EA02-025

FORD 10/27/03

APPENDIX N

BOOK 38

PART 3 OF 3

ACURA SPEED CONTROL

VARIABLE COST SUMMARY SEPTEMBER 16, 1991

1991 ECONOMICS
VOLUME: 50,000 UNITS ANNUAL

NASC (8/7/91)

SERVO ACTUATOR	$		
SERVO ACTUATOR MATERIAL		13.73	
IN BOUND FREIGHT 2%		0.27	
DIRECT LABOR-FINAL ASSEMBLY		3.21	
INDIRECT & OVERHEAD		1.62	
SUB-ASSEMBLY LABOR & OVERHEAD		1.97	
TOTAL SERVO COST	$	21.00	19.66
SPEED CONTROL AMPLIFIER			
AMPLIFIER MATERIAL	$	14.63	
IN BOUND FREIGHT 2%		0.29	
DIRECT LABOR		3.45	
INDIRECT AND OVERHEAD		1.56	
TOTAL AMPLIFIER COST	$	19.93	15.98
COMBINED VARIABLE COST	$	40.94	35.54 (1992)

JAPAN IS THE ASSUMMED COUNTRY OF MANUFACTURE.

MATERIAL AND LABOR COST REFLECT LOW VOLUME BUILD.

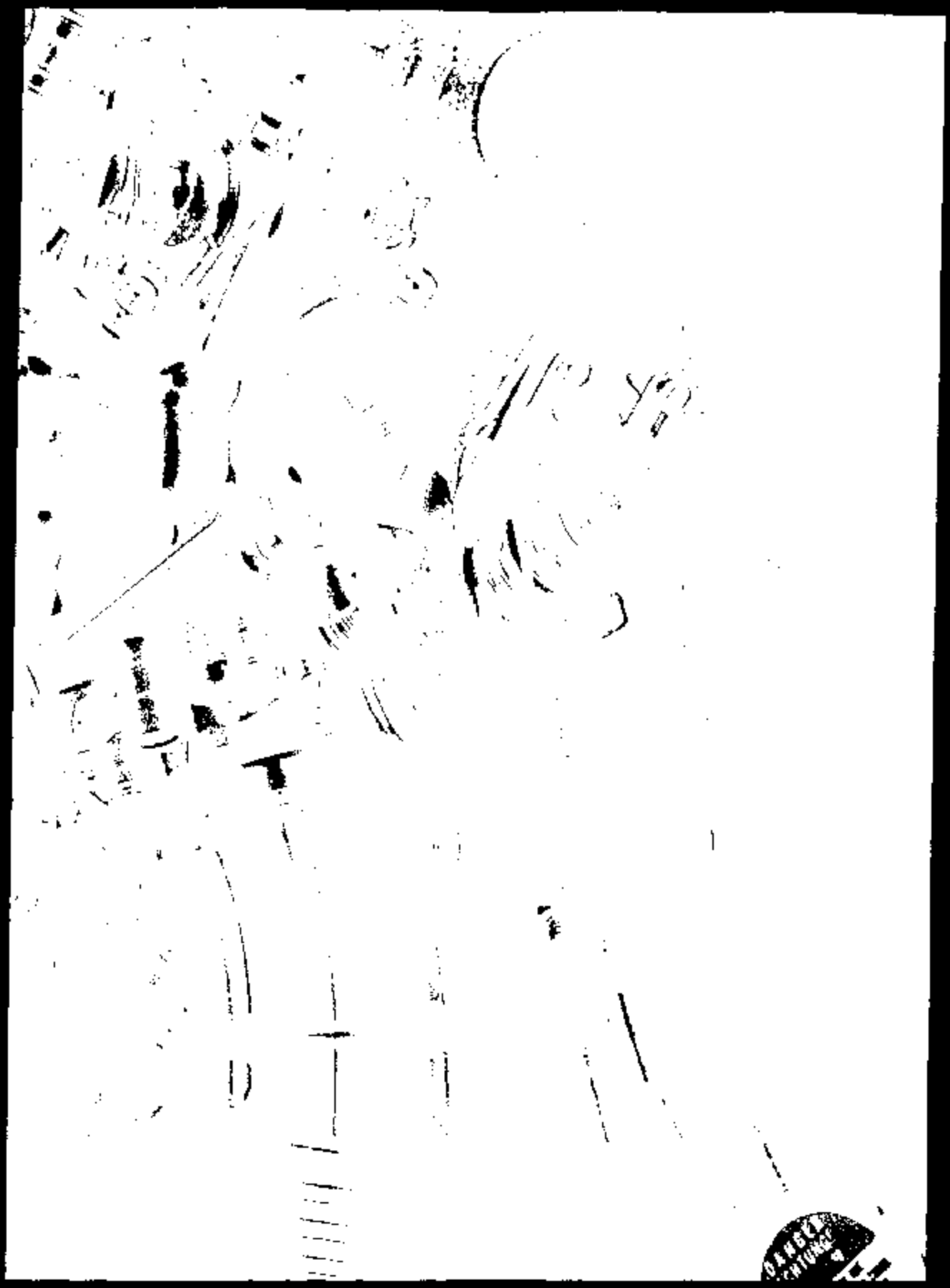
DIRECT LABOR RATE USED, $19.05 PER HOUR.

VEHICLE CONTROLS
COST ESTIMATING
SEPT. 13, 1991

ER62-825-R 26115

DM3-024-4 28116

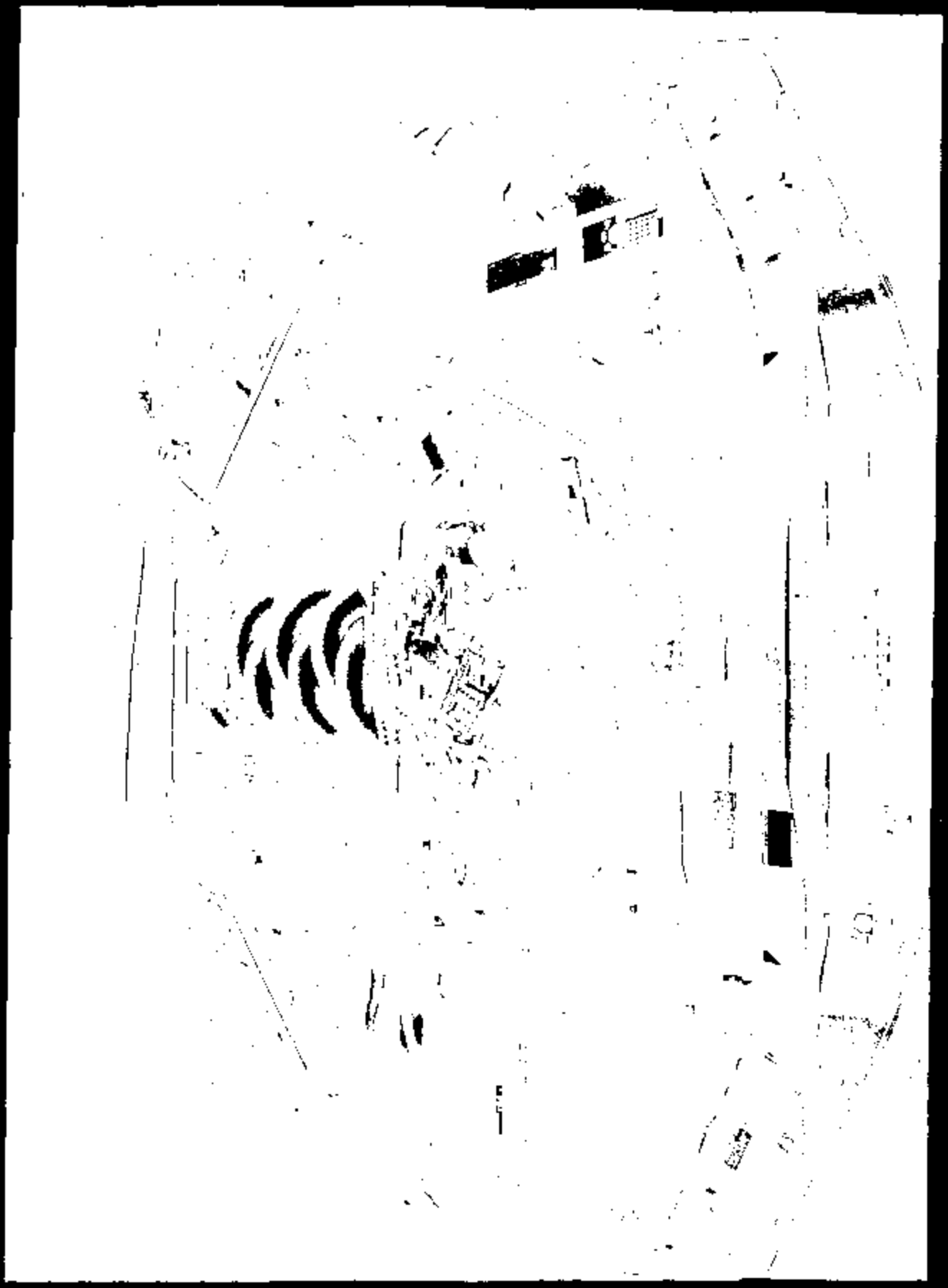
DM02-023-A 28117



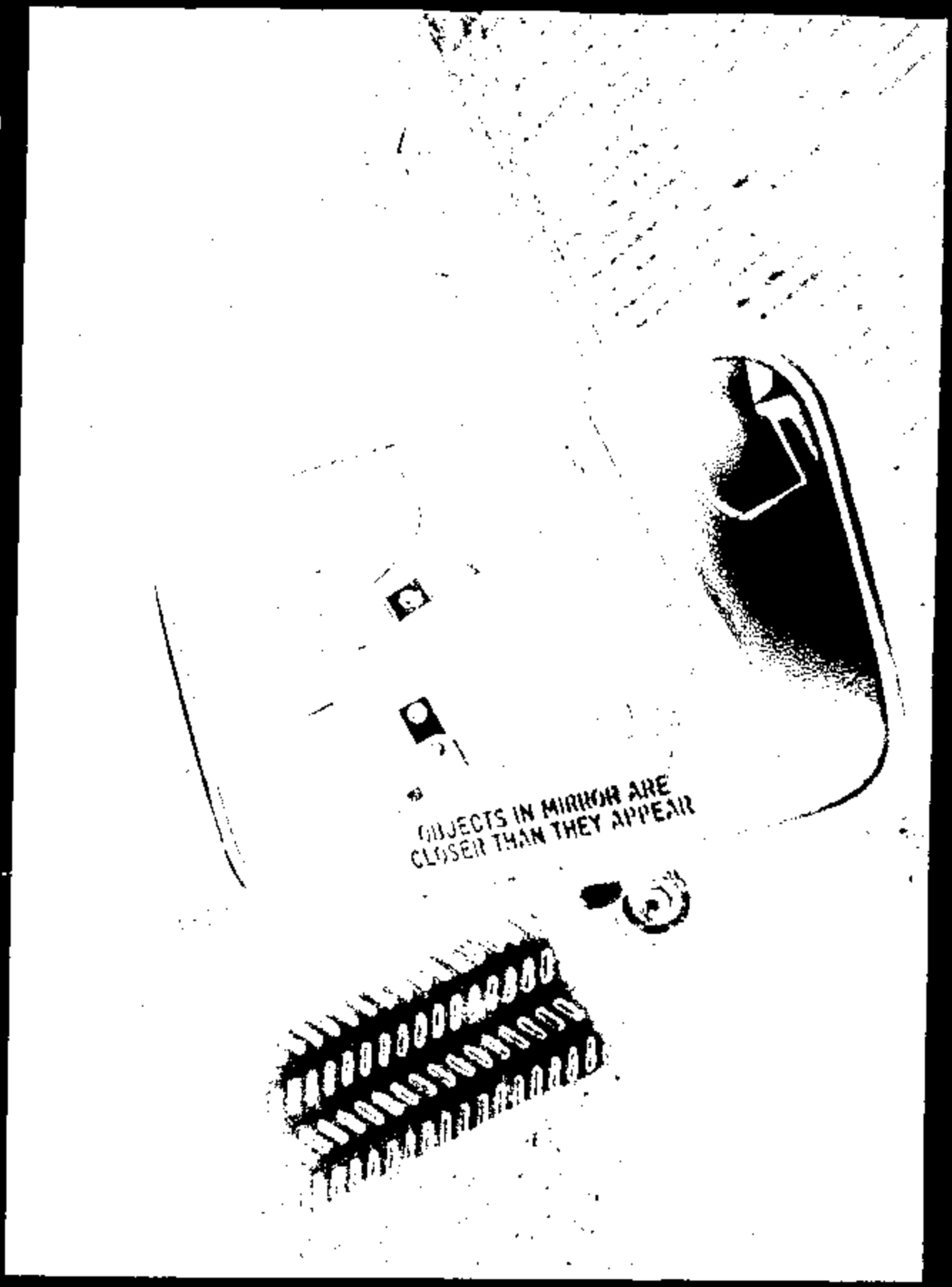
ER02-025-A 28118

USDC-SDN-A 28110

DANGER
REACH OF CHILDREN



EP82-029-A 28121



EA82-828-A 28122

INFO:
MARK FRIEDRICH

Inter Office

Electronics Division
Product Engineering Office

September 20, 1991

To: Sam Rahaim

cc: Joel Perkins

Subject: Competitive Analysis Study Results

- Saturn Electronic Speed Control
- Acura Electronic Speed Control

A letter was distributed by me on August 30, 1991, requesting information for an upcoming competitive analysis review. The review will be conducted during the SBU NPSSC meeting, scheduled for October 15, 1991, 3:00 PM to 5:00 PM. Vehicle Controls and Powertrain at that time will present the year-to-date results of the 1991 Competitive Workplans. The Design Section Supervisor, that is responsible for each product in the competitive workplan, will present the information and answer any questions. The information requested was listed in the August 30, 1991, letter.

Why was the competitive analysis study performed?
What has been learned?
What opportunities have been identified?
What opportunities have been recommended for implementation?
When will the study be completed?

Please enter the information on the attached form, and provide me with a copy, no later than COB Thursday, September 26, 1991. I will be writing the Executive Summary of the results, and submitting it for approvals prior to the review.

Section Supervisors, please mark this meeting on your calendars and plan on attending and presenting your competitive product information. I will meet with the Supervisors and Managers prior to October 15, to review the Executive summary and preview the presentations.

Ted Pauck
Competitive Analysis Coordinator
Vehicle Controls SBA

E982-826-A 28123

COMPETITIVE ANALYSIS STUDY RESULTS

* Saturn Electronic Speed Control

Why was the competitive analysis study performed ?

What has been learned ?

What opportunities have been identified ?

What opportunities have been recommended for implementation ?

When will the study be completed ?

ELD'S COMPETITIVE POSITION:

PRODUCT	DESIGN FEATURES	ELD'S COMPETITIVE POSITION			
	fill in info	DESIGN FEATURES	PARTS COUNT	COST	OVERALL
SATURN ELECTRONIC SPEED CONTROL		L C U	L C U	L C U	L C U

******* CIRCLE ANSWER *******

ELD'S COMPETITIVE STATUS: U = UNCOMPETITIVE C = COMPETITIVE L = LEADER

COMPETITIVE ANALYSIS STUDY RESULTS

* Acura Electronic Speed Control

Why was the competitive analysis study performed ?

What has been learned ?

What opportunities have been identified ?

What opportunities have been recommended for implementation ?

When will the study be completed ?

ELD'S COMPETITIVE POSITION:

PRODUCT	DESIGN FEATURES	ELD'S COMPETITIVE POSITION			
	fill in info	DESIGN FEATURES	PARTS COUNT	COST	OVERALL
ACURA ELECTRONIC SPEED CONTROL		L C U	L C U	L C U	L C U

******* CIRCLE ANSWER *******

ELD'S COMPETITIVE STATUS: U = UNCOMPETITIVE C = COMPETITIVE L = LEADER

VEHICLE CONTROLS SBA - 1991 COMPETITIVE WORKPLAN

SCHEDULE OF EVENTS

PRODUCT STUDY	PARTS ORDERED	PARTS RECEIVED	KICKOFF MEETING	BOM FROM ENGINEERING	IC COST	LABOR STUDY	COST STUDY	ENGINEERING STUDY	EST. FINISH DATE	REPORT ISSUED DATE	COMMENTS
Delco Moraine ABS VI GM ABS System	3/14/91	4/26/91	5/13/91	5/22/91	8/05/91	7/26/91	REQ ******** 8/22/91	*******			10 COST STUDY ENGINEERING STUDY
Bosch ABS2E ABS Module	N/A	3/91	5/20/91	8/19/91	7/24/91	NTD	REQ ******* 8/19/91	*******			20 LABOR STUDY - NTD COST ESTIMATE ENGINEERING STUDY
Magnavox (Japanese) RABS II Module	8/07/91	9/05/91	*******								30 WAITING FOR ENGINEERING
Saturn Electronic Speed Control Subsystem	N/A	2/91	3/27/91	4/01/91	8/06/91	6/03/91	8/07/91	*******			10 VEHICLE PERFORMANCE
Accura Electronic Speed Control Subsystem	N/A	2/91	3/27/91	4/24/91	9/09/91	6/09/91	8/17/91	*******			10 VEHICLE PERFORMANCE
Infiniti Q45 Height Sensor	3/19/91	4/10/91	8/05/91	N/A	N/A	ESTIMATE 9/15/91	ESTIMATE 9/15/91	ESTIMATE 10/20/91			10 COST ESTIMATE FROM POWER TRAIN SBA
Infiniti Q45 "G" Sensor	3/19/91	4/10/91	8/05/91	N/A	N/A	ESTIMATE 9/15/91	ESTIMATE 9/15/91	ESTIMATE 10/20/91			20 COST ESTIMATE FROM POWER TRAIN SBA
BMW 850I Adaptive Suspension Module	5/20/91	6/14/91	6/28/91	8/00/91	FMI REQUEST 8/19/91			ESTIMATE 9/20/91			20 IC COST ESTIMATE - FMI
Celica Low Band Active Suspension Module	9/XX/91	FWD-EST. 9/30/91									40 FRG PURCHASE
Mercedes Adaptive Suspension Module											40 EAG PURCHASE
Buick Park Avenue Dual Zone EATC Subsystem	3/14/91	5/03/91	7/12/91	ESTIMATE ****** 8/26/91				ESTIMATE 9/16/91			20 BOM FROM ENGINEERING
Beretta/Trofeo EATC CRT Control Module	6/07/91	6/21/91	7/22/91	N/A	N/A	N/A	N/A	ESTIMATE 9/16/91			20 ENGINEERING STUDY ONLY
Dodge Stealth EATC VF Display Module	6/06/91 8/20/91	8/21/91	8/07/91	*******							20 BOM FROM ENGINEERING
Acura Legend EATC Module	6/05/91	6/18/91	7/10/91	ESTIMATE ****** 8/26/91				ESTIMATE 9/16/91			20 BOM FROM ENGINEERING
Mercedes 500 SL Wiper System	5/22/91	6/04/91	6/26/91	N/A	N/A	N/A	N/A	ESTIMATE 9/20/91			20 ENGINEERING STUDY ONLY
Chevy Lumina SL Wiper System	5/03/91	5/20/91	6/26/91	N/A	N/A	N/A	N/A	ESTIMATE 9/20/91			20 ENGINEERING STUDY ONLY
Lexus LS400 Wiper System	5/08/91	6/14/91	6/26/91	N/A	N/A	N/A	N/A	ESTIMATE 9/20/91			20 ENGINEERING STUDY ONLY

EMC2-020-A 20128

RECEIVED JAN 04 1994

Ford

Truck Operations

Ford Motor Company
[illegible] Road
Dearborn, Michigan 48121

Bob Hesse
Pls call me
CWS

December 2, 1993

H adure -
w lot forum
would be best
to bring cu
& allen
Smith
etc up to
speed?
Bob
1/3

To: C. W. Szuluk

Subject: NGSC Diagnostics

At the Light Truck Matters Meeting of 10/05 the proposal for speed control diagnostics was reviewed. The proposal was rejected due to the adverse cost to benefit relation associated with either the NGF or ISO 9141 based diagnostics.

Light Truck would like to extend its appreciation to ELD-Driver Controls for the effort put forth on this proposal.

Light Truck continues to have an interest in obtaining some level of diagnostics for the speed control system and requests that ELD develop a proposal for a minimum cost system that targets the priority warranty issues.

