



Service

Article #27

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“Product Engineering Documentation”

by Peter J. Davis (dec) and Tony Cripps

1. Introduction

The process of designing and building a motor vehicle is of course a very complex one. At BMC/Leyland Australia, a system of documentation was established to allow for the timely and organised transfer of information between the various Departments involved. This documentation was under the control of Peter J Davis, Engineering Administration Manager, Product Engineering.

Since the production of vehicles could involve assembly from completely knocked down kits (CKD), locally manufactured parts, or, as in most cases, a mixture of the two. Only a very small number of models were imported completely built up (CBU) although many subassemblies were done so (e.g. A series power units).

The most important documents within Product Engineering Administration are listed below. Documents produced by other Departments within Product Engineering, such as Standards, Proving, and Prototype Manufacturing are not covered in this article.

Unfortunately, only a very few of these documents survive, even in sample form. However, a complete set of engineering drawings plus a subset issued to the Parts and Accessories Department, were microfilmed and these have survived.

2. Product Engineering Documentation

2.1 Knocked Down Allocation Schedule (KDAS), Knocked Down Assembly Manual, and Schedule of Parts.

The controlling document for the CKD pack was a Knocked-Down-Allocation-Schedule (KDAS). The KDAS was constructed in the format of Product Engineering Schedule of Parts.

- Group A: Body in White
- Group B: Trim and fittings, facia
- Group C: Chassis, suspension, rear axle
- Group D: Instruments, electrical
- Group E: Power unit, transmission

Initially, Australia used UK-issued KDAS's. UK usually had one KDAS per model, country-unique components had separate listings.

With the introduction of the Government local content programme in 1958, Australia eventually took over the compilation of KDAS's for CKD packs for Australia. Having completed the KDAS's in Australia meant that Australia, not UK, was responsible for their content. Any errors or omissions usually had to be made up by air freight. The lead time of an Australian-origin KDAS was twelve months.

2.2 Engineering Drawings

From the beginning Australia took vehicles as designed in UK and local content was achieved usually by supplying a local vendor with a sample of the component required to be purchased. Once approved, the local component was deleted from the CKD pack.

UK Engineering initially supplied transparencies of the drawings needed for the models of Australian interest. If Australia wanted drawings for say, ADO15 Morris Mini, drawings for the whole ADO15 range were supplied. Product Engineering produced a Parts List, Schedule of Parts, using the UK format for the Australian-produced models be they CKD or a mixture of CKD and local content, or full local content manufacture and assembly. Local content Part Numbers replaced the UK Part Numbers were applicable.

With the introduction of the "A" Plan to achieve the required 85% local content in either the Body-in-White or the Power Units, engines and transmissions had to be local manufacture.

BMC Australia was the only location in the world that produced a complete vehicle on the one site and hence saw all drawings for models for which Australia was interested.

Upon seeing all the drawings, this exposed cases in UK of duplicated drawing numbers. This was in most cases concerned with Body-In-White where Pressed Steel Fisher and BMC Engineering both issued part numbers for the same part. The Pressed Steel Fisher system relied on their own part numbering system to work.

Where duplicates occurred, the UK was sent a partial copy of each drawing for amendment, in the course of time the drawings were corrected.

Microfilming of paper and transparencies began in 1963, roughly the same time as the local content program got underway.

Original drawings of Australian origin fell into two types – Australian drawings made from UK drawings, and Australian drawings of wholly Australian origin.

Australian drawings made from UK drawings were done via a transparency made of the UK drawing, and an Australian Part Number allocated to the drawing. The issue number of the UK drawing was endorsed on the Australian drawing as a reference point to check future UK drawing amendments. The Material Specification was converted to an Australian Material Specification and then issued as an Australian drawing.


