CLEANING GARAGE/TOOLS	Wed 21/01/1998	0.67
ACT 00000017	COLLECT & DELIVER COPPICE RD	Wed 21/01/1998	2.95
ACT 00000009	VEHICLE COLLECT/DELIVER	Wed 21/01/1998	2.39
ACT 00000012	CUSTOMER CARE	Wed 21/01/1998	0.52
ACT 00000000	START DAY	Thu 22/01/1998	0.33
ACT 00000003	ADMINISTRATION	Thu 22/01/1998	12.34
ACT 00000005	CLEANING GARAGE/TOOLS	Thu 22/01/1998	0.24
ACT 00000014	MEDICAL TREATMENT	Thu 22/01/1998	4.48
ACT 00000000	START DAY	Fri 23/01/1998	0.58
ACT 00000003	ADMINISTRATION	Fri 23/01/1998	11.57
ACT 00000005	CLEANING GARAGE/TOOLS	Fri 23/01/1998	1.08
ACT 00000014	MEDICAL TREATMENT	Fri 23/01/1998	2.32

NON - Chargeable Entries Summary

Code	Description	Total hours
ACT 00000000	START DAY	3.14
ACT 00000003	ADMINISTRATION	58.26
ACT 00000005	CLEANING GARAGE/TOOLS	5.78
ACT 00000012	CUSTOMER CARE	0.85
ACT 00000009	VEHICLE COLLECT/DELIVER	6.22
ACT 00000002	PERSONAL/HYGIENE	0.34
ACT 00000017	COLLECT & DELIVER COPPICE RD	3.92
ACT 00000014	MEDICAL TREATMENT	6.81
Total:		85.21

APPENDIX 4.

Diary Jobs Report at EK2 between 29/12/1997 and 25/01/1998

Date	Jobs	TIME (hours)		LABOUR		PARTS		OTHER	
		Standard	Logged	Cost	Sale	Cost	Sale	Cost	Sale
29/12/1997	10	13.45	24.47	£5.51	£324.30	£92.66	£153.58	£0.00	£0.00
30/12/1997	8	14.65	7.95	£1.79	£348.25	£218.90	£375.39	£0.00	£0.00
31/12/1997	4	12.55	21.43	£22.81	£323.40	£190.04	£293.86	£0.01	£10.00
02/01/1998	4	8.25	4.80	£10.22	£211.20	£124.11	£171.87	£0.00	£0.00
05/01/1998	19	37.77	39.30	£113.05	£881.81	£630.99	£933.96	£56.00	£66.00
06/01/1998	14	39.90	35.88	£139.88	£965.65	£660.57	£1080.60	£38.00	£88.00
07/01/1998	9	39.25	35.23	£75.85	£1015.61	£800.26	£1209.80	£71.00	£77.00
08/01/1998	8	24.70	16.87	£77.84	£598.56	£249.63	£379.02	£88.00	£88.00
09/01/1998	13	18.80	19.48	£97.07	£439.30	£217.49	£208.77	£1163.87	£1163.87
12/01/1998	18	28.85	38.38	£187.94	£698.17	£427.53	£586.68	£234.86	£266.00
13/01/1998	16	24.00	17.40	£70.07	£542.74	£313.75	£387.05	£44.00	£44.00
14/01/1998	14	32.72	25.92	£78.53	£846.43	£276.89	£413.99	£89.00	£109.00
15/01/1998	17	36.00	39.25	£124.04	£928.57	£167.59	£401.16	£133.00	£144.10
16/01/1998	12	25.70	25.47	£64.85	£653.31	£271.49	£375.08	£44.00	£44.00
19/01/1998	15	24.65	25.87	£106.02	£627.63	£265.01	£405.96	£66.00	£66.00
20/01/1998	14	31.45	35.25	£140.49	£877.78	£768.80	£936.26	£123.84	£172.00
21/01/1998	13	21.00	19.13	£63.68	£623.49	£314.44	£465.41	£151.16	£2077.00
22/01/1998	14	35.80	27.20	£145.92	£927.48	£453.18	£336.37	£91.08	£114.62
23/01/1998	10	26.20	21.33	£83.15	£634.97	£378.67	£562.87	£66.00	£66.00
<b>Totals</b>	<b>232</b>	<b>503.68</b>	<b>469.72</b>	<b>£1568.72</b>	<b>£12438.74</b>	<b>£6731.00</b>	<b>£10277.88</b>	<b>£2519.82</b>	<b>£4555.59</b>