J. R. Hughebart for
J. R. Hughebart

RGM/jm

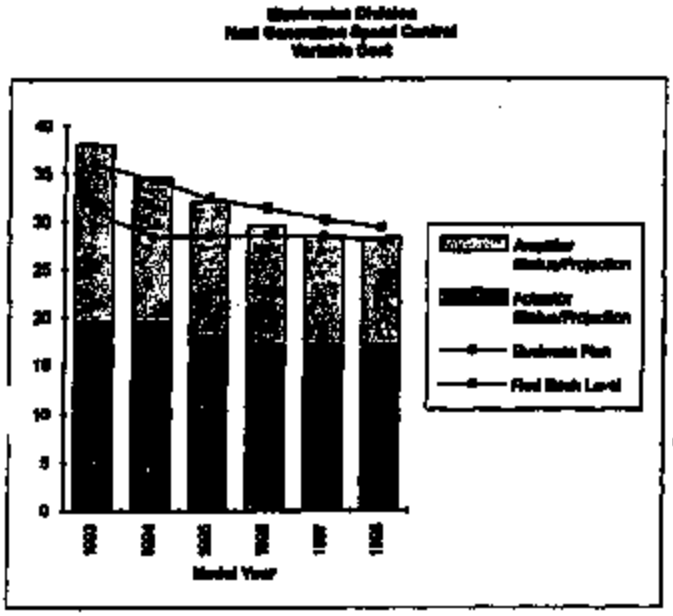
ER82-825-A 28127

Electronics Division
Next Generation Speed Control
Variable Cost Review

Subject: Review System Cost Status for Next Generation Speed Control

Competitiveness:

Vehicle	Actuator	Amplifier	Total	Notes/Comments
Ford NGSC	$20.37	$15.31	$35.68	
Ford Vacuum	$14.50	$ 8.00	$22.50	Poor Perf., EMC issues, Complx.
Toyota Camry	$22.86	$38.41	$61.27	Pass. Comp. Amp., Multiple Parts
GM Saturn	$14.48	$13.77	$28.35	Pass. Comp. Intg. Amp+Act., Noisy
Acura Legend	$21.00	$19.94	$40.94	Pass. Comp. Amp.



Present Status	[illegible]	[illegible]	[illegible]	[illegible]
Continuous Commitment	[illegible]	[illegible]	[illegible]	[illegible]
Status (Qtr) Commitment	[illegible]	[illegible]	[illegible]	[illegible]
Explanation of Variance:				Major: 1993 B.Plan (Cycle Average)
Warner (Lost Ford offer)	(64.77)	[illegible]	(88.57)	PRT: [illegible]
Labor/overhead mult	[illegible]	[illegible]	[illegible]	ROA: 16%
Material Efficiencies	0.85	0.30	6.12	ROE: 9%
Other	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	

Issue: Missing Customer Red Book Targets in the near term
- Warner Negotiations
- Labor and Overhead
- Volume Variance

Resolution: Ongoing actions including:
- Continuing negotiations with Warner/Resourcing
- Weekly meeting with PEO/Plant/Finance/Purchasing to identify tasks for '94 & beyond (Note: 110% MCP identified for '94).
- Launch Thin-FR4 for the 1996 SN-95
- Increase volume through new business (Toyota, KIA, Honda)
- Update Benchmarking (1994 Camry and Acura, GM Saturn)
- Pursue New Design alternatives

STATUS OF PLAN TO RE-SOURCE MOTOR SUPPLIER FOR

NEXT GENERATION SPEED CONTROL AND

ELECTRONIC THROTTLE CONTROL

OBJECTIVE -

Find a capable actuator supplier other than Warner for the NGSC and ETC programs.

ALTERNATIVES -

1 - Find a new supplier to make the existing design VR motor. (or find someone to buy warner)
2 - Develop new technology such as electronically commutated or brush DC motor.

DECISION -

Alternative 1 - stay with the current VR motor technology because:
- it's the shortest time path to a new supplier, possibly to support NGSC for '96 MY,
- it's the lowest incremental development cost,
- the latest competitive analysis shows the VR stepper motor to be a lower cost approach vs. the GM permanent magnet stepper motor speed control and,
- sourcing the package of NGSC and ETC is the most attractive to potential suppliers.

PLAN -

Find a VR motor supplier capable of building a custom VR stepper motor while protecting the confidentiality of the search and determine the legal exposure in working with a new supplier for both the NGSC and ETC programs. Timing is as follows:
- 11/93 - Write specification for generic VR stepper motor.
- 12/93 - Issue initial RFQ's.
- 01/94 - Initiate discussions with Warner to sort out ownership of intellectual property.
- 02/94 - RFQ reply's complete.
- 03/94 - Benchmark NGSC actuator.
- 04/94 - Select alternate supplier.

STATUS -

16 potential suppliers have been contected and 3 have thus far responded negatively (see Attachment). A couple of suppliers have responded requesting more information. OGC is reviewing design related information to establish guidelines to be used in discussing the NGSC and ETC programs with a new supplier. The investigation is on track to produce a decision by early April.

(Attachment)

SUPPLIER.XLS

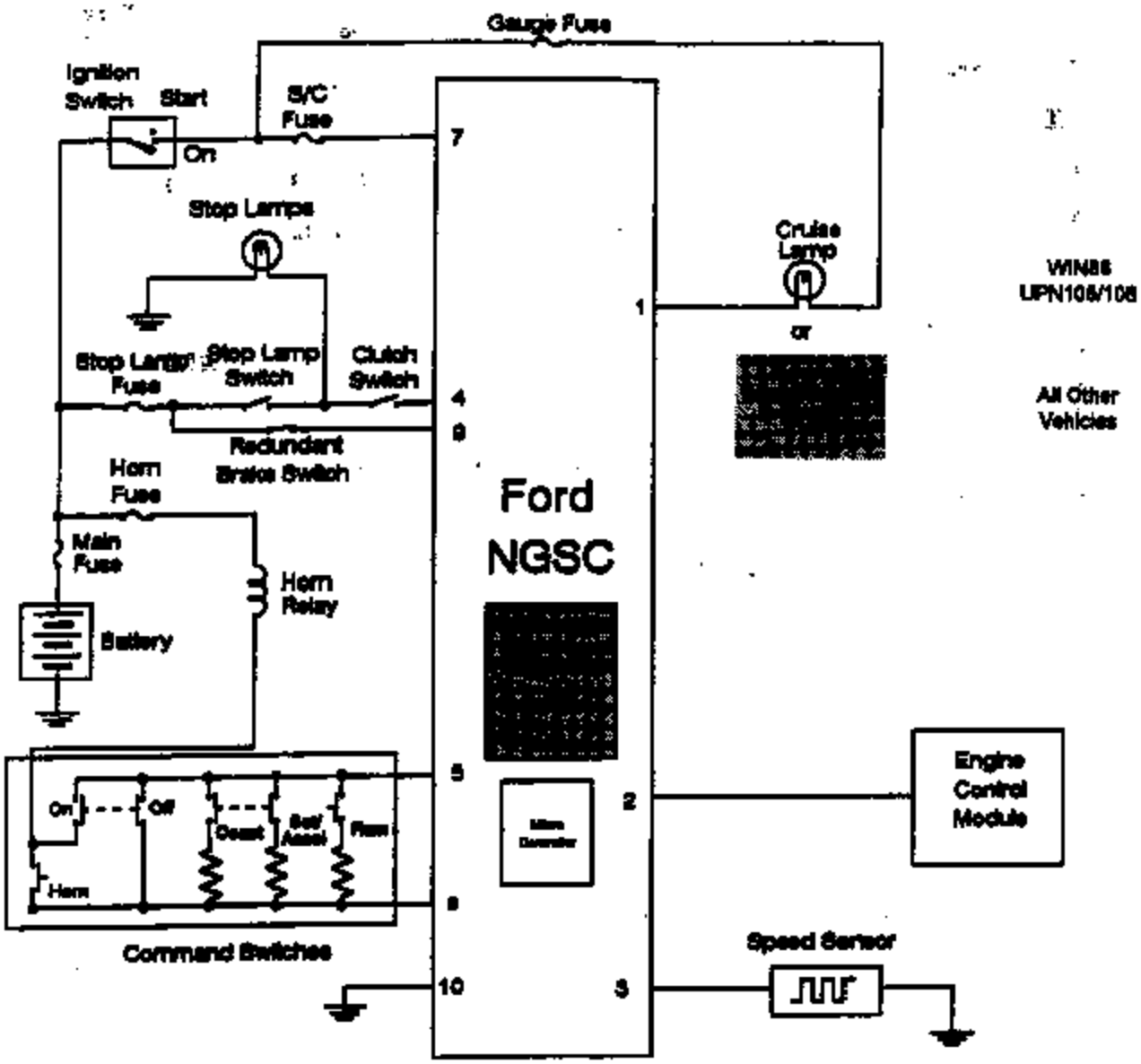
Company	Contact	Response	Other
EMC Motor Company	Jeff Burger		
MES S.A.	Gerardo Maino		
Phillips Technologies	Dennis Lasanski		
Crouzet Controls Inc.	Eric Peister		
Bodine Electric Co.	Michael Wojciechowski	No Quote	
Eastern Air Devices	Dorothy Barretz		
Econocruise Ltd.	Roger Hamilton		
Buehler Products Inc.	Michael Hanane		
Seimens	Eric Bergama	No Quote	
Hurst (Emerson)			
Pittman	Charles Pittman	No Quote	They do not make Step Motors
Daewoo International	Daniel Hartman		
General Electric			
Escap	Marie-Laurence Lienard		
Burgess-SAIA	Richard Maxwell		
Sonceboz SA	Edouard Pfister		
McCord Winn	Other Possible Source		
Reliance Electric	Other Possible Source		
Sale	Other Possible Source		
Seiko	Other Possible Source	Supplied by Seimens	
Epson	Other Possible Source	Supplied by Seimens	
Hitachi	Other Possible Source	Supplied by Seimens	

BM02-025-R 28130

Vehicle Wiring Schematic

Next Generation Speed Control

With DIAGNOSTICS



Ford Motor Co.
Driver Controls Engineering
D:\FL\SCOTTNGSC_US\.DRW

17-Dec-93

E962-825-R 20132

NEXT GENERATION SPEED CONTROL DIAGNOSTICS

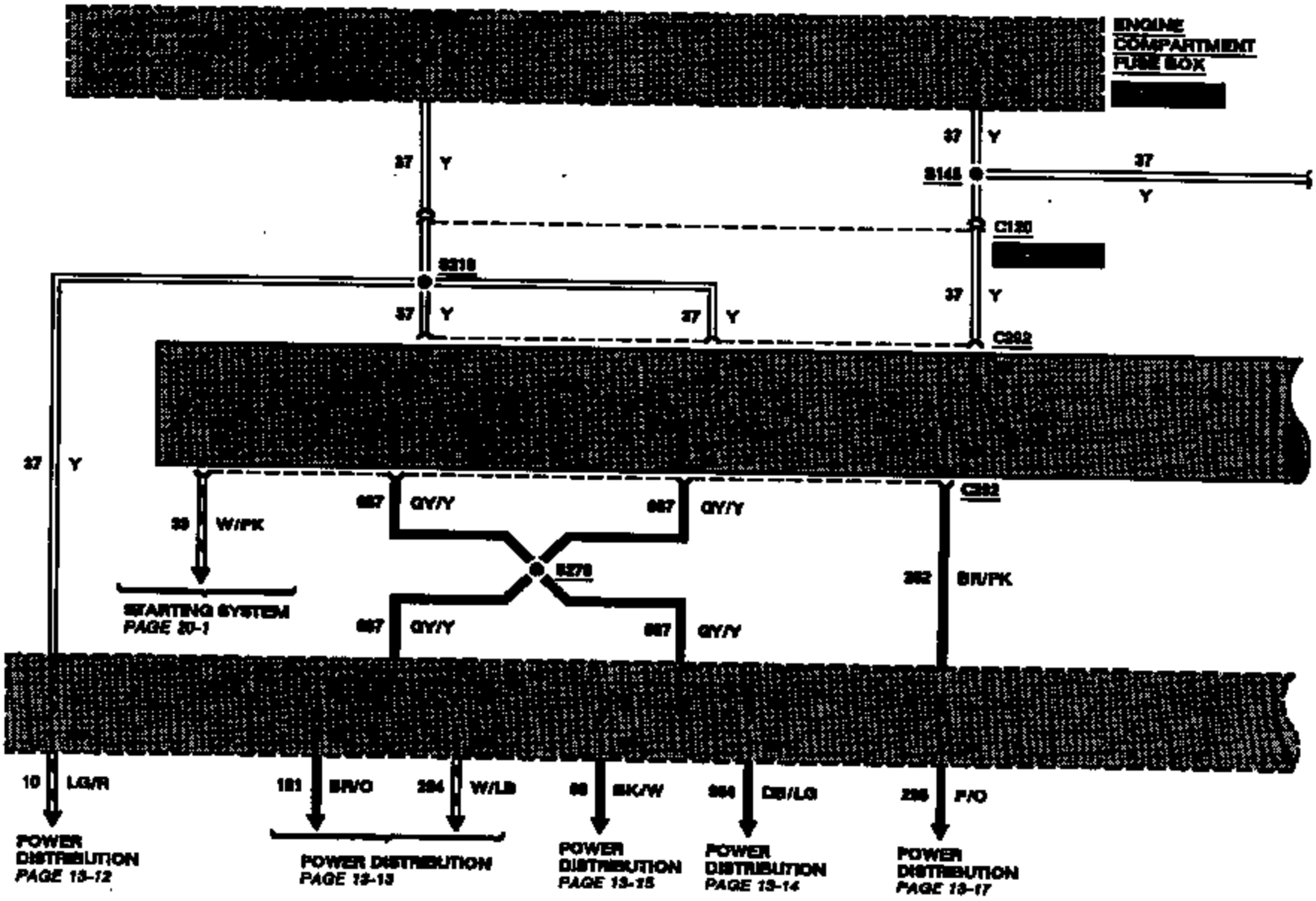
Variable Cost	LEVEL A - SCP	LEVEL B - MINIMUM	
		Vehicles w/o ON or SET Indicator	Vehicles w/ ON or SET Indicator
Circuit/System Changes	($ 5.36)	($ 1.33)	($ 0.65)
Offsets			
1x Truck Warranty Offset (3/36)	$ 1.44	$ 0.58	$ 0.58
4x Truck Warranty Offset (3/36)	$ 3.18	$ 2.32	$ 2.32

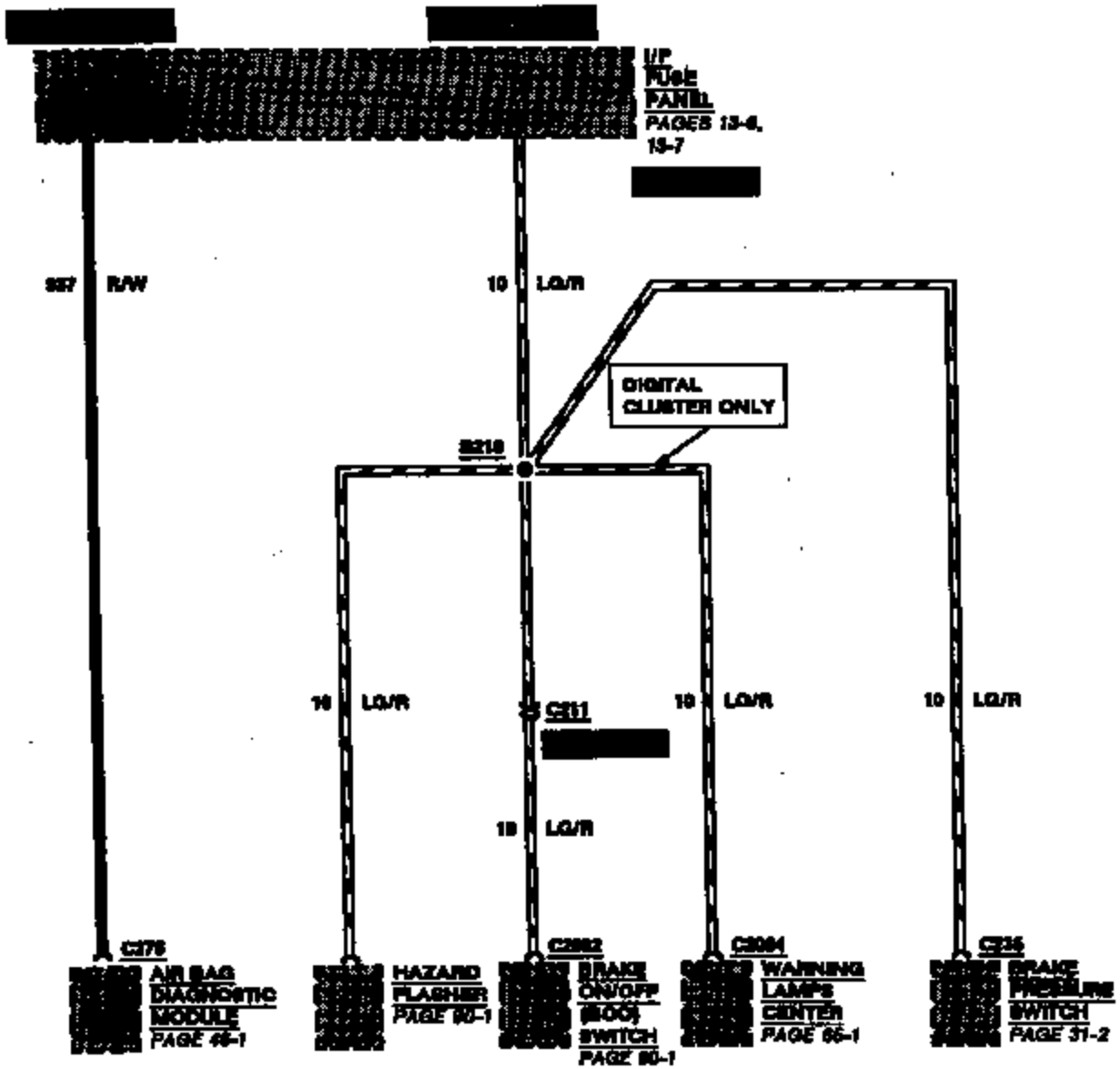
F&T Investment (mils)	LEVEL A - SCP	LEVEL B - MINIMUM
FCSD	($ 2.0) (TBD)	($ 0.0)
B&AO	($ 0.0)	($ 0.0)
IC Tooling/Equipment	($ 1.4)	($ 0.9)
Total (mils) ***	($ 3.4)	($ 0.9)

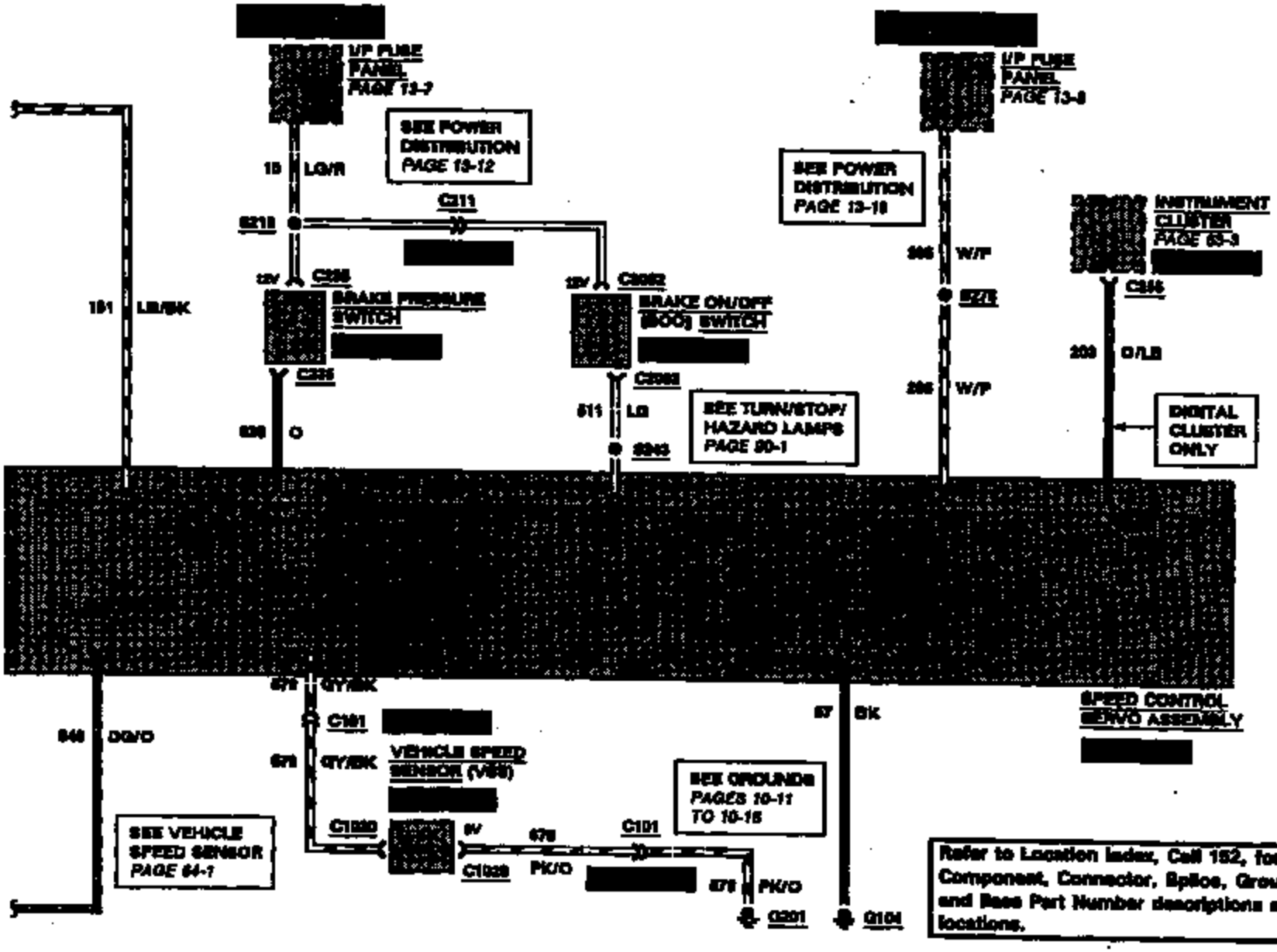
*** 20% Provision for Truck FCR F&T not included ($ 0.68 and $ 0.19 mils respectively)