ENGINEERING RELEASE NOTE					ISSUE	DATE	ECS	PART N°
MODEL	QTY	P/LIST	SIZE	ROUTE	PART NAME			1111, 2015
MASTER DESTROYED					MAT'L SPEC.			
					INTROD. POINT.			
P.E. SAMPLE								
REASON								
REMARKS					B.M.C. (Aust) Pty. Ltd. PRODUCT ENGINEERING			
<small>MMM 1-603 "FRANCOER" BRAND APERTURE CARD PRODUCT OF 3M CO. ST. PAUL, MINNESOTA 55119 U.S. PAT. NOS. 2,512,156, 2,387,522, PRINTED IN U.S.A.</small>								

Fig. 1 An Aperture card with a microfilmed drawing.

ENGINEERING CHANGE SUMMARY

Part No. See body of Note.	Group D5.	Ref No: 23711																					
Part Name Battery and Fixings.		Date 29.8.67																					
Models Affected ADO16.		Sh. 1 of 2.																					
Details of Change: A narrower battery is to be introduced for the above models. The hook bolt long has been modified and a new holding sheet is to be introduced to replace the Polythene Sheet and also the battery tray. A new arrangement drawing is also released.																							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Deleted</th> <th>Added</th> <th></th> </tr> </thead> <tbody> <tr> <td>ATS-9010</td> <td>ATS-9011</td> <td>Battery } Alternative.. 1 off LB, MGF/CAB</td> </tr> <tr> <td>ATS-9179</td> <td>ATS-9021</td> <td>Battery } 1 off LB, MGF/CAB</td> </tr> <tr> <td>ACA-9673</td> <td></td> <td>Battery Tray. 1 off LB, MGF/CAB</td> </tr> <tr> <td>ATS-9156</td> <td></td> <td>Polythene Sheet. 1 off LB, MGF/CAB</td> </tr> <tr> <td>ATS-9153</td> <td>ATS-9119</td> <td>Holding Sheet - Battery. 1 off LB, MGF/CAB</td> </tr> <tr> <td>ATS-9153</td> <td>ATS-9119</td> <td>Arrangement - Battery Mounting. 2/0.</td> </tr> </tbody> </table>			Deleted	Added		ATS-9010	ATS-9011	Battery } Alternative.. 1 off LB, MGF/CAB	ATS-9179	ATS-9021	Battery } 1 off LB, MGF/CAB	ACA-9673		Battery Tray. 1 off LB, MGF/CAB	ATS-9156		Polythene Sheet. 1 off LB, MGF/CAB	ATS-9153	ATS-9119	Holding Sheet - Battery. 1 off LB, MGF/CAB	ATS-9153	ATS-9119	Arrangement - Battery Mounting. 2/0.
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ATS-9153	ATS-9119	Holding Sheet - Battery. 1 off LB, MGF/CAB																					
ATS-9153	ATS-9119	Arrangement - Battery Mounting. 2/0.																					
Interchangeability: Providing modified hook bolts are used, new battery will service existing vehicles.																							
Stock Disposition: Use up on Manual vehicles.																							
Reason for change: To obtain clearance from the Torque Converter Housing and maintain interchangeability.																							
Authority:	E.C.E. Mandatory.	Change Class: 1.																					
Days Affected:	Two.	Interchangeable: No. Part Line Affected: Yes.																					
TABLET INTRODUCTION																							
MODEL	INTRO	DEL. STAGE	DEL. METHOD	MODEL	INTRO	DEL. STAGE	DEL. METHOD																
ADO16 Auto	Due 1.																						
Manual	2/16-1/16																						
Remarks: Parts Not Released			Drawings Issued																				
Group D5, Sheet 1, Issue 16.			ATS-9119 Sheet 1.																				
Group D1, Sheet 2, Issue 17.			ATS-9111 Sheet 1.																				
			ATS-9112 Sheet 1.																				
			ATS-9118 Sheet 1.																				
			ATS-9119 Sheet 1.																				
Checked by: H. Dunlop.			Prepared by: G. Bell.																				
			Authorized by: <i>[Signature]</i>																				

Fig. 3 Engineering Change Summary.

Where an ECS materially altered the vehicle, a cycle of actions had to be undertaken.

Materials and Supply Departments had to determine the most economical change point, matching up the deleted components with when the new components would be available – sourced LB, LB/LM or LM.

Planning Engineering had to determine a change point, with Materials and Purchasing departments.

Production also had to determine a change point for components sourced LM.