Code	Activity	Time (hours)	Percent
0000000	START DAY	14.65	2.0
0000001	PERSONAL/HYGIENE	0.34	0.0
0000003	ADMINISTRATION	176.14	24.0
0000004	PARTS COLLECTION	3.75	0.5
0000005	CLEANING GARAGE/TOOLS	24.30	3.3
0000007	R&M TOOLS	0.32	0.0
0000009	VEHICLE COLLECT/DELIVER	28.20	3.8
0000010	TRAVEL	0.06	0.0
0000012	CUSTOMER CARE	8.89	1.2
0000014	MEDICAL TREATMENT	6.81	0.9
0000017	COLLECT & DELIVER COPPICE RD JOBS	23.90	3.3
		447.08	60.9
<b>Total</b>		<b>734.44</b>	<b>100.0</b>



EXHIBIT 6.

DIARY JOBS REPORT JANUARY 1988

10-JUN-98

JOB NO	TIME	HOURS	MATERIAL	LABOUR		PARTS		OTHER		TOTAL	
				COST	SALE	COST	SALE	COST	SALE	SUBS	COST
57	131.60	112.73		1,825.61	3,221.20	2,992.31	6,136.22	119.66	139.88	7,882.28	2,012.10
115	275.30	206.45		4,051.29	6,872.65	3,097.05	4,512.03			11,382.68	6,218.13
75	291.20	201.47		3,281.15	8,640.79	2,047.16	5,102.48	161.89	184.11	10,640.59	3,097.39
97	177.30	151.03		34.69	-4,257.08	2,283.18	3,486.35	24.43	306.87	-8,200.10	2,252.92
77	166.18	109.73		2,388.22	4,426.01	2,150.03	3,567.32	141.90	144.00	7,397.13	4,292.44
31	114.00	112.35		1,451.28	2,883.94	2,124.34	3,174.64	31.00	31.00	5,279.53	3,686.13
53	68.80	85.80		712.33	1,063.61	571.34	1,277.53	42.00	-12.00	2,383.12	1,237.57
66	195.72	228.39		33.93	-4,628.20	2,917.81	4,110.91	1,200.13	1,417.23	10,922.02	4,184.95
45	344.73	372.73		1,964.29	3,458.80	712.41	1,237.13	64.68	107.31	4,615.34	2,766.11
77	217.77	320.00		2,625.91	5,257.24	2,894.29	2,910.72	444.00	516.09	10,117.06	5,134.40
60	412.21	478.70		478.00	2,740.47	1,800.82	2,165.14	111.51	244.22	5,117.03	2,037.13
332	505.54	568.30		1,197.64	12,538.74	6,731.03	10,277.83	2,511.88	3,534.92	27,272.21	10,818.12
115	343.20	375.47		2,355.35	6,392.91	3,524.05	6,128.36	792.26	773.26	15,795.69	6,651.67
106	307.55	371.55		2,319.93	5,021.78	3,081.75	5,349.71	2,341.51	2,916.72	13,288.33	7,751.04
64	169.84	178.30		1,788.61	3,284.45	3,032.01	3,521.49	713.99	707.46	8,115.34	6,139.16
32	103.27	85.61		1,122.21	2,644.29	1,743.91	2,697.70	44.09	117.46	5,191.61	2,061.84
25	53.91	68.47		28.31	1,453.20	657.59	1,036.00	200.23	212.00	2,076.20	988.16

1,520	3,224	1,491	21,000	76,544	41,701	84,261	2,291	12,418	118,223	27,111
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