12/21/93

13-7 POWER DISTRIBUTION

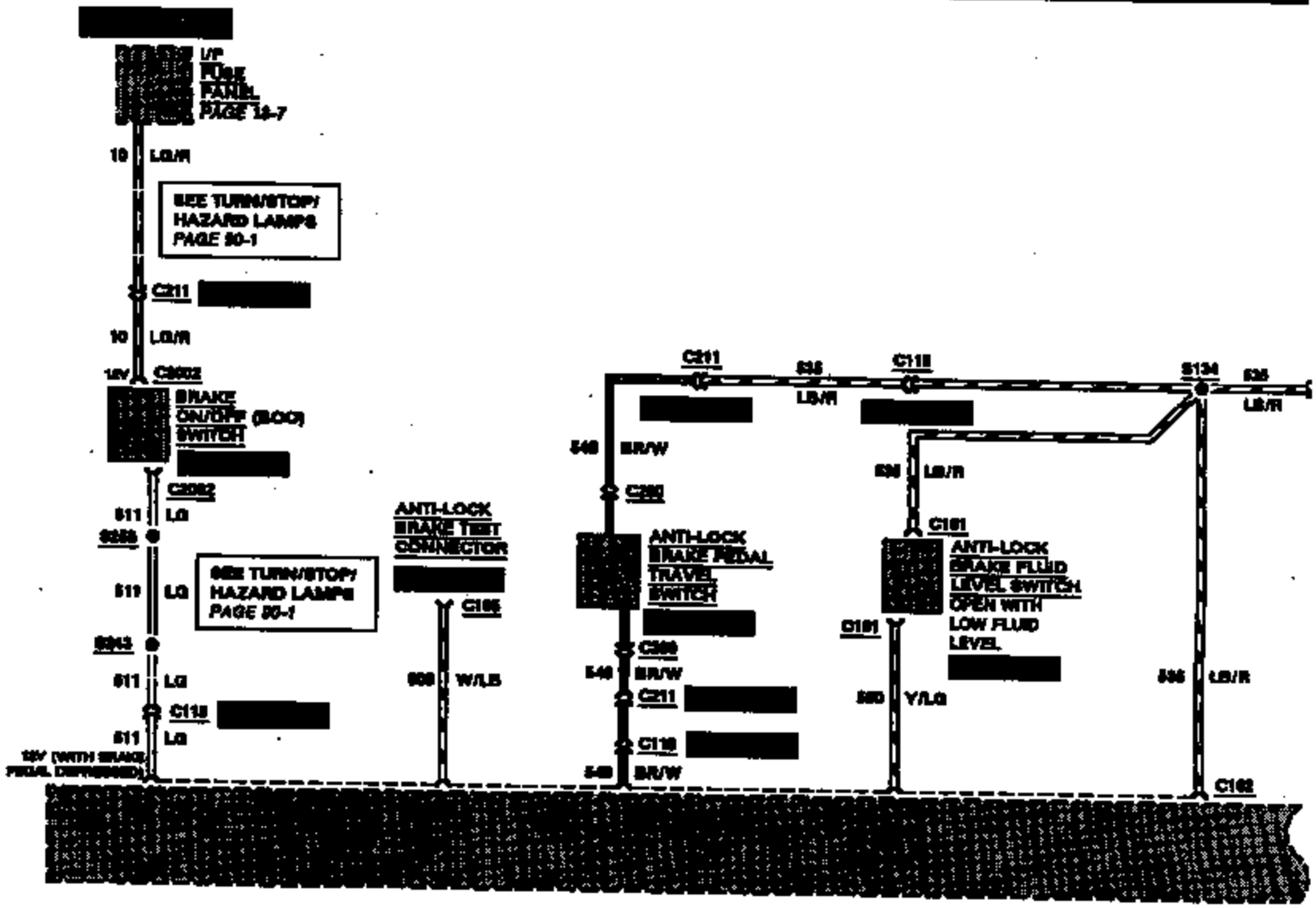



I/P
FUSE
PANEL
PAGES 13-6,
13-7
R/W
10
LG/R
DIGITAL
CLUSTER ONLY
10
LG/R
C211
10
LG/R
10
LG/R
10
LG/R
C276
AIR BAG
DIAGNOSTIC
MODULE
PAGE 48-1
HAZARD
FLASHER
PAGE 90-1
BRAKE
ON/OFF
(BOO)
SWITCH
PAGE 90-1
WARNING
LAMPS
CENTER
PAGE 86-1
BRAKE
PRESSURE
SWITCH
PAGE 31-2



Refer to Location Index, Cell 152, for Component, Connector, Splice, Ground and Base Part Number descriptions and locations.

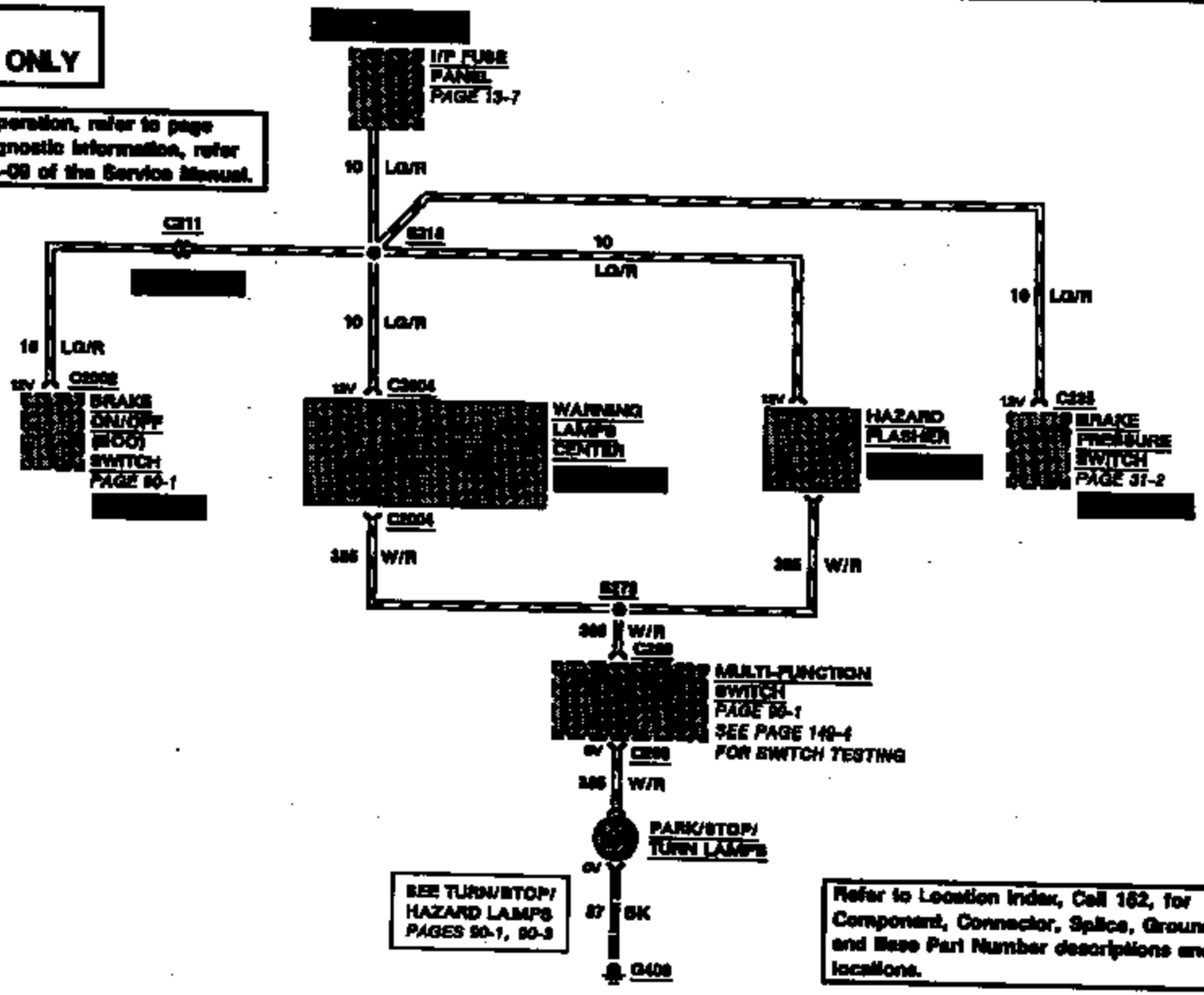
42-3 ANTI-LOCK BRAKE SYSTEM WITH TRACTION ASSIST



65-1 WARNING LAMPS

DIGITAL CLUSTER ONLY

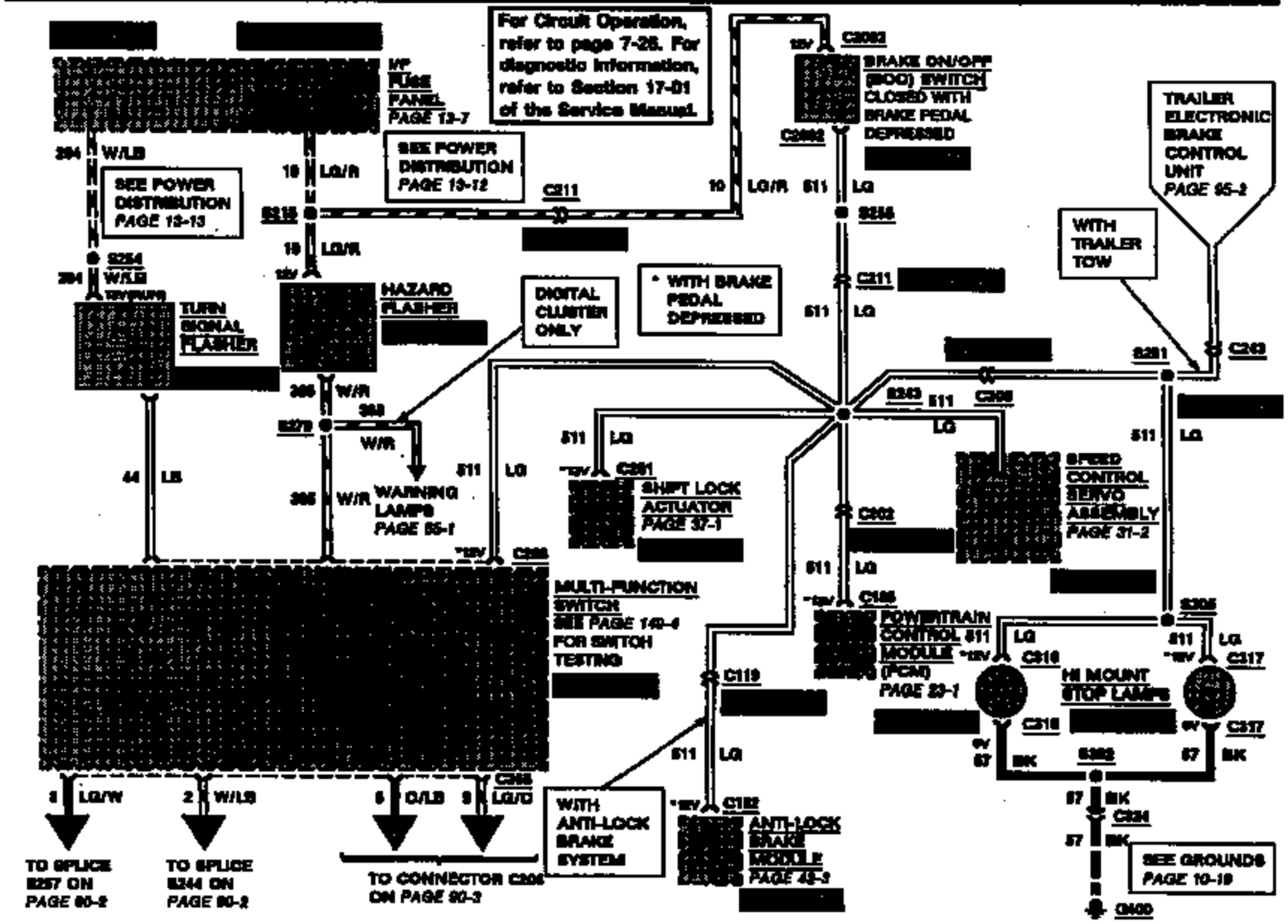
For Circuit Operation, refer to page 7-22. For diagnostic information, refer to Section 13-09 of the Service Manual.

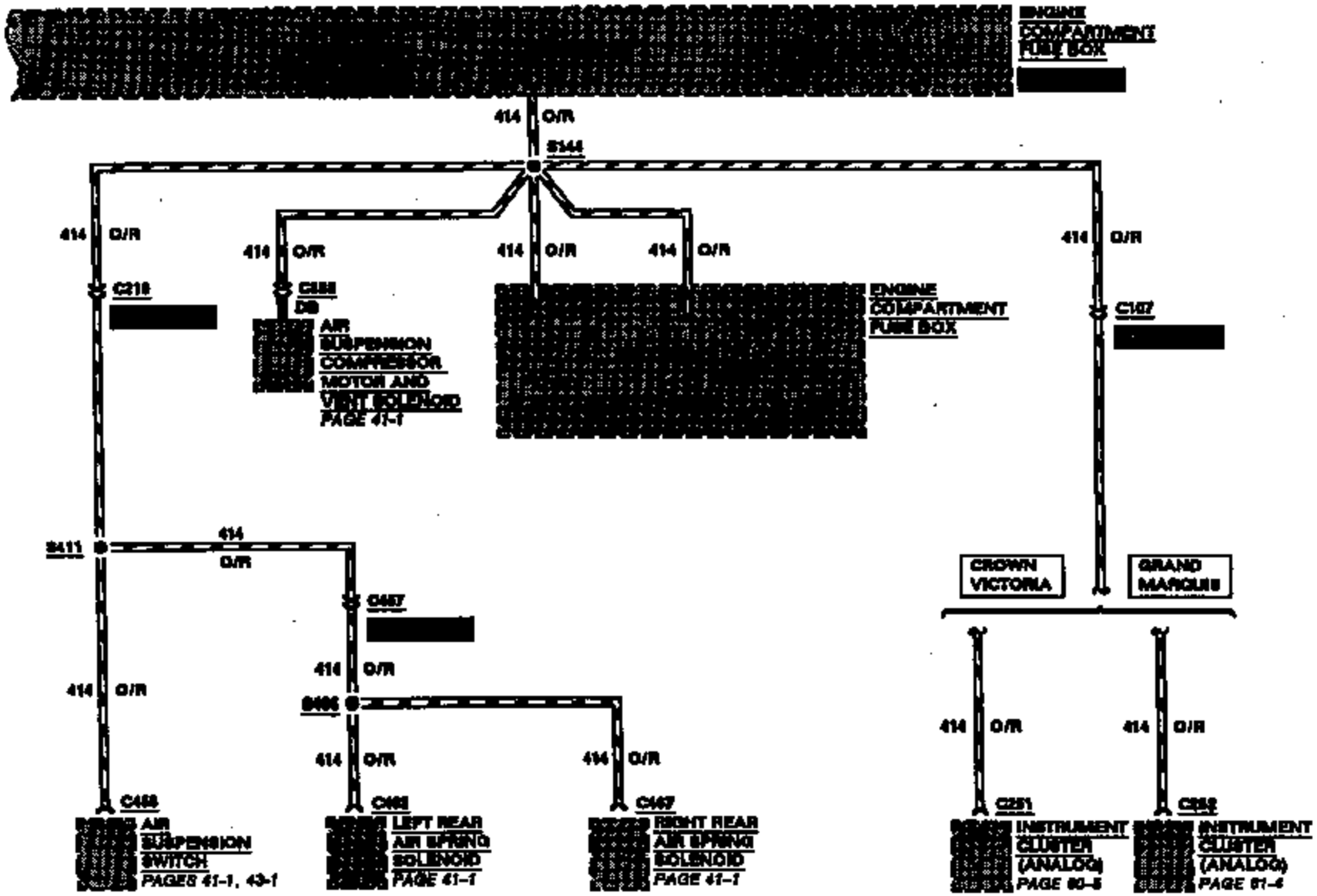


SEE TURN/STOP/ HAZARD LAMPS PAGES 90-1, 90-3

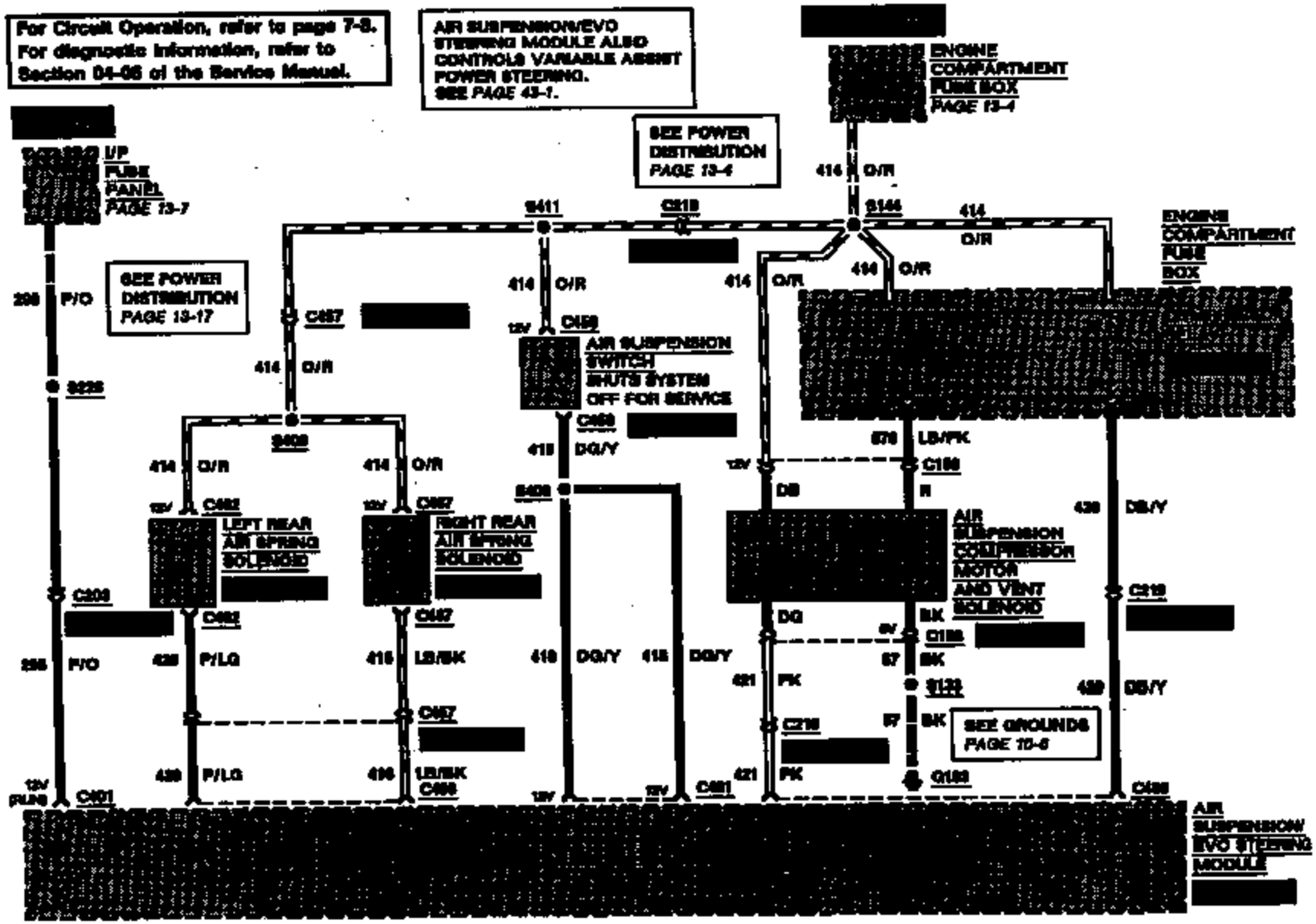
Refer to Location Index, Cell 162, for Component, Connector, Splice, Ground and Base Part Number descriptions and locations.