All actions resulted in the Material Control part of the Materials Department issuing a Material Availability Advice (MAA).

THE BRITISH MOTOR CORPORATION (AUSTRALIA) PTY. LTD. A/C
C.B. 390

MATERIAL AVAILABILITY ADVICE No. CAB 1732
DATE: 10/10/67

SUPPLY DEPARTMENT
MATERIAL CONTROL SECTION

PRODUCT ENGINEERING REF: ECS-23711 ADO-16 Automatic

PART ADDED: ATS-9011 Battery } alternative
ATS-9021 Battery } prop STOCKS IN STORE ON:
ATS-9119 Holding Sheet Battery }
ATS-9152 Hook-Bolt (Re-work) to mod. Drg. 2/26-8-67

PART DELETED: ATS-9010 Battery }
ATS-9179 Battery } alternative STOCKS HELD AT DATE ABOVE:
ACA-9673 Battery Tray }
UNIT COST: ATS-9156 Polythene Sheet
ATS-9150 Hook-bolt

INTRODUCTION: None No: APPROX. INTRODUCTION DATE:
Date: 1st Prod.

SIGNED: *[Signature]*

Note:- for manual versions refer M.A.A. CAB 1732/A

Fig. 4 Material Availability Advice (MAA)

Where a change could affect several planning engineering and production departments, a mutual change point had to be settled on. This could mean increasing stock of just superseded components, or a write-off of just superseded components.

When the MAA was received by Planning Engineering, one of several of the departments raised a Change Point Notice (CPN) to introduce the change to vehicle specification into production, the change may require more than one CPN if the change affected more than one factory.

THE BRUSH MOTOR CORPORATION (AUSTRALIA) PTY. LTD.

CHANGE POINT NOTICE

PLANNING ENGINEERING DEPARTMENT
BODY/FREIGHT/ENGINE/VEHICLE PLANNING

No. C97/A21
SHT. 1 OF 1.
DATE: 5th October, 1967

MODEL: AD016 Automatic.

PROD. ENG. REF.- RES. 2104A, 2111, 2367A, KD. ENG. REF.-

BACK/LOCAL INTRO. No. 042-1079

APPROX. INTRO. DATE: 5th October, 1967 BODY No. 501.
PART No.

QUALITY CONTROL ARE ARRANGED REQUIRED TO RECORD
DETAILS OF CHANGE EXACT BODY/ENGINE CHANGE POINT

INTRODUCTION OF AD016 AUTOMATIC

AD016 Planning Sheets, as detailed below, are reissued or issued for the Automatic version.

Planning Sheets

Sub Assembly 201.	Card Nos. 1:2A:20-5:9.
Sub Assembly 201.	Card No. 5.
Sub Assembly 202.	Cards Nos. 1 and 2.
Sub Assembly 203.	
Sub Assembly 204.	Consumable Card No. 8.
Sub Assembly 205.	Cards Nos. 8, 1, 10, 11.
Sub Assembly 206.	Cards Nos. 20A:29:29A:29B:30:31:33:44.
Sub Assembly 207.	Cards Nos. 6 and 11.
Sub Assembly 208.	Consumable Card No. 7.
Sub Assembly 209.	
Sub Assembly 210.	Cards Nos. 1:1A:1B:2:2A:4:5.
Sub Assembly 211.	Cards Nos. 1:1:5:6:7:8:9:11:15.
Sub Assembly 212.	Cards Nos. 7 and 8.
Sub Assembly 213.	Cards Nos. 4 and 9.
Sub Assembly 214.	Card No. 2.
Sub Assembly 215.	Card Nos. 2 and 4.
Sub Assembly 216.	Card No. 1.
Sub Assembly 217.	Consumable Card No. 11.

Note: For details of Vehicle Identification Plate, refer Planning Sheet 035-38/3, Body Number for Automatic AD016, 109800, will commence from 501.

THREE COPIES OF CHANGE POINT NOTICE TO BE ISSUED TO QUALITY CONTROL:

(1) FILE.
(2) RETURN TO PLANNING WITH ACTUAL CHANGE POINTS.
(3) COPY TO SERVICE WITH ACTUAL CHANGE POINTS.