90-1 TURN/STOP/HAZARD LAMPS

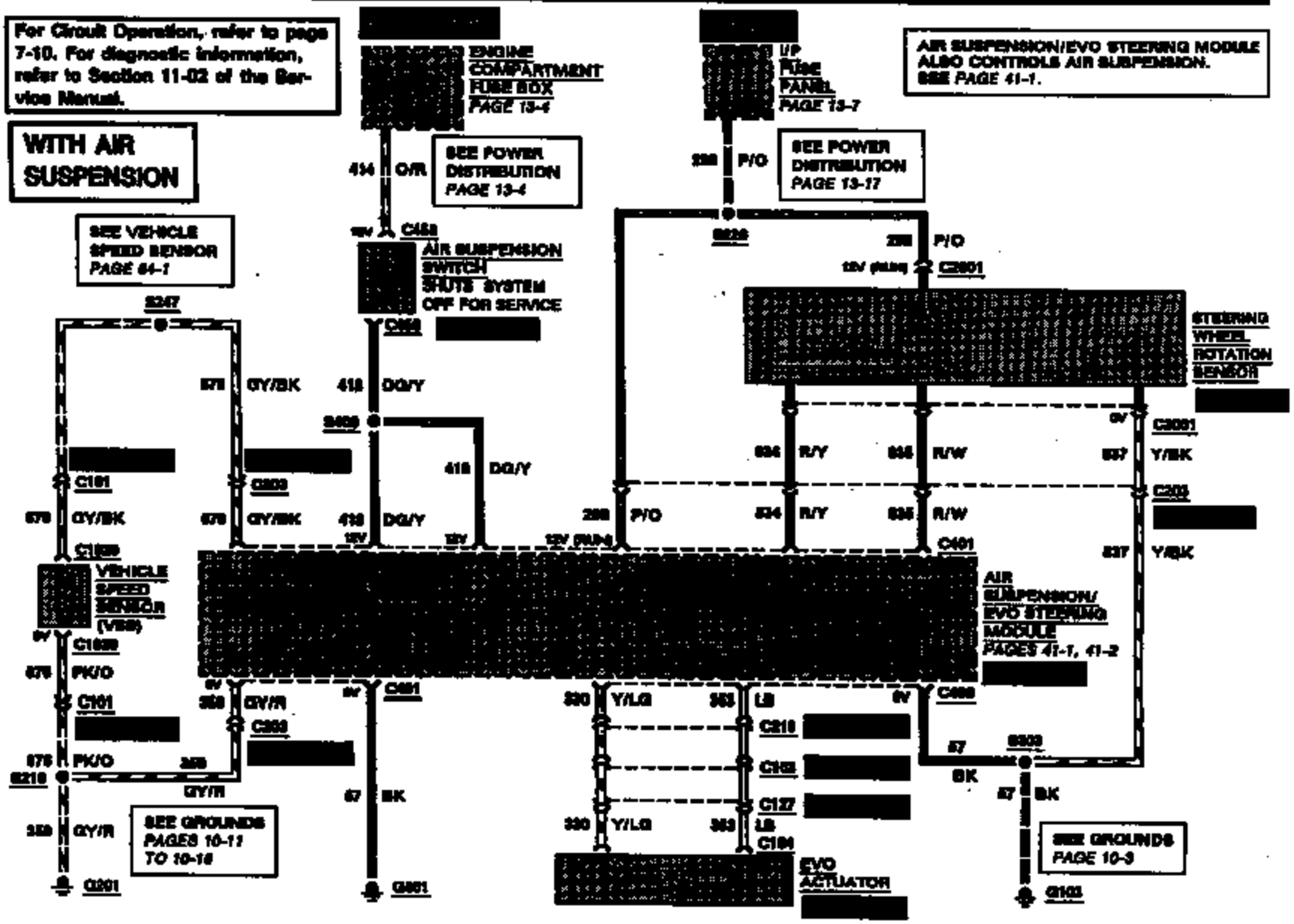


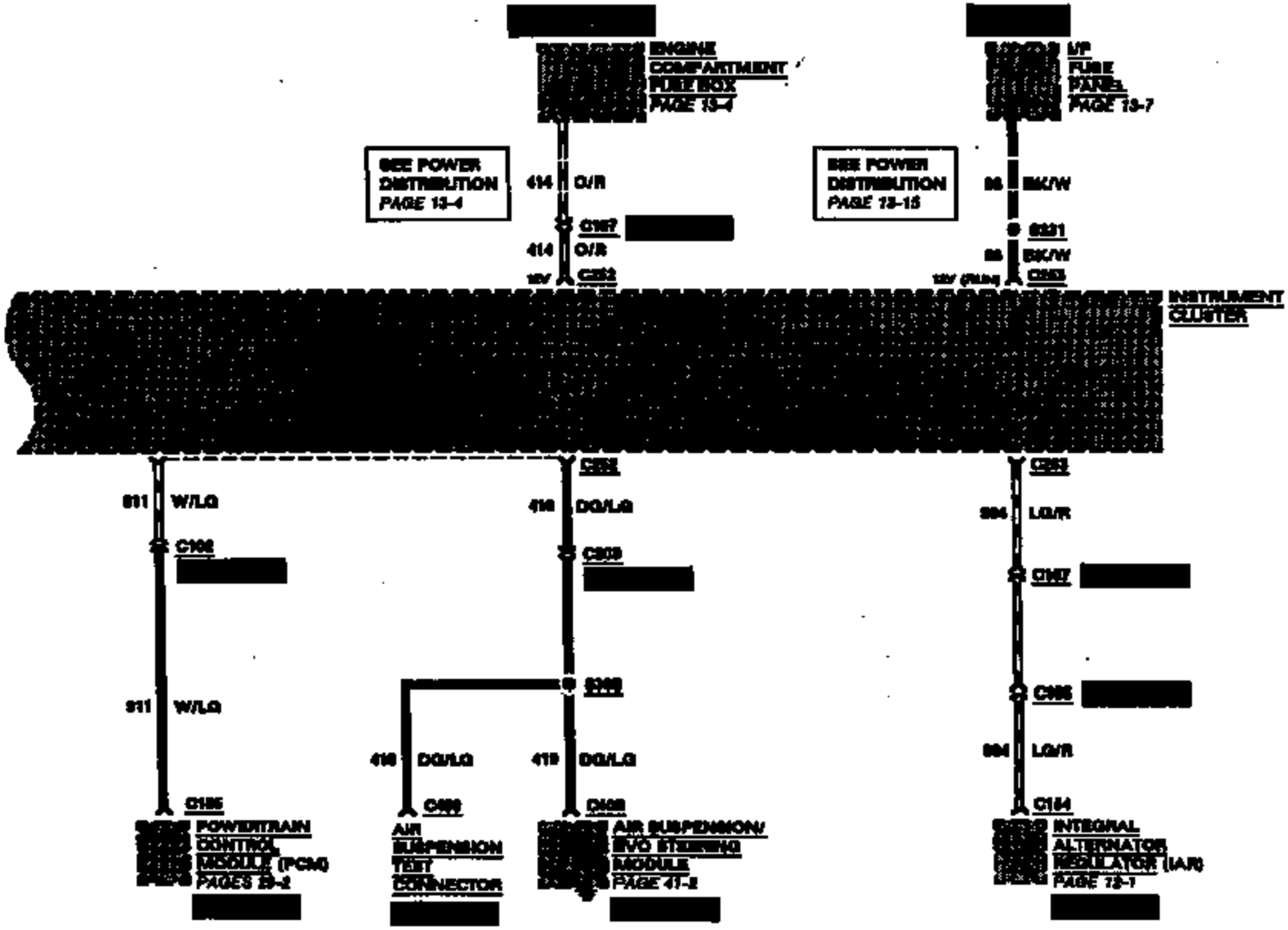

ENGINE COMPARTMENT FUSE BOX
414 O/R
S144
414 O/R
C218
414 O/R
C288
D8
AIR SUSPENSION COMPRESSOR MOTOR AND VENT SOLENOID
PAGE 41-1
414 O/R
414 O/R
ENGINE COMPARTMENT FUSE BOX
414 O/R
C107
S411
414 O/R
C487
414 O/R
S406
414 O/R
414 O/R
414 O/R
C458
AIR SUSPENSION SWITCH
PAGES 41-1, 43-1
C466
LEFT REAR AIR SPRING SOLENOID
PAGE 41-1
C467
RIGHT REAR AIR SPRING SOLENOID
PAGE 41-1
CROWN VICTORIA
GRAND MARQUIS
414 O/R
414 O/R
C251
INSTRUMENT CLUSTER (ANALOG)
PAGE 80-5
C252
INSTRUMENT CLUSTER (ANALOG)
PAGE 81-4

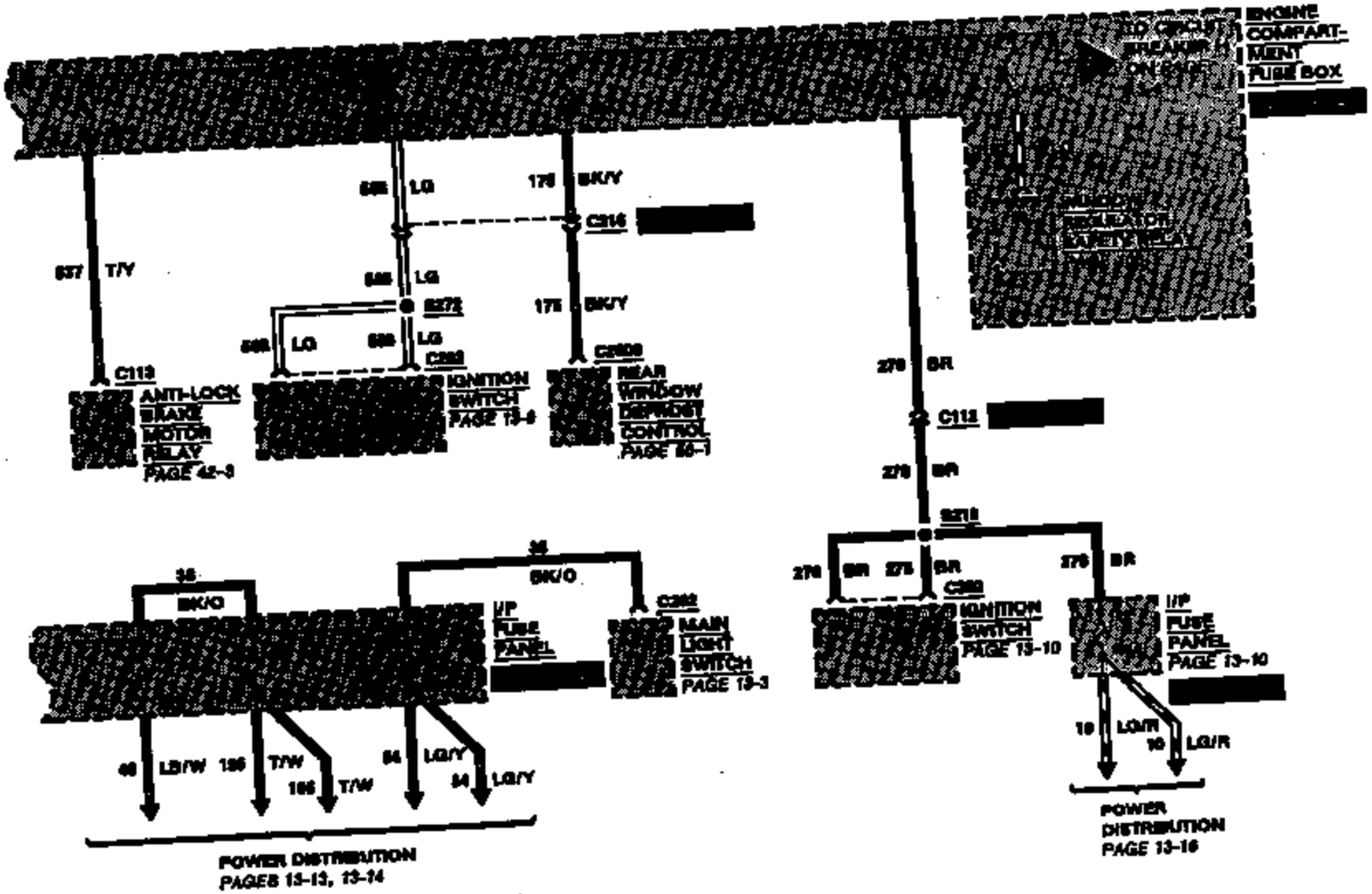
41-1 AIR SUSPENSION

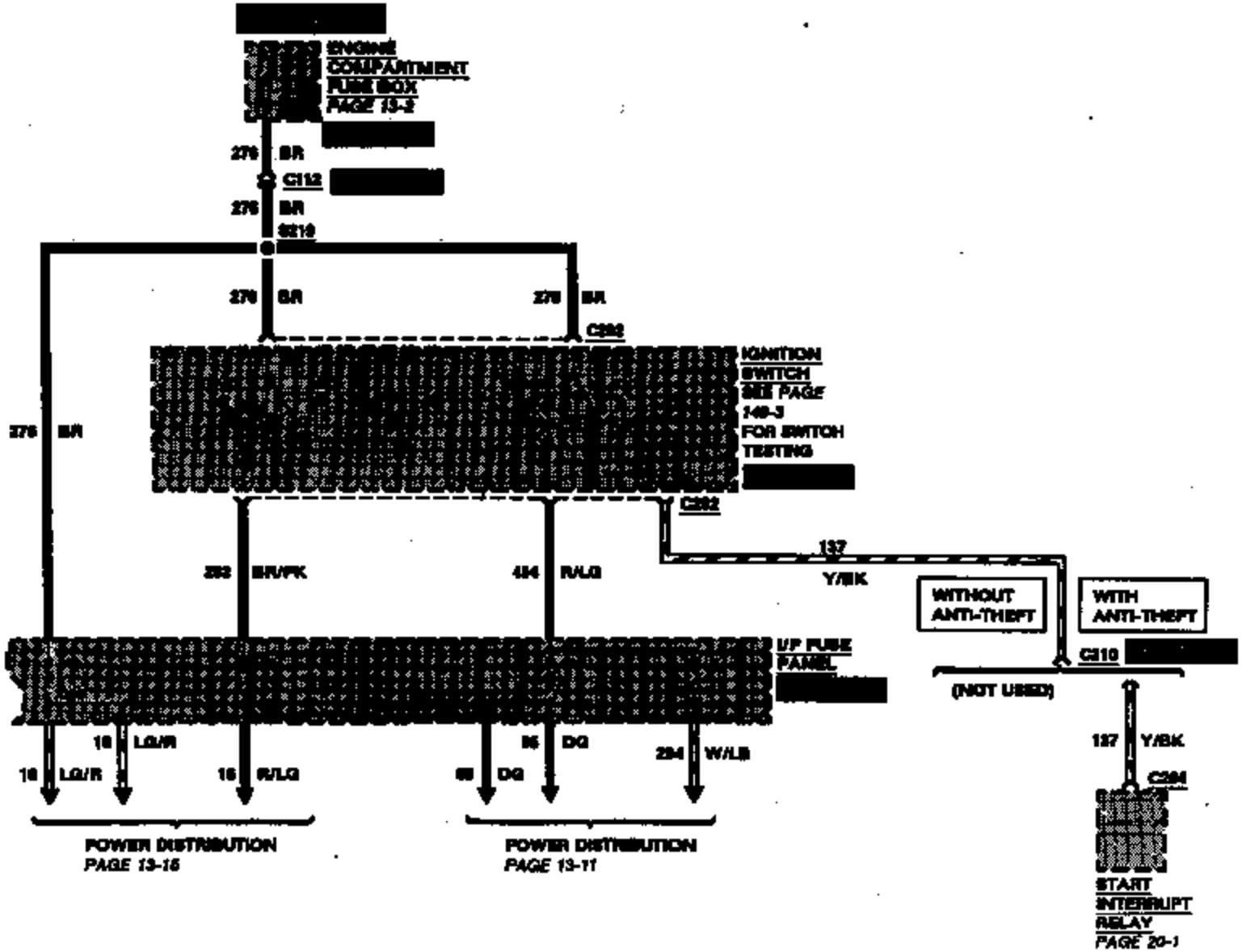


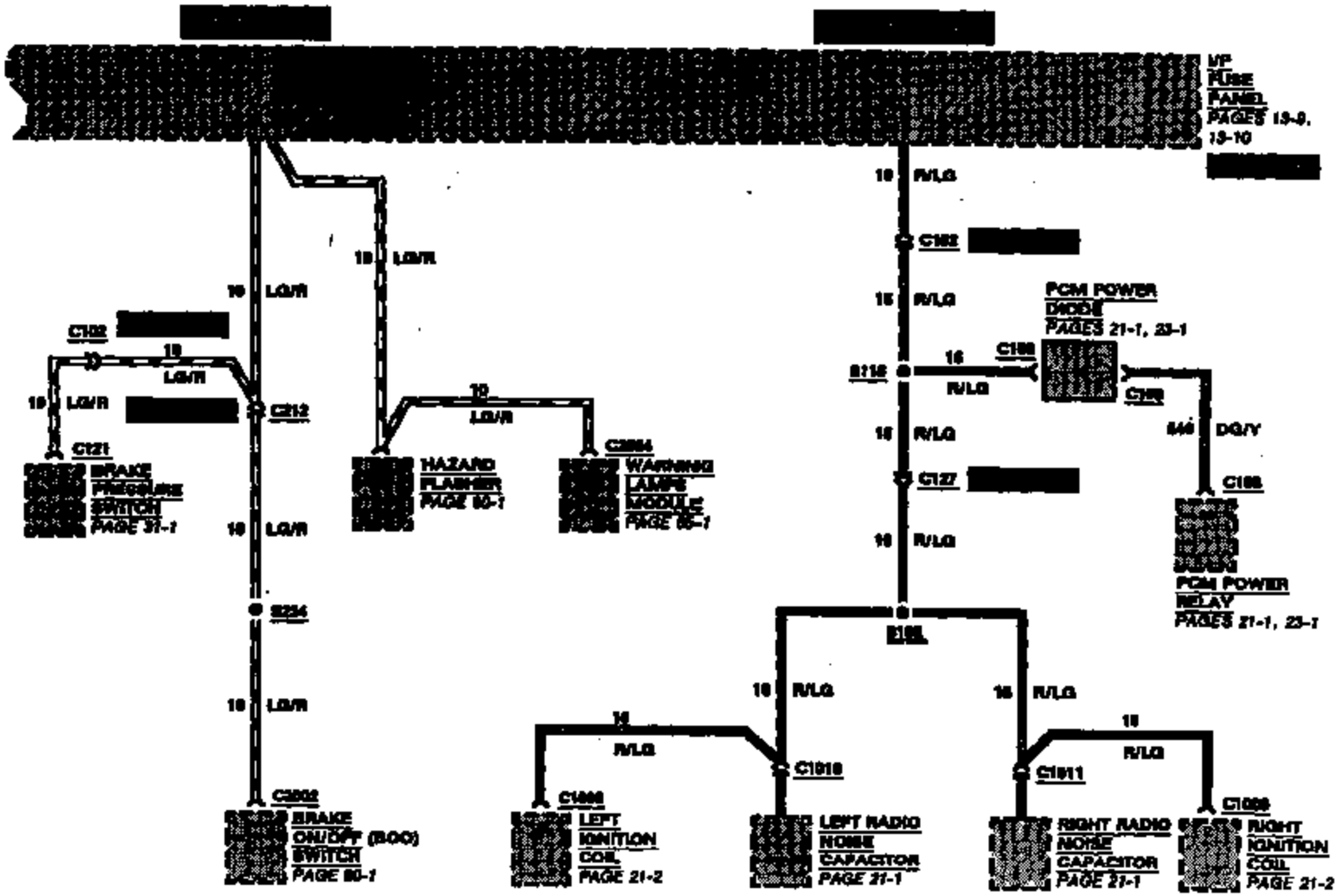
43-1 ELECTRIC VARIABLE ASSIST POWER STEERING



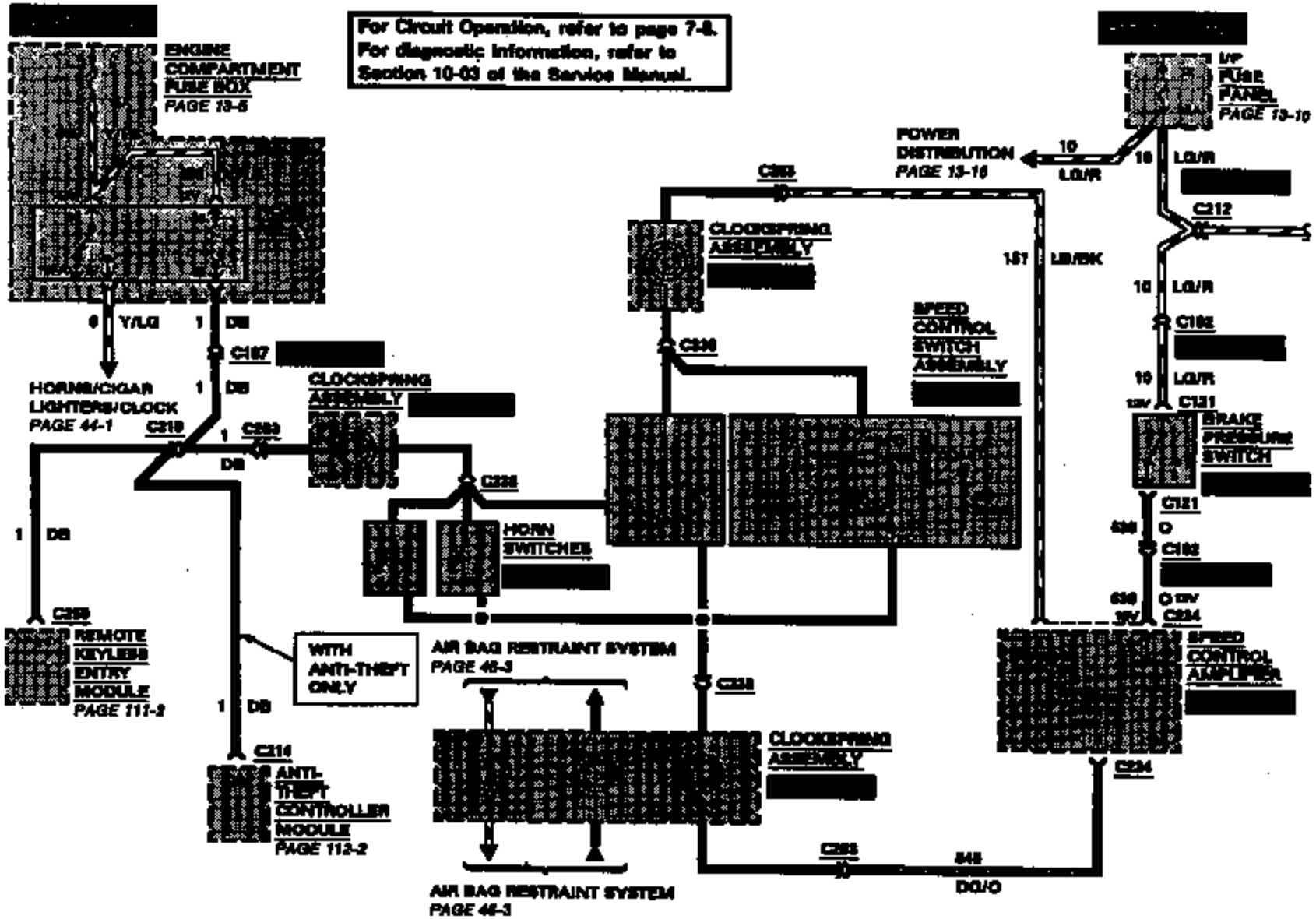

ENGINE COMPARTMENT FUSE BOX PAGE 13-4
I/P FUSE PANEL PAGE 13-7
SEE POWER DISTRIBUTION PAGE 13-4
SEE POWER DISTRIBUTION PAGE 13-15
414 O/R
414 O/R
BK/W
BK/W
INSTRUMENT CLUSTER
811 W/LG
811 W/LG
416 DG/LG
419 DG/LG
LG/R
LG/R
POWERTRAIN CONTROL MODULE (PCM) PAGES 29-2
AIR SUSPENSION TEST CONNECTOR
AIR SUSPENSION/ EVO STEERING MODULE PAGE 41-2
INTEGRAL ALTERNATOR REGULATOR (IAR) PAGE 13-1

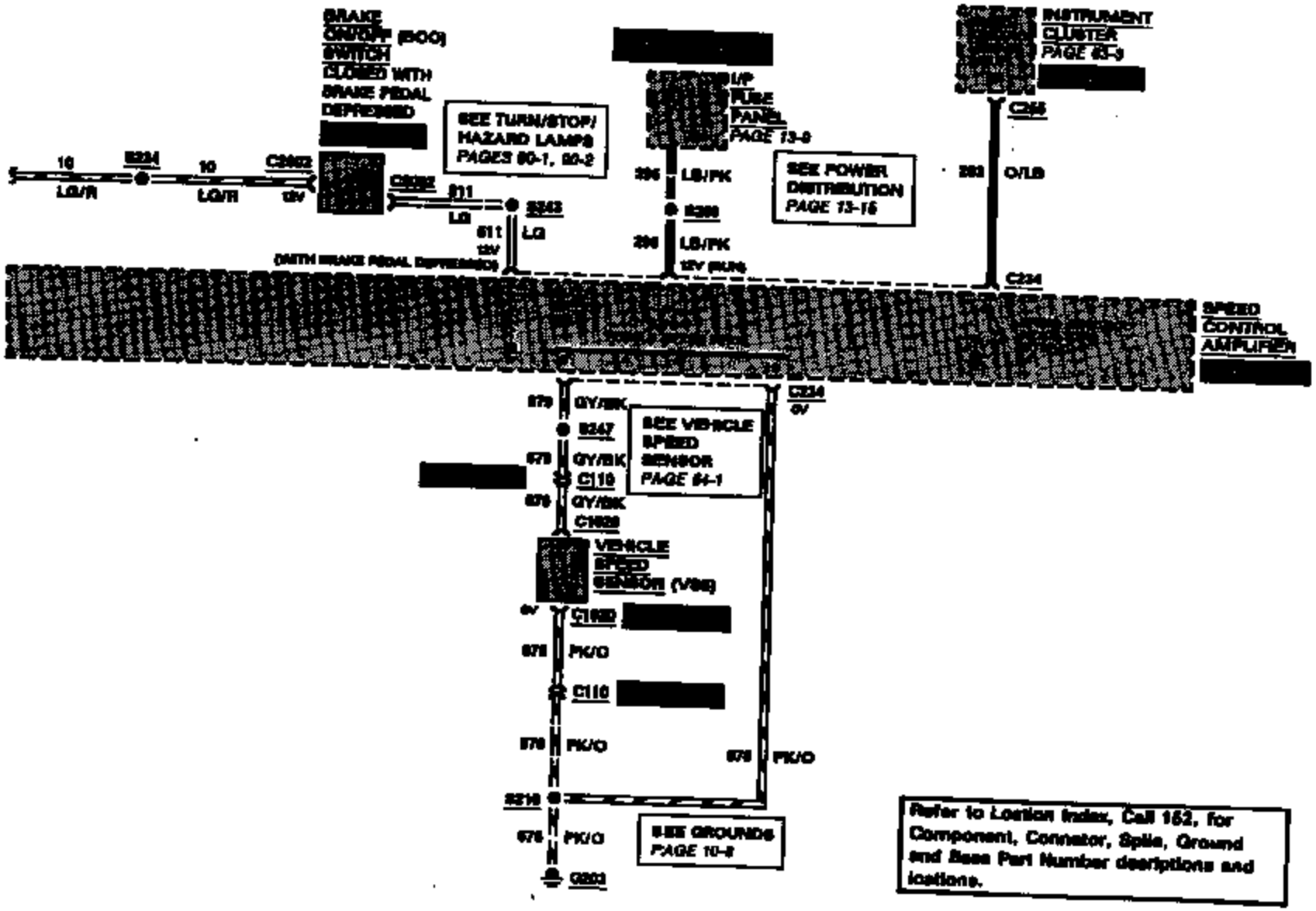

ENGINE COMPARTMENT FUSE BOX
C216
C113
ANTI-LOCK BRAKE MOTOR RELAY
PAGE 42-3
IGNITION SWITCH
PAGE 13-6
REAR WINDOW DEFROST CONTROL
C112
I/P FUSE PANEL
MAIN LIGHT SWITCH
PAGE 13-3
IGNITION SWITCH
PAGE 13-10
I/P FUSE PANEL
PAGE 13-10
POWER DISTRIBUTION
PAGES 13-13, 13-14
POWER DISTRIBUTION
PAGE 13-16


ENGINE COMPARTMENT FUSE BOX
PAGE 13-2
276 BR
C112
276 BR
S210
276 BR
276 BR
C242
IGNITION SWITCH
SEE PAGE 14B-3 FOR SWITCH TESTING
276 BR
C282
137 Y/BK
WITHOUT ANTI-THEFT
WITH ANTI-THEFT
C310
(NOT USED)
282 BR/PK
484 R/LG
I/P FUSE PANEL
16 LG/R
16 LG/R
16 R/LG
86 DG
86 DG
294 W/LB
137 Y/BK
C284
START INTERRUPT RELAY
PAGE 20-1
POWER DISTRIBUTION
PAGE 13-16
POWER DISTRIBUTION
PAGE 13-11


UP FUSE PANEL PAGES 13-9, 13-10
C102
C212
C121
BRAKE PRESSURE SWITCH PAGE 31-1
HAZARD FLASHER PAGE 80-1
WARNING LAMPS MODULE PAGE 80-1
S234
C2002
BRAKE ON/OFF (BOO) SWITCH PAGE 80-1
C102
C127
PCM POWER DIODE PAGES 21-1, 23-1
C108
PCM POWER RELAY PAGES 21-1, 23-1
C1910
C1911
LEFT IGNITION COIL PAGE 21-2
LEFT RADIO NOISE CAPACITOR PAGE 21-1
RIGHT RADIO NOISE CAPACITOR PAGE 21-1
RIGHT IGNITION COIL PAGE 21-2
LG/R
R/LG
DG/Y

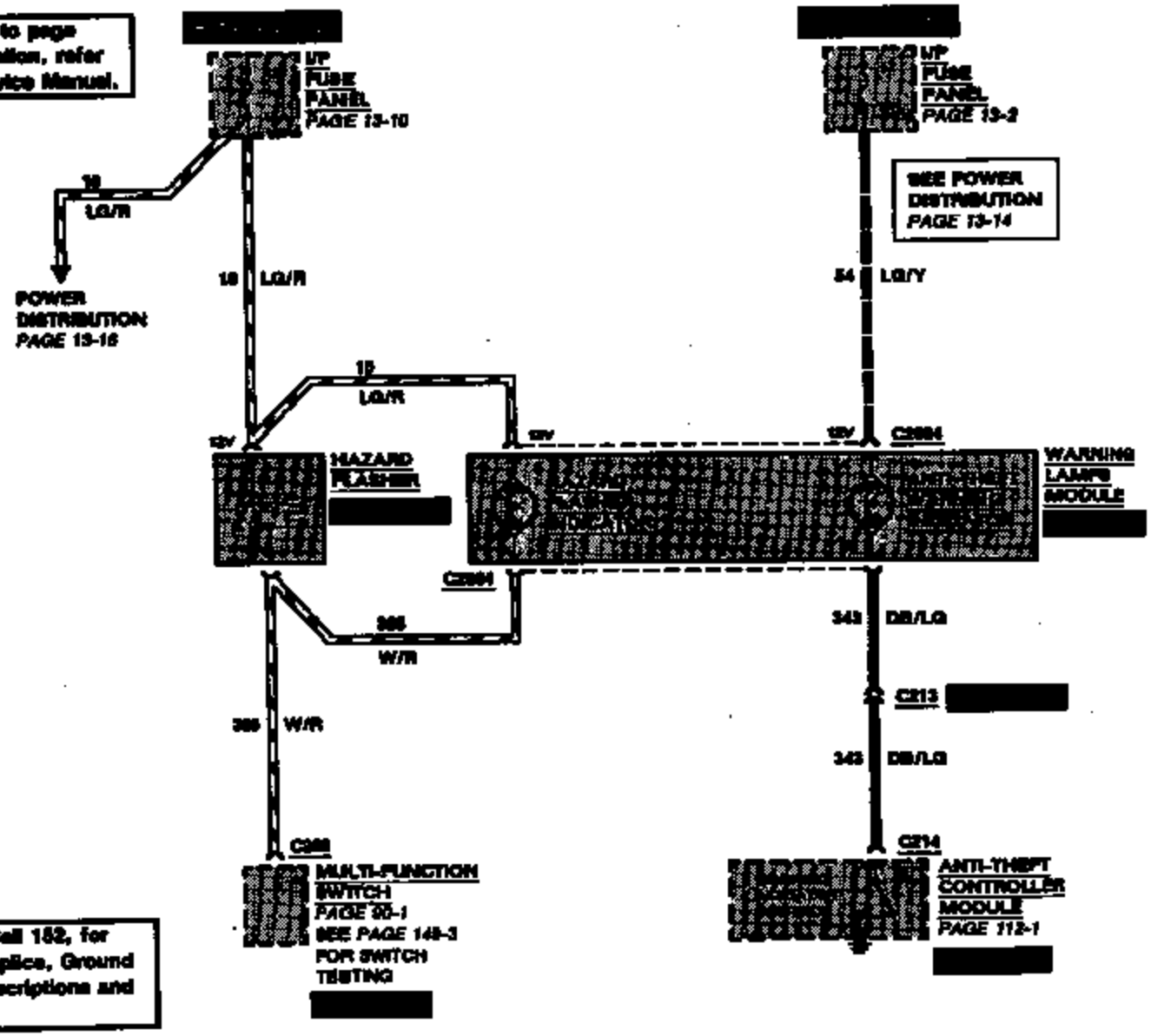
31-1 SPEED CONTROL




BRAKE ON/OFF (BOO) SWITCH CLOSED WITH BRAKE PEDAL DEPRESSED
SEE TURN/STOP/ HAZARD LAMPS PAGES 80-1, 80-2
I/P FUSE PANEL PAGE 13-9
SEE POWER DISTRIBUTION PAGE 13-16
INSTRUMENT CLUSTER PAGE 82-9
C244
C234
SPEED CONTROL AMPLIFIER
SEE VEHICLE SPEED SENSOR PAGE 64-1
VEHICLE SPEED SENSOR (VSS)
SEE GROUNDS PAGE 10-8
Refer to Location Index, Cell 152, for Component, Connector, Splice, Ground and Base Part Number descriptions and locations.

65-1 WARNING LAMPS

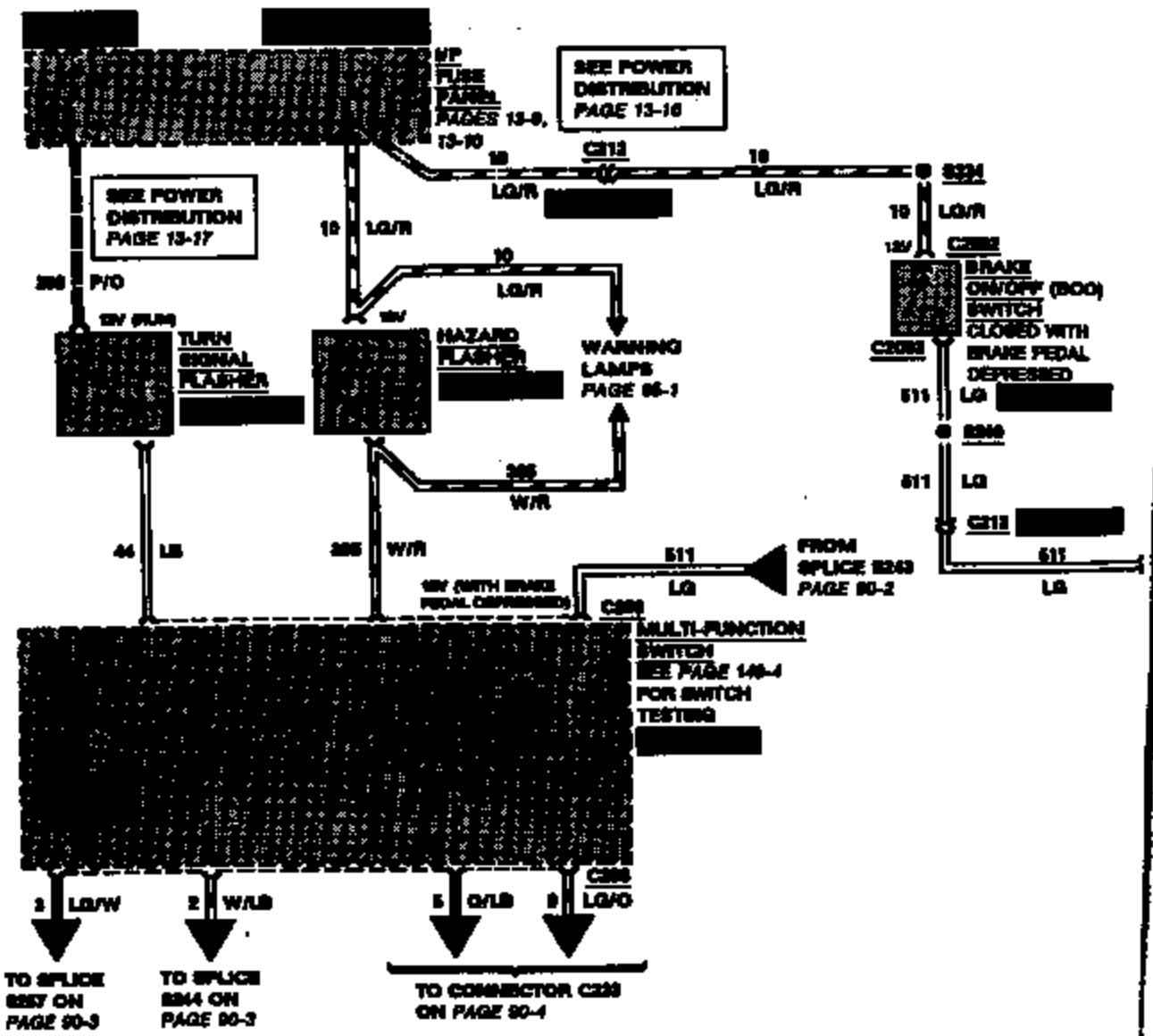
For Circuit Operation, refer to page 7-18. For diagnostic information, refer to Section 13-08 of the Service Manual.

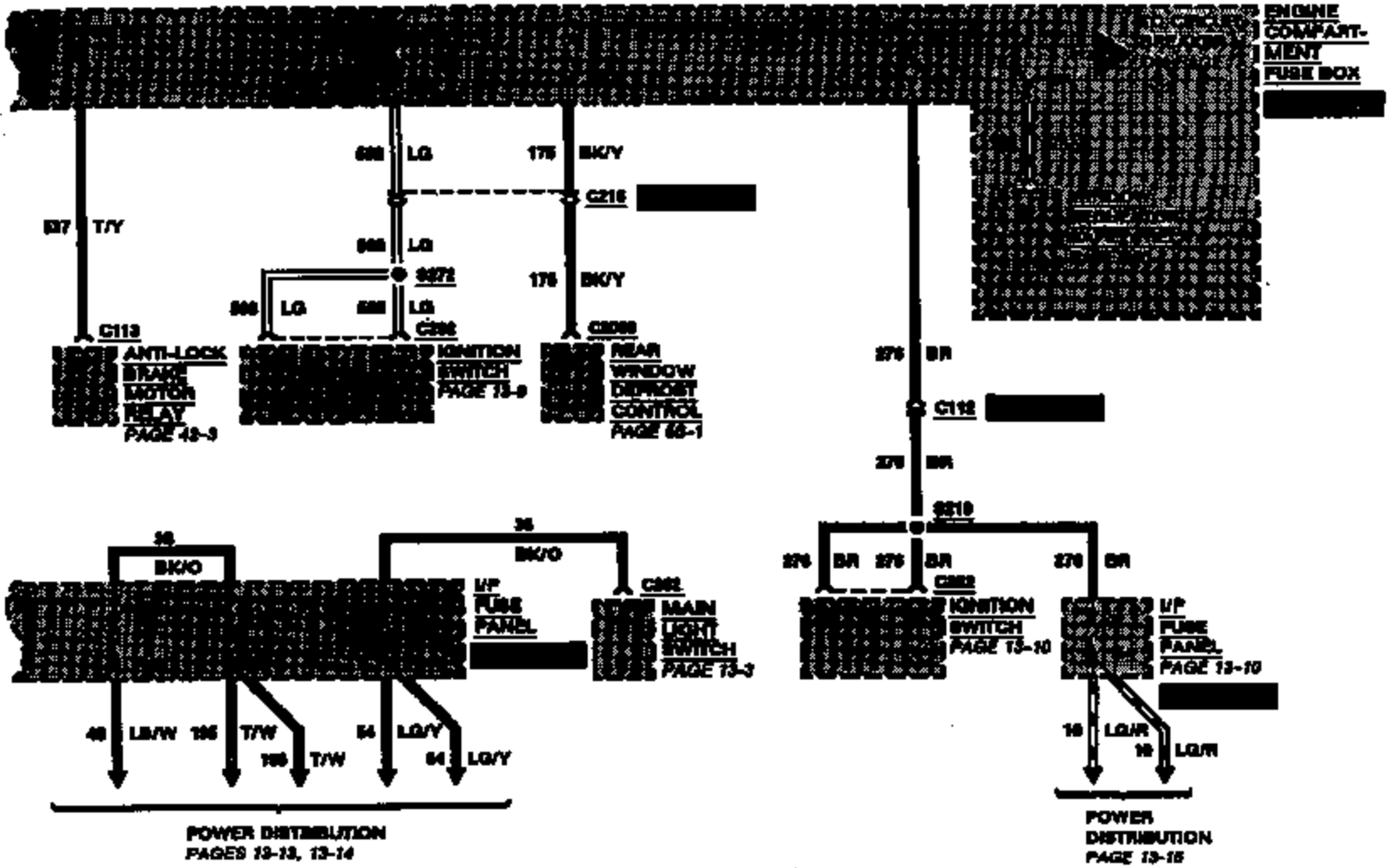


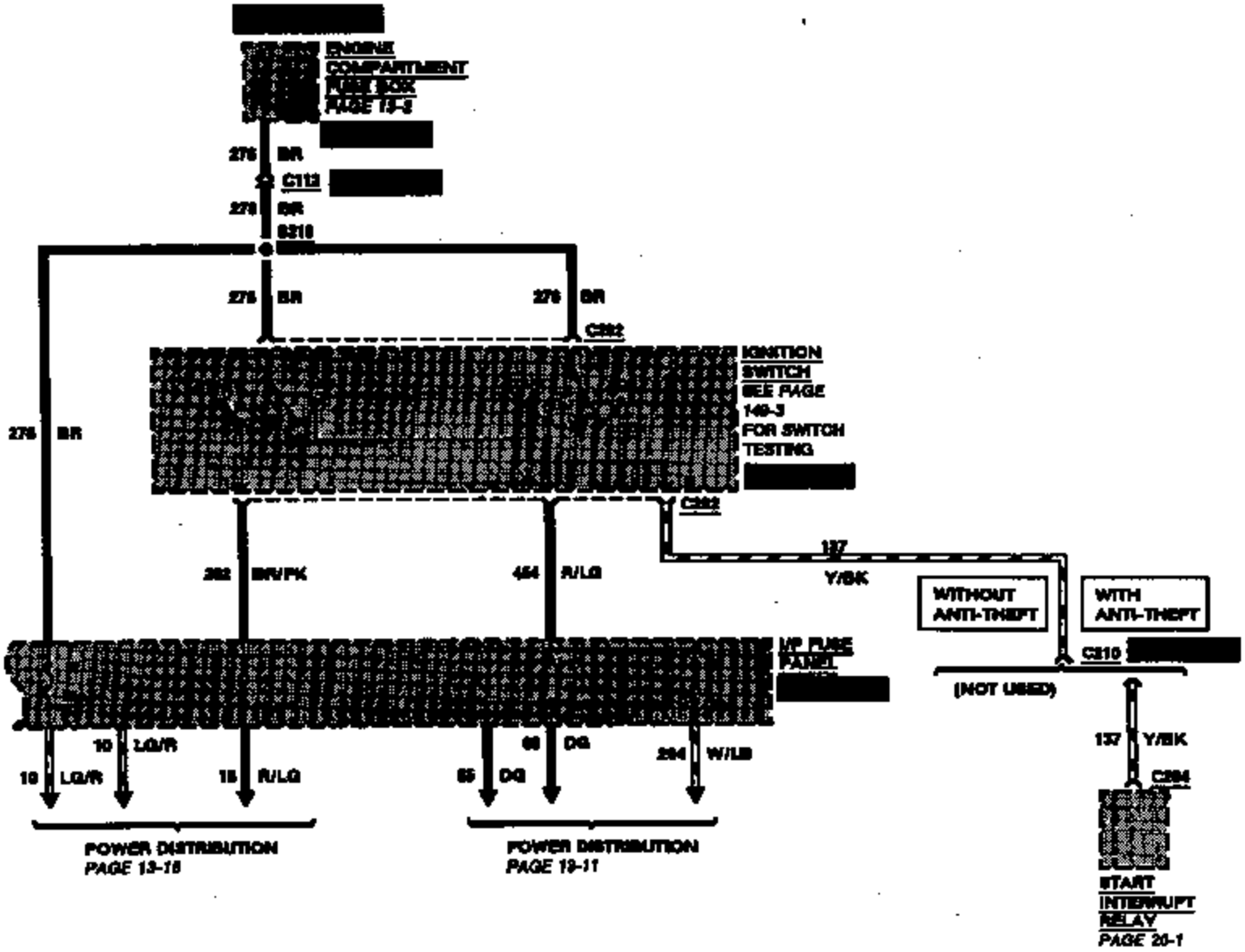
Refer to Location Index, Call 152, for Component, Connector, Splice, Ground and Base Part Number descriptions and locations.

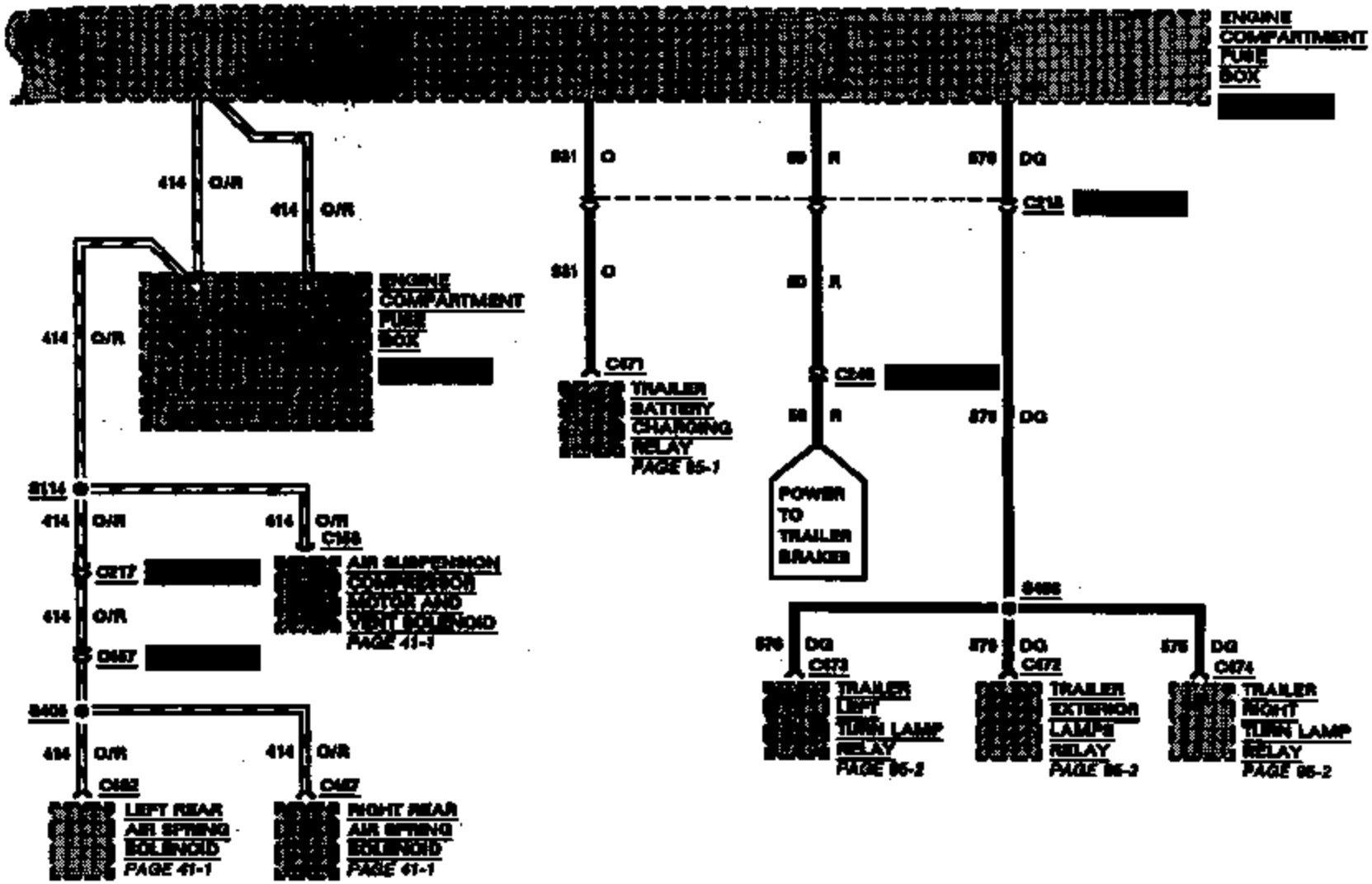
90-1 TURN/STOP/HAZARD LAMPS

For Circuit Operation, refer to page 7-21. For diagnostic information, refer to Section 17-01 of the Service Manual.




ENGINE COMPART-MENT FUSE BOX
[redacted]
LG
BK/Y
C216
[redacted]
T/Y
LG
LG
LG
LG
BK/Y
C113
ANTI-LOCK BRAKE MOTOR RELAY
PAGE 43-3
IGNITION SWITCH
PAGE 13-9
REAR WINDOW DEFROST CONTROL
PAGE 65-1
BR
C112
[redacted]
BR
BR
BR
BR
BR
BK/O
BK/O
I/P FUSE PANEL
[redacted]
MAIN LIGHT SWITCH
PAGE 13-3
IGNITION SWITCH
PAGE 13-10
I/P FUSE PANEL
PAGE 13-10
[redacted]
LB/W
T/W
T/W
LG/Y
LG/Y
LG/R
LG/R
POWER DISTRIBUTION
PAGES 13-13, 13-14
POWER DISTRIBUTION
PAGE 13-15

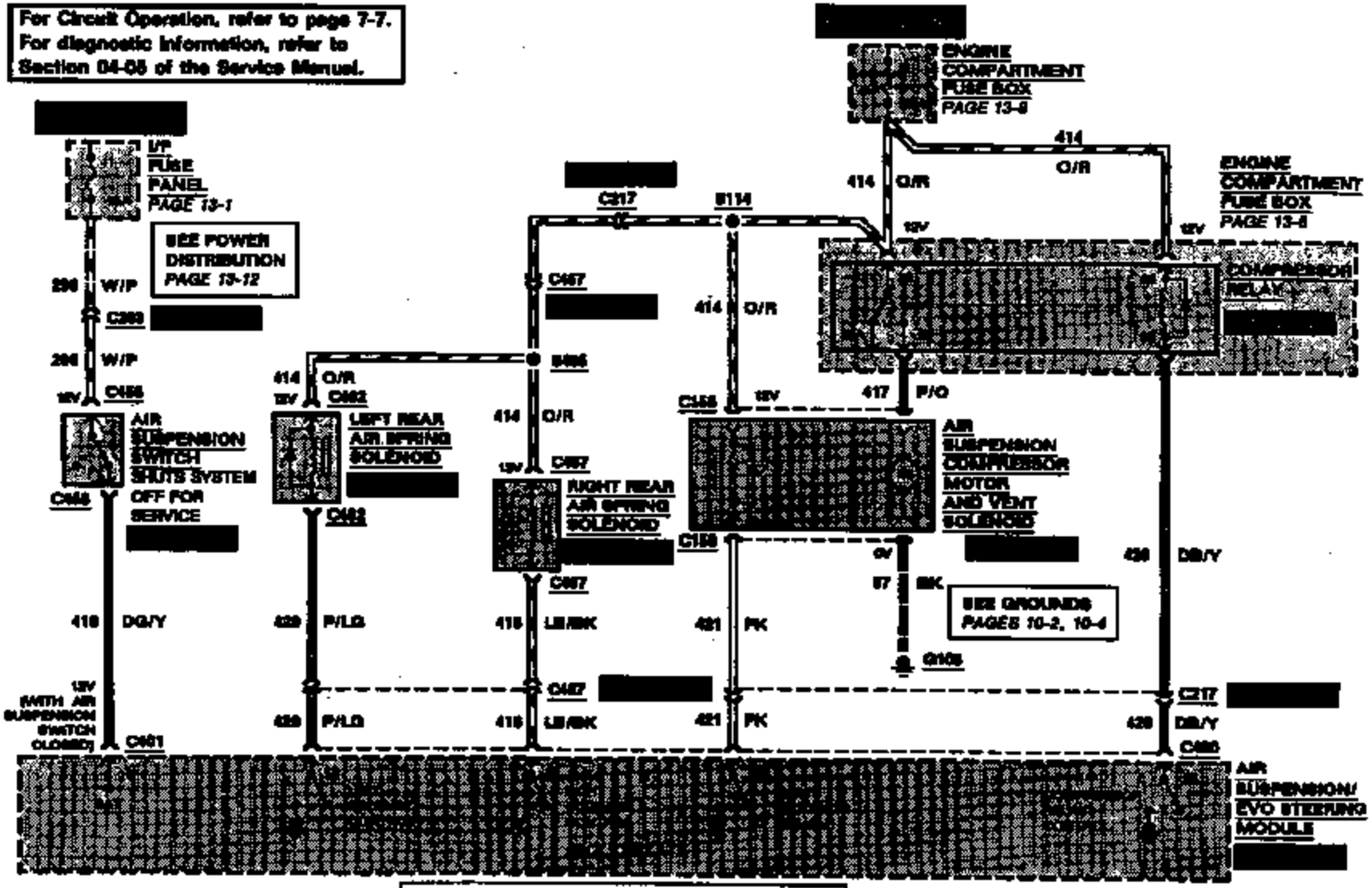

ENGINE COMPARTMENT FUSE BOX PAGE 13-2
276 BR
C113
276 BR
S210
276 BR
276 BR
C282
IGNITION SWITCH SEE PAGE 149-3 FOR SWITCH TESTING
276 BR
C282
137 Y/BK
282 BR/PK
464 R/LG
WITHOUT ANTI-THEFT
WITH ANTI-THEFT
I/P FUSE PANEL
C210
(NOT USED)
10 LG/R
10 LG/R
15 R/LG
65 DG
66 DG
294 W/LB
137 Y/BK
C284
START INTERRUPT RELAY PAGE 20-1
POWER DISTRIBUTION PAGE 13-18
POWER DISTRIBUTION PAGE 13-11


ENGINE COMPARTMENT FUSE BOX
414 O/R
414 O/R
ENGINE COMPARTMENT FUSE BOX
414 O/R
S114
414 O/R
414 O/R
C158
C217
AIR SUSPENSION COMPRESSOR MOTOR AND VENT SOLENOID
PAGE 41-1
414 O/R
C167
S405
414 O/R
414 O/R
C162
C167
LEFT REAR AIR SPRING SOLENOID
PAGE 41-1
RIGHT REAR AIR SPRING SOLENOID
PAGE 41-1
551 O
551 O
C271
TRAILER BATTERY CHARGING RELAY
PAGE 85-1
80 R
80 R
C248
POWER TO TRAILER BRAKES
576 DG
576 DG
C218
S406
576 DG
C273
TRAILER LEFT TURN LAMP RELAY
PAGE 86-2
576 DG
C272
TRAILER EXTERIOR LAMPS RELAY
PAGE 86-2
576 DG
C274
TRAILER RIGHT TURN LAMP RELAY
PAGE 86-2

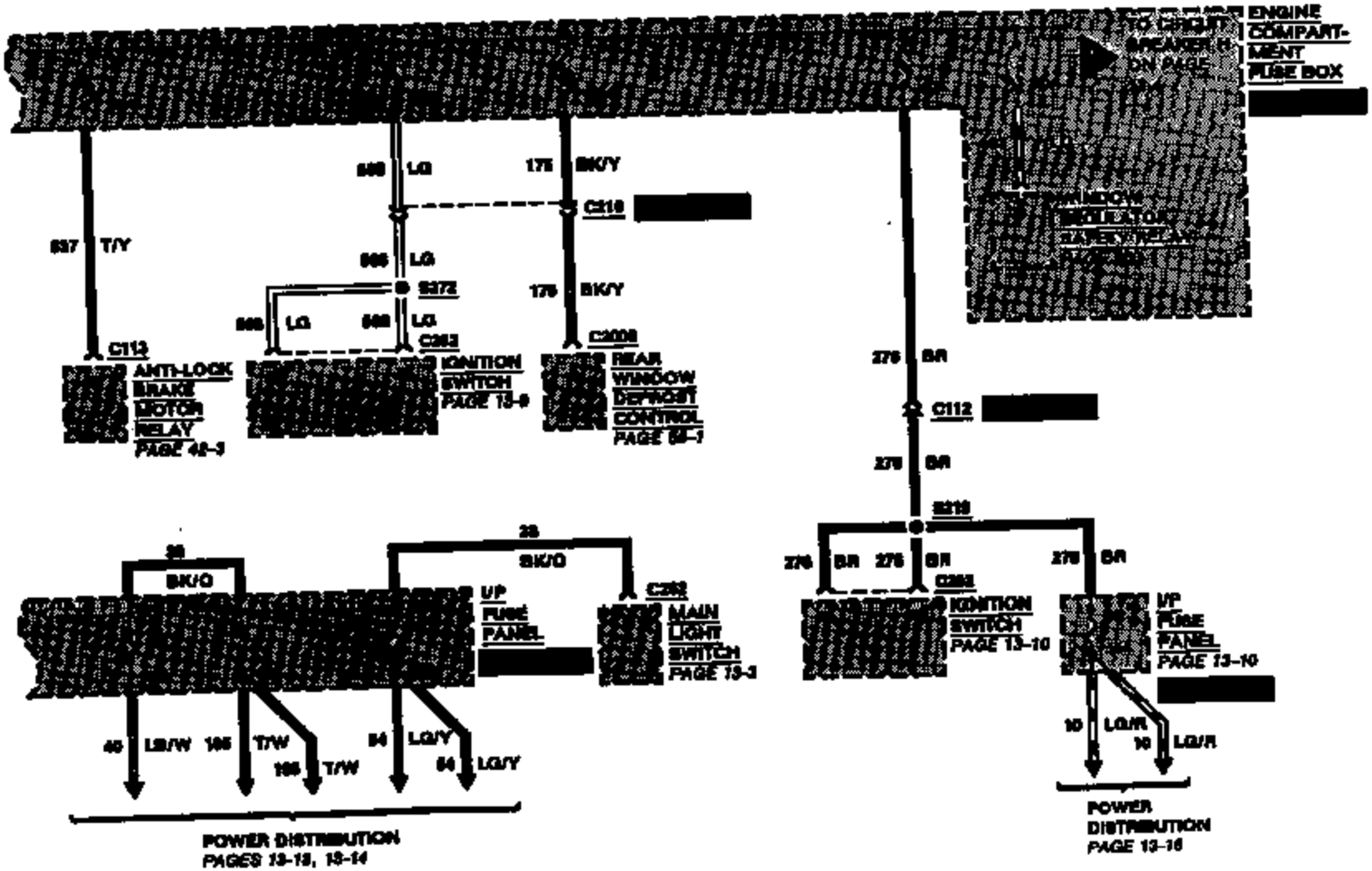
1-1 AIR SUSPENSION

[redacted]

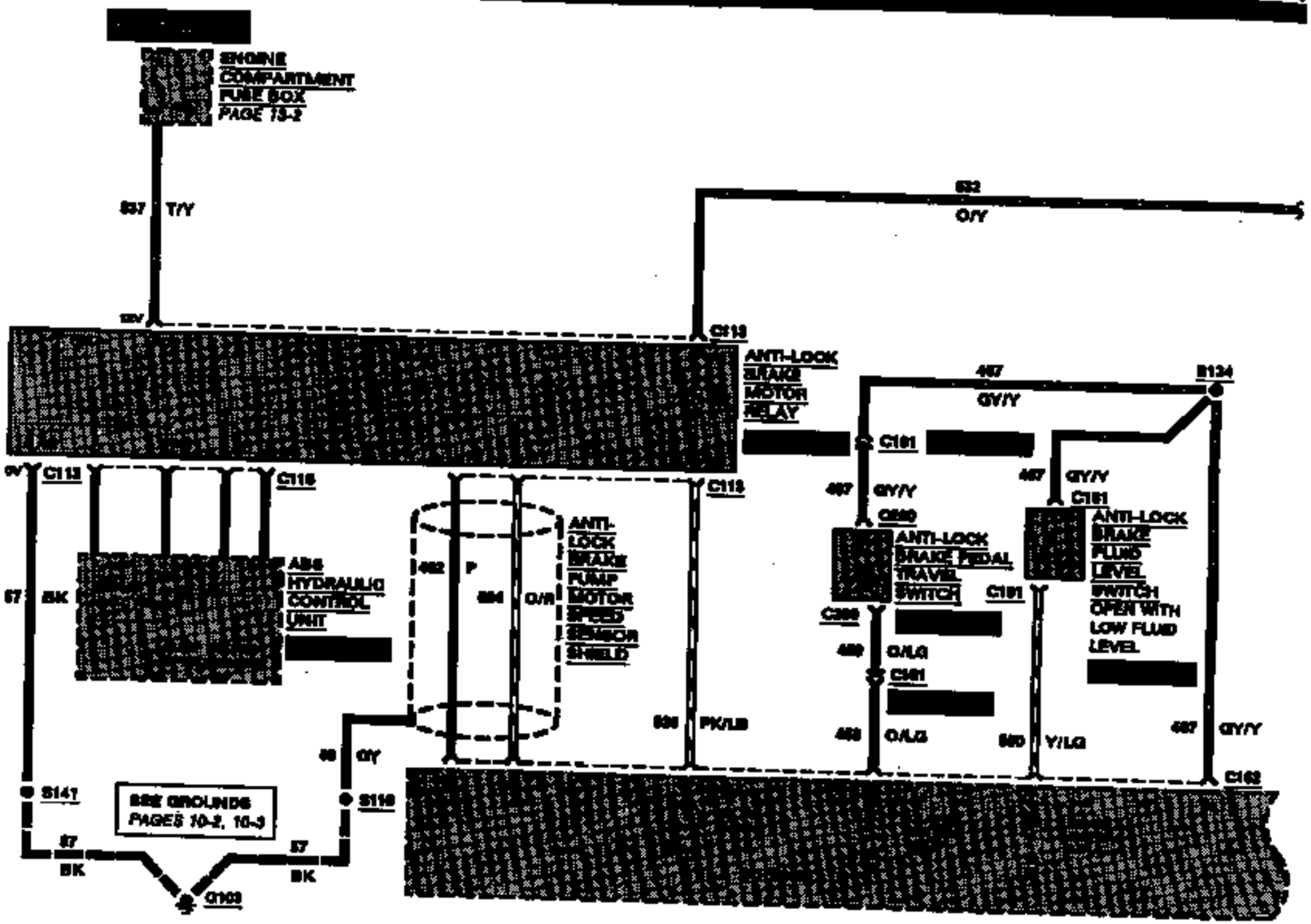
For Circuit Operation, refer to page 7-7.
For diagnostic information, refer to Section 04-05 of the Service Manual.

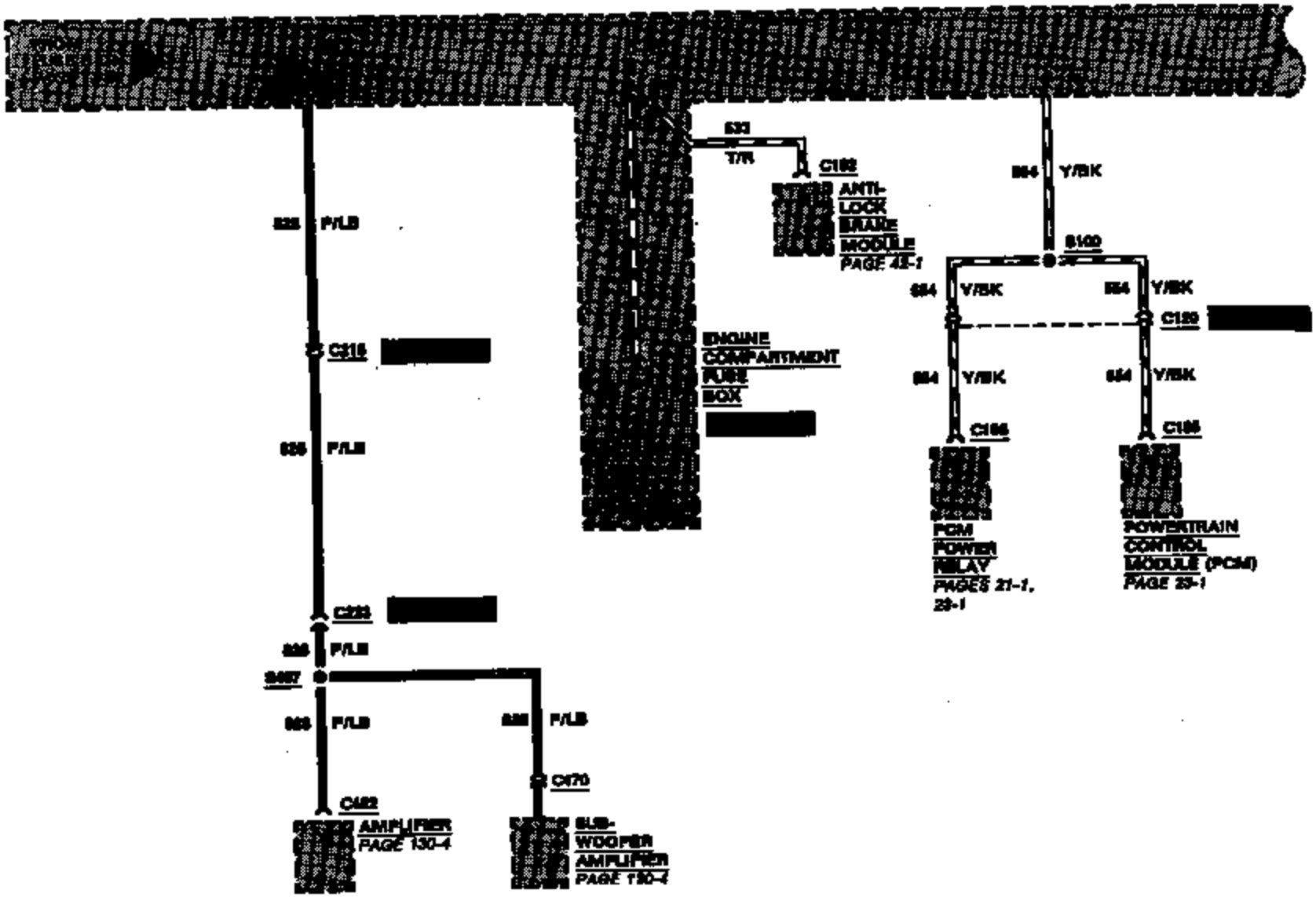


AIR SUSPENSION/EVO STEERING MODULE ALSO CONTROLS ELECTRONICALLY VARIABLE ORIFICE (EVO) POWER STEERING. SEE PAGE 43-1.

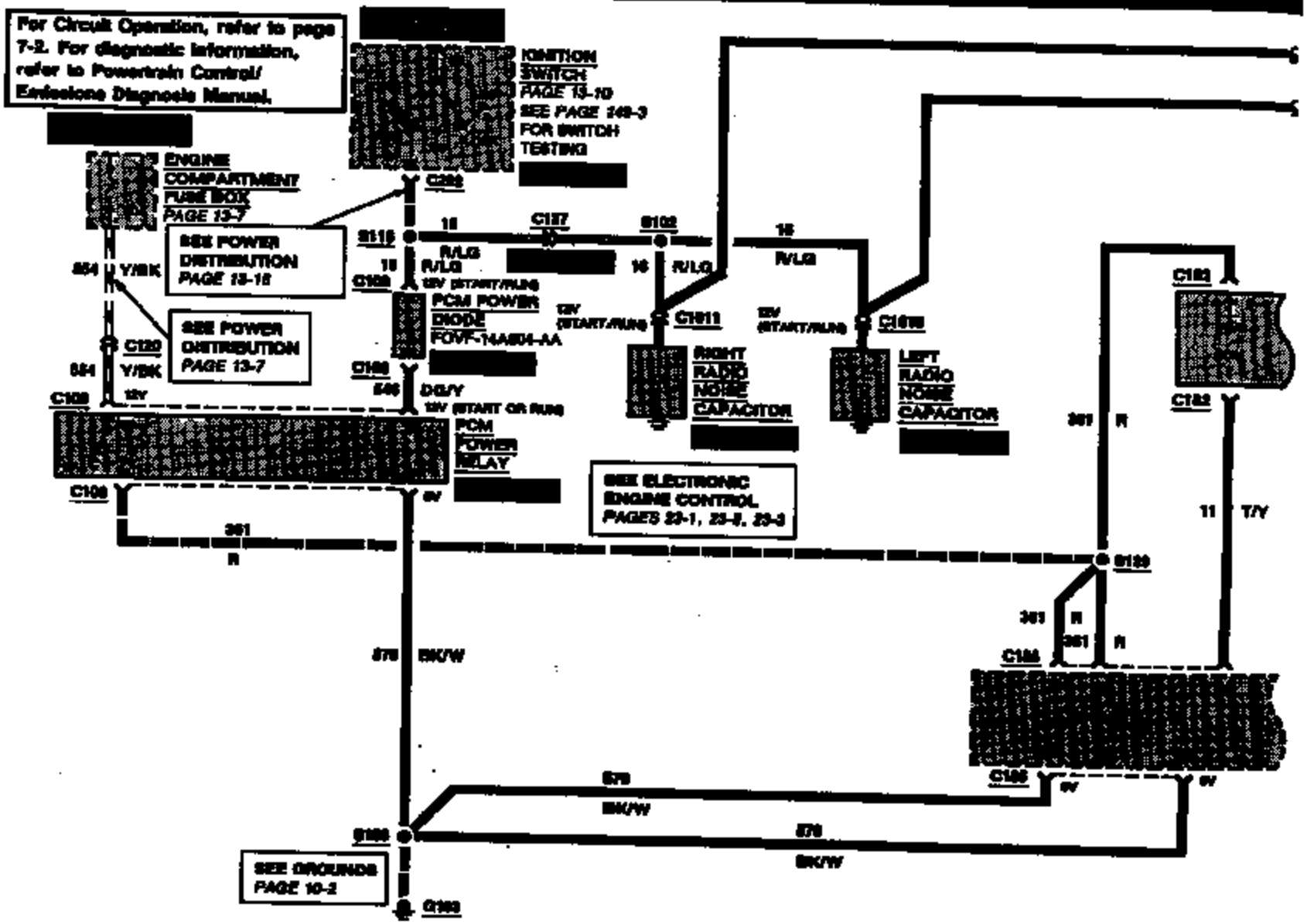

ENGINE COMPARTMENT FUSE BOX
TO CIRCUIT BREAKER H ON PAGE
WINDOW MOTOR
C112
ANTI-LOCK BRAKE MOTOR RELAY
PAGE 42-1
IGNITION SWITCH
PAGE 13-9
REAR WINDOW DEFROST CONTROL
PAGE 56-1
C112
IGNITION SWITCH
PAGE 13-10
I/P FUSE PANEL
PAGE 13-10
I/P FUSE PANEL
MAIN LIGHT SWITCH
PAGE 13-1
POWER DISTRIBUTION
PAGES 13-13, 13-14
POWER DISTRIBUTION
PAGE 13-16

2-3 ANTI-LOCK BRAKE SYS . EM (WITH OR WITHOUT TRACTION ASSIST)



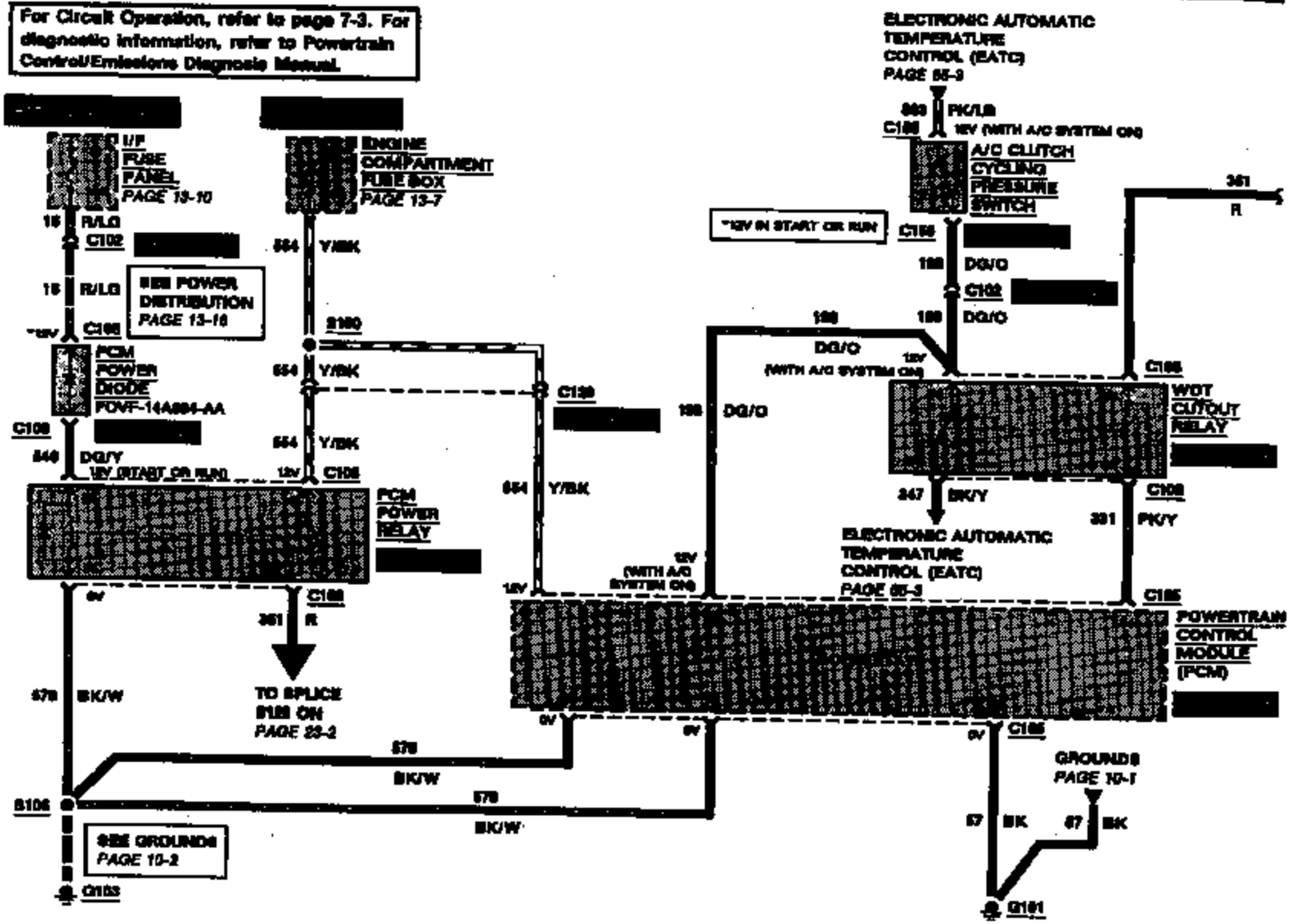

F/LB
C315
F/LB
C233
F/LB
S607
F/LB
F/LB
C170
C482
AMPLIFIER
PAGE 130-4
SUB-
WOOFER
AMPLIFIER
T/R
C182
ANTI-
LOCK
BRAKE
MODULE
PAGE 43-1
ENGINE
COMPARTMENT
FUSE
BOX
Y/BK
S100
Y/BK
Y/BK
C120
Y/BK
Y/BK
C186
C185
PCM
POWER
RELAY
PAGES 21-1,
23-1
POWERTRAIN
CONTROL
MODULE (PCM)
PAGE 23-1

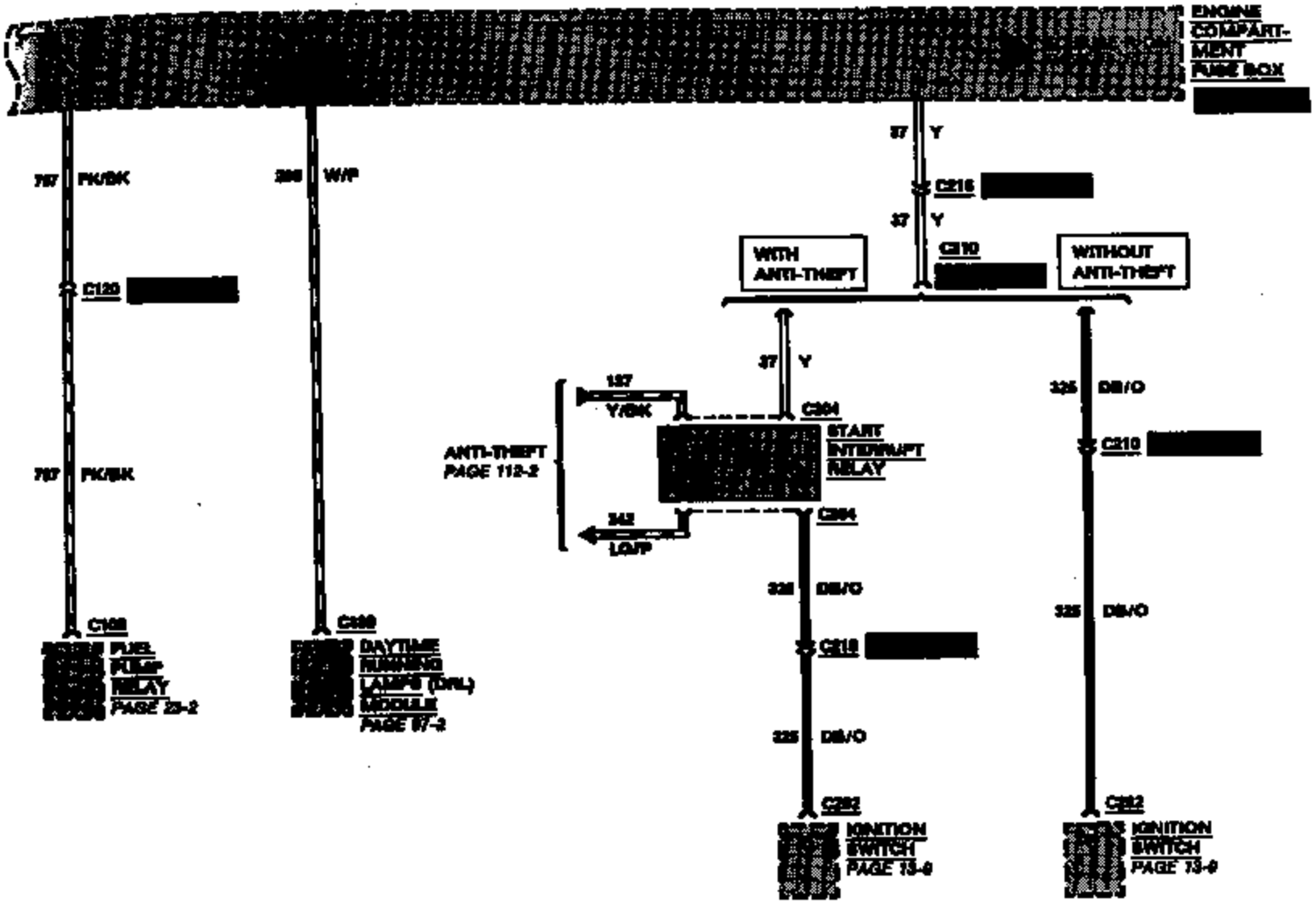
21-1 IGNITION SYSTEM

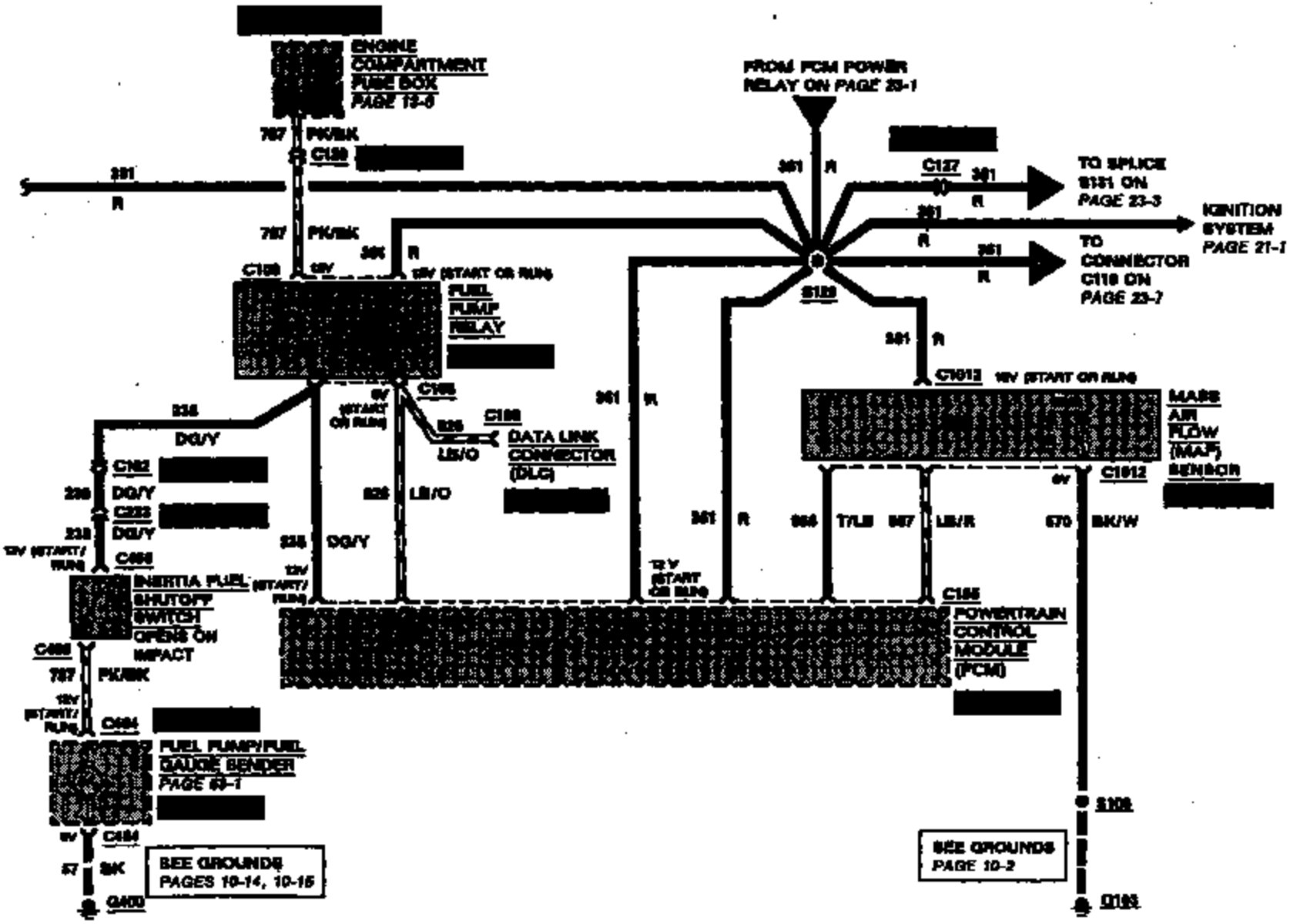


23-1 ELECTRONIC ENGINE CONTROL

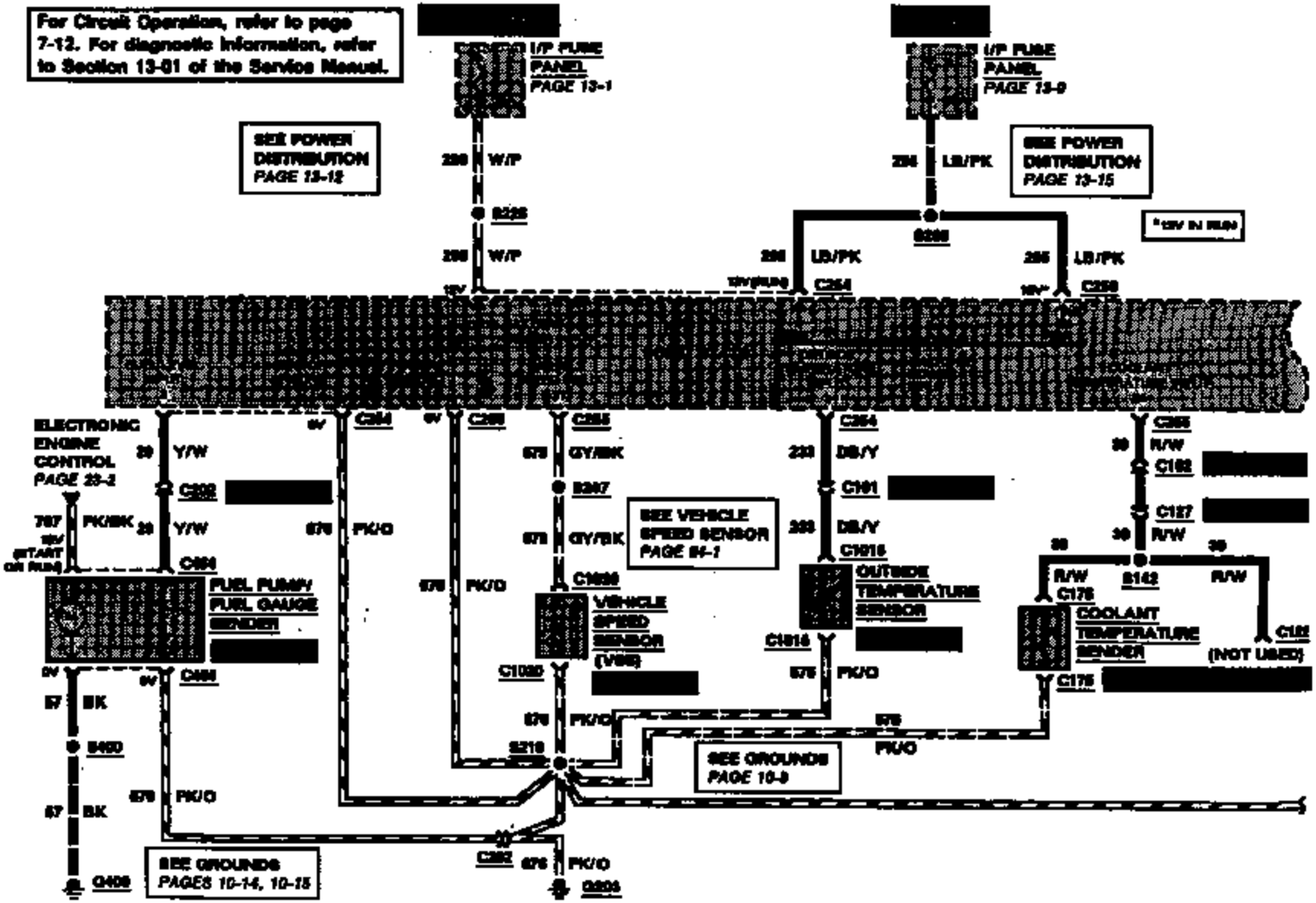
For Circuit Operation, refer to page 7-3. For diagnostic information, refer to Powertrain Control/Emissions Diagnosis Manual.



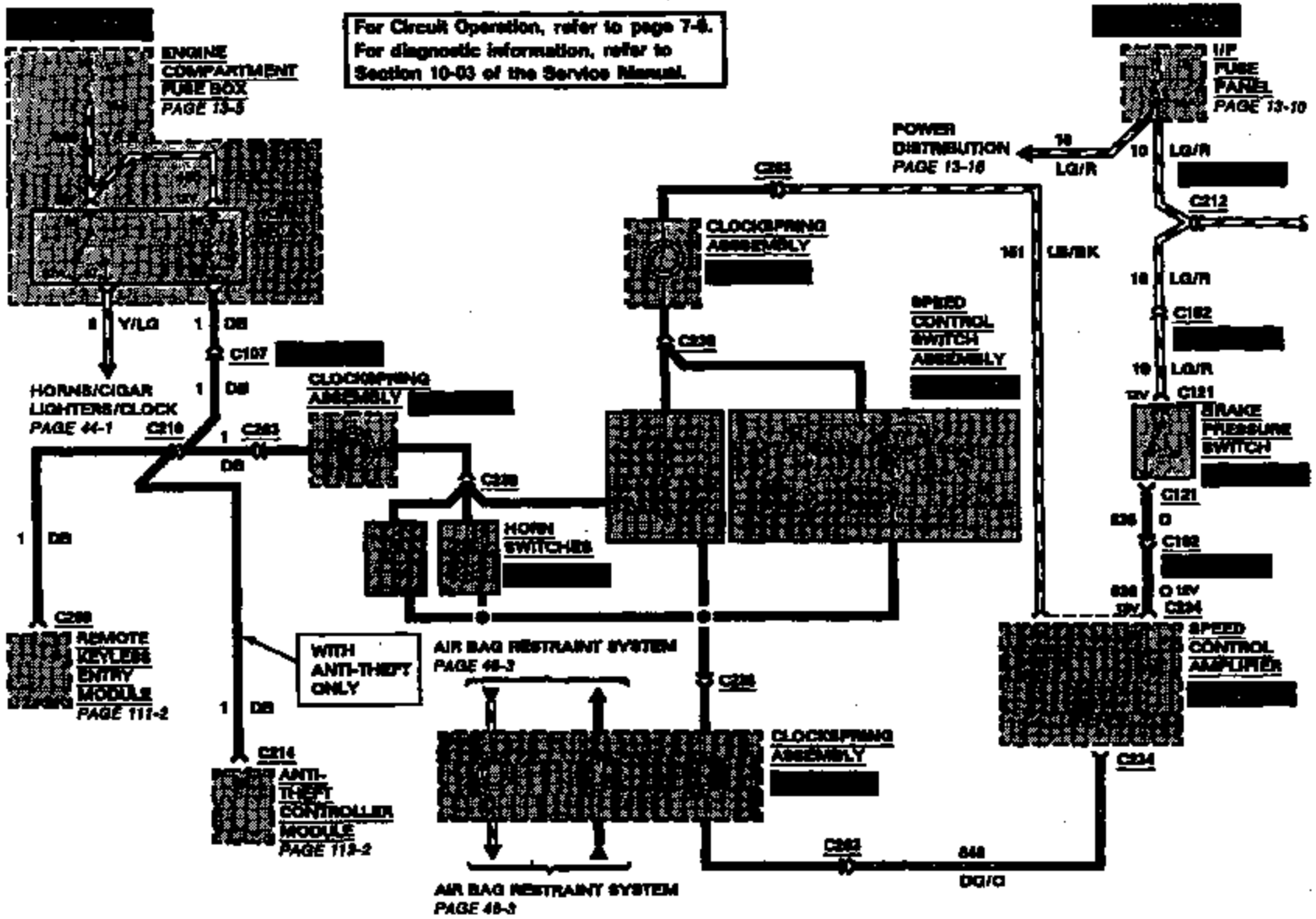

ENGINE COMPARTMENT FUSE BOX
[redacted]
37 Y
C216 [redacted]
37 Y
C210 [redacted]
WITH ANTI-THEFT
WITHOUT ANTI-THEFT
787 PK/BK
C120 [redacted]
787 PK/BK
C168
FUEL PUMP RELAY
PAGE 23-2
W/P
C209
DAYTIME RUNNING LAMPS (DRL) MODULE
PAGE 87-2
37 Y
C304
START INTERRUPT RELAY
ANTI-THEFT
PAGE 112-2
137
Y/BK
342
LG/P
C304
326 DB/O
C219 [redacted]
325 DB/O
C282
IGNITION SWITCH
PAGE 13-6
325 DB/O
C210 [redacted]
325 DB/O
C282
IGNITION SWITCH
PAGE 13-6


ENGINE COMPARTMENT FUSE BOX
PAGE 13-6
FROM PCM POWER RELAY ON PAGE 23-1
TO SPLICE S151 ON PAGE 23-3
IGNITION SYSTEM PAGE 21-1
TO CONNECTOR C118 ON PAGE 23-7
FUEL PUMP RELAY
DATA LINK CONNECTOR (DLC)
MASS AIR FLOW (MAF) SENSOR
INERTIA FUEL SHUTOFF SWITCH OPENS ON IMPACT
POWERTRAIN CONTROL MODULE (PCM)
FUEL PUMP/FUEL GAUGE SENDER
PAGE 63-1
SEE GROUNDS PAGES 10-14, 10-15
SEE GROUNDS PAGE 10-2
DG/Y
LB/O
T/LB
LB/R
BK/W
PK/BK
BK
G400
G100

63-1 INSTRUMENT CLUSTER

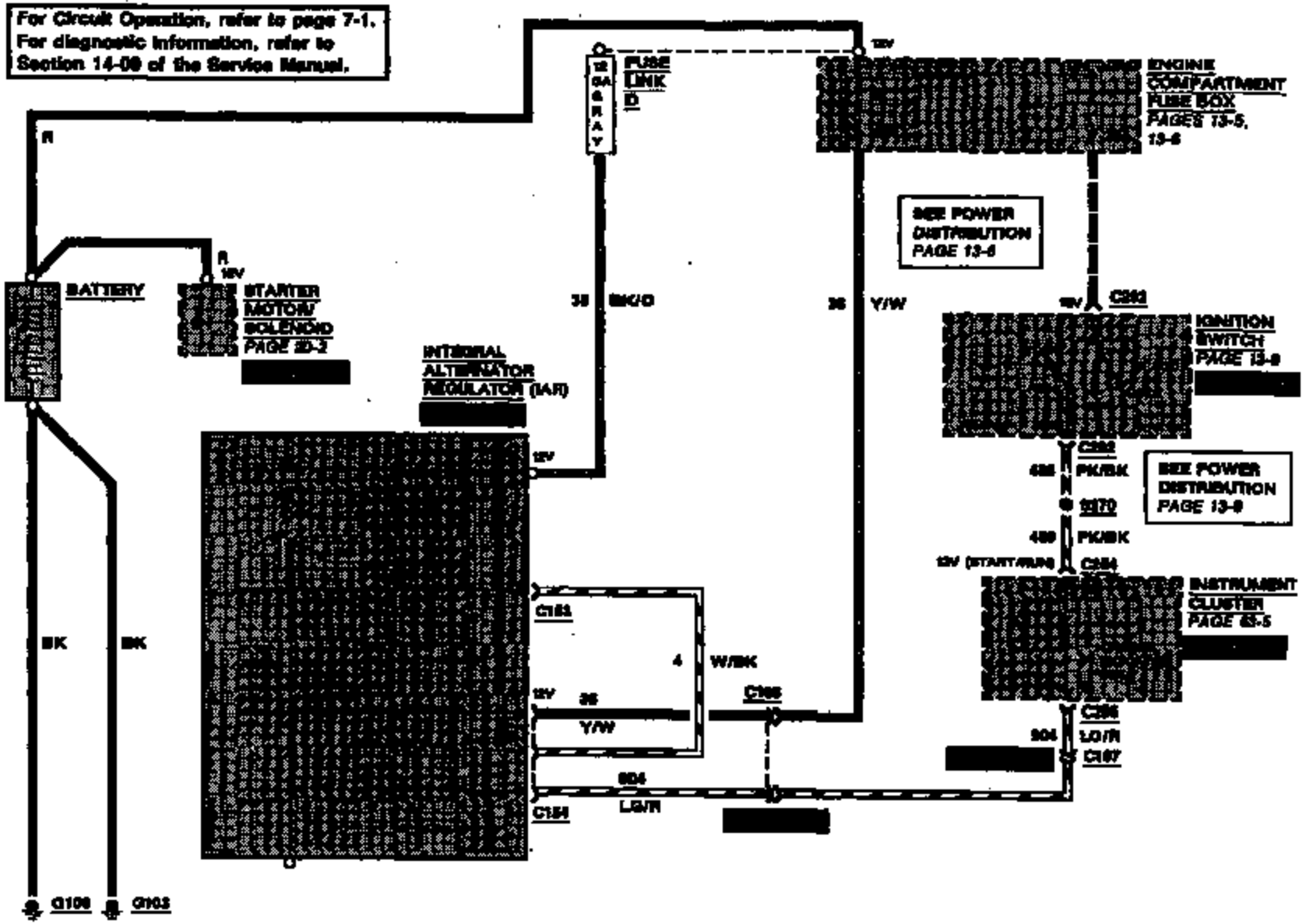


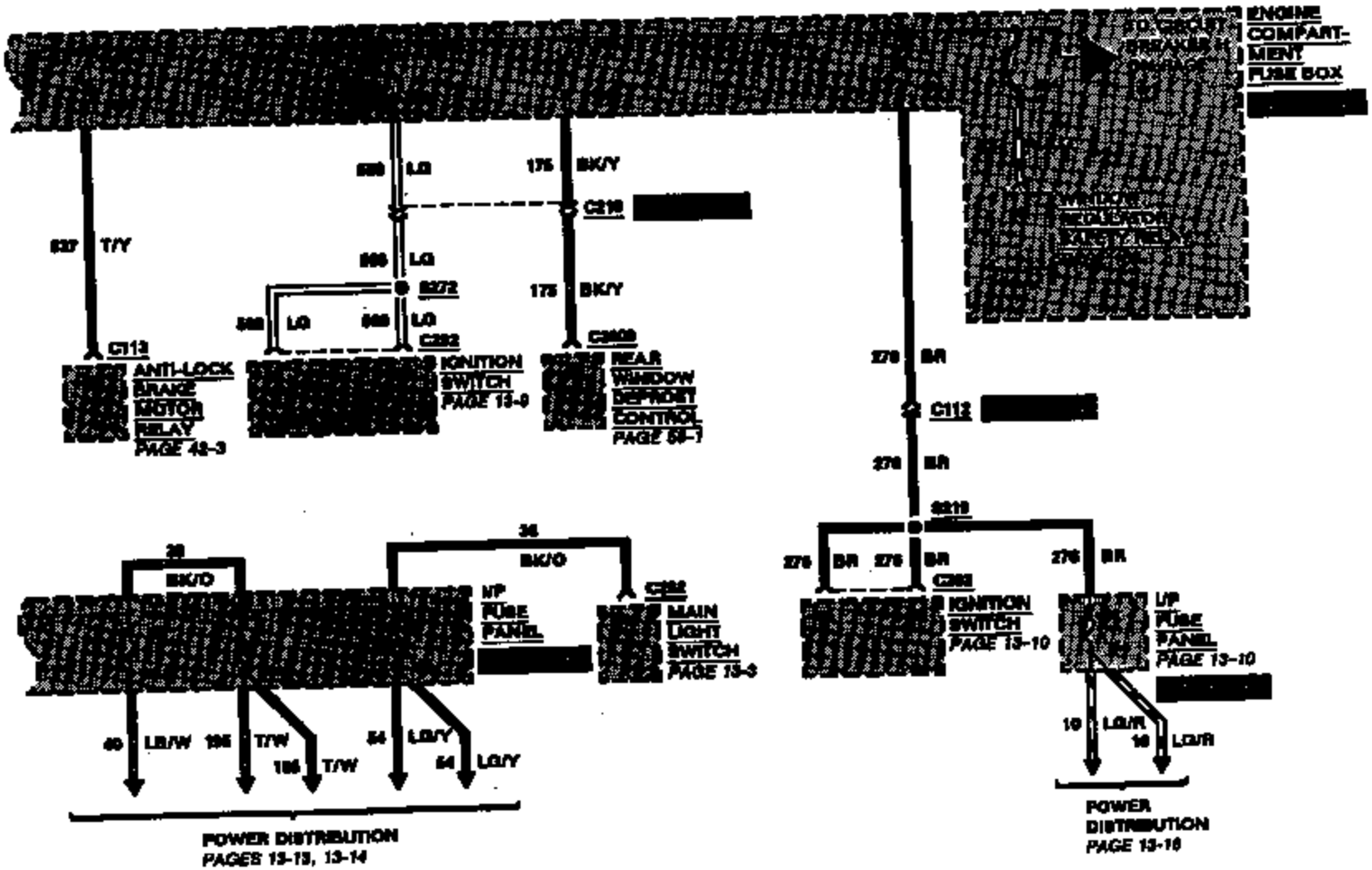
31-1 SPEED CONTROL

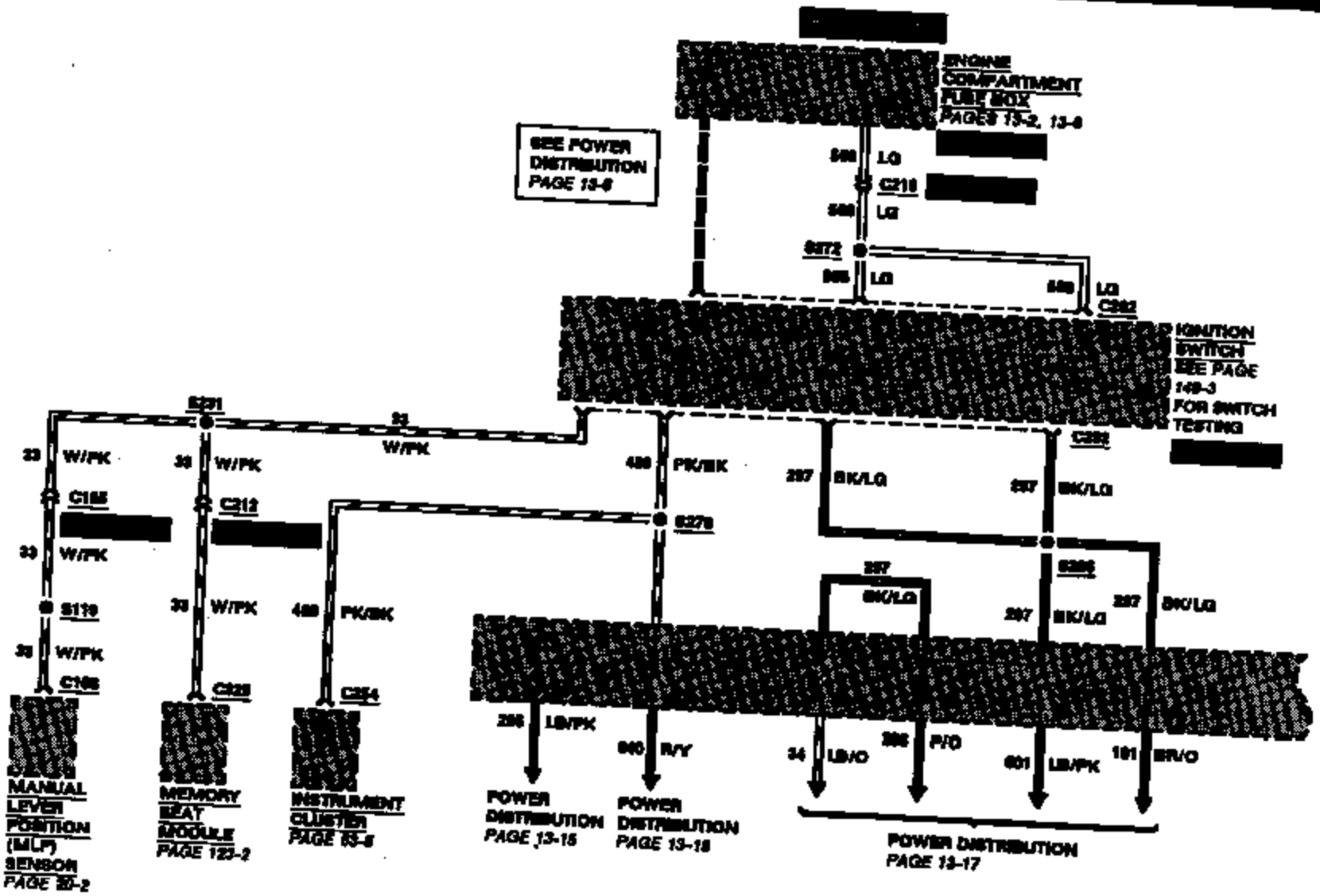