SUB-CONTRACTOR DISTRIBUTION :- PREPARED BY :- B. King.
AUTHORISED BY :-

Fig. 5 Change Point Notice (CPN)

When all this implementation is completed, Product Engineering issue a revised ECS replacing the pink parts lists sheets with normal issue sheets to show that the ECS had been implemented.

2.7 Concession Request (CR)

Concession Requests (CR) were a stand-alone document that were issued mainly to overcome a problem on the assembly line or to overcome a shortage of supply.

In general, a Concession Request was used as a means whereby permission was granted by Product Engineering for the temporary use of an item in lieu of one specified for use in the Parts list, and also to cover any temporary deviation from specification laid down by Product Engineering.

2.8 Stop Order

A Stop Order was issued for the purpose of stopping or restricting the purchasing, manufacturing or tooling of items previously released on the authority of an Engineering Release Note, pending investigation into further use of the items or components concerned.

A Stop Order could only be issued under the authority of the Mechanical Engineer, Body Engineer, Commercial Vehicles Engineer.

2.9 Drawing Office Instruction (DOI)

Drawing Office Instructions (DOI) were mainly issuing direction to Production Engineering and Service Department.

DOI's were raised by the Body Design Engineer and commercial Vehicle Engineer to highlight a problem that did not have any effect on production. For instance, issuing to the Service Department instructions for the after-market fitting of seat belt anchorages and seat belts.

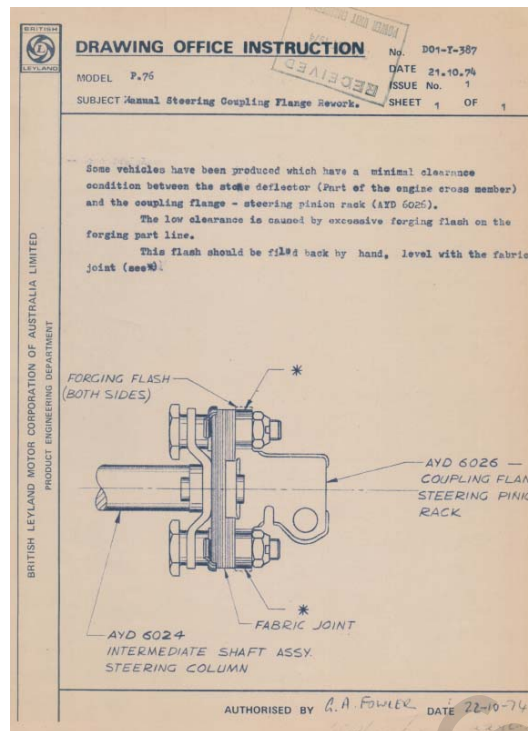


Fig. 6 Drawing Office Instruction

2.10 Styling Australia Specification (SAS)

Styling Instruction, Styling Australia Specification (SAS) were issued by the Styling Department of Product Engineering located within the Experimental Department of Product Engineering but responsible to the Chief Design Engineer.

SAS covered:

Body Engineering

- Body shell painting instructions, mono or duo-tone finish
- Trim style and finish for seating and headlining
- Finish required for miscellaneous body panels not part of the body shell complete.

Mechanical Engineering

- Colour of steel road wheels
- Colour of the front and rear suspension
- Colour of the exhaust system
- Colour of the petrol tank
- Colour of the power unit

The SAS were issued and updated through the ECS system.

2.11 Production Suppliers Release (PSR)

With the amalgamation of Planning Engineering and Product Engineering Records Section in 1963, a planning function that did not directly involve Product Engineering was the Product Supplies Release (PSR) system.

The PSR system covered the control and issue of consumable supplies that were issued for vehicle production. Paint and trim materials that were covered by Product Engineering specification regarding material specification and colour specification were covered as regards usage by the PSR system.

PRODUCTION SUPPLIES RELEASE

PART NAME DRILL - 4.5MM DIA. CATALOGUE No. PTD 348
JOBBER'S STRAIGHT SHANK DRG. No. _____
 MATERIAL SPEC'N HIGH SPEED STEEL
 APPROVED MANUFACTURERS PATRICE & NICHOLSON
 SUPERSEDES PART No. PTD 41, PTD 52, PTD 276 RELEASE No. 077/328
078/28

MODEL:	QTY/VEHICLE	QTY	LOCATION	QTY	LOCATION	QTY
PTFA-1						
PTFA-2						
PTFA-3						
M.S.B.P.						
M.P.						

MODEL:	QTY/VEHICLE	QTY	LOCATION	QTY	LOCATION	QTY
PTFA-1						
PTFA-2						
PTFA-3						
M.S.B.P.						
M.P.						

PACKAGE TYPE PACKET QUANTITY 10

LOCATION	QTY.	LOCATION	QTY.	LOCATION	QTY.
1A1 BUILDING BODY SHOP					
SECTION A11 WOKS	.004				
CENTRE 60A	.02				
60C	.04				

TYPED BY: REMARKS: ISSUE 1
ISSUE 2: CENTRE 60A & 60C ADDED 3/2/78
 CHECKED BY: INTRODUCTION POINT PART NO. CHANGE ONLY
 ISSUED BY K.A. FIELD APPROVED BY R. PIKE DATE 21/9/77

Fig. 7 Production Supplies Release

The PSR system was introduced to gain control of what was being purchased for consumable materials, each factory had its materials, greater volumes and cost reduction were achieved by putting all the requirements together.

3. Document Flow Chart

Within Product Engineering, documents were produced as multiple copies and circulated to those concerned using an established protocol. The image below shows that for the ECR process, whereby a change might be proposed, circulated to various departments, and then if approved, drawn, costed, documented and introduced as a change. The receiving Departments were:

- Quality Control
- Supply
- Planning
- Accounts

- Parts and Accessories
- Service
- Sales

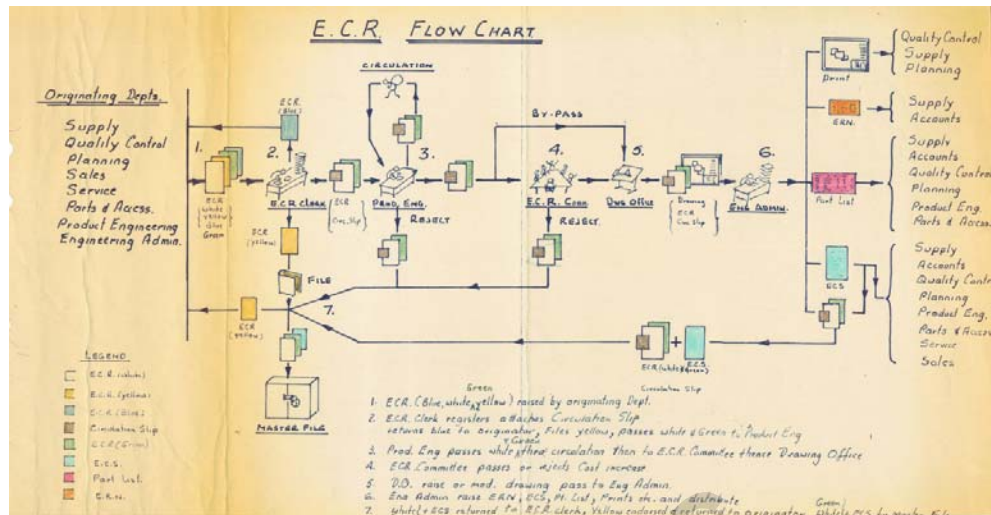


Fig. 8 ECR Flowchart (J. Bigelow)

3. Conclusion

The administration of documents within Product Engineering was so effective that the system was considered to be one of the most successful in the business. Indeed, after the closure of the factory, Peter Davis was sought out by Joy Manufacturing to replicate the whole thing for their coal mining equipment manufacturing concern which was then implemented in their USA works.

But, the days where forms were filled out in quadruplicate and passed around in interoffice envelopes are long gone to be replaced by electronic cloud based teams software, Zoom meetings, with electronic storage with search and filtering functions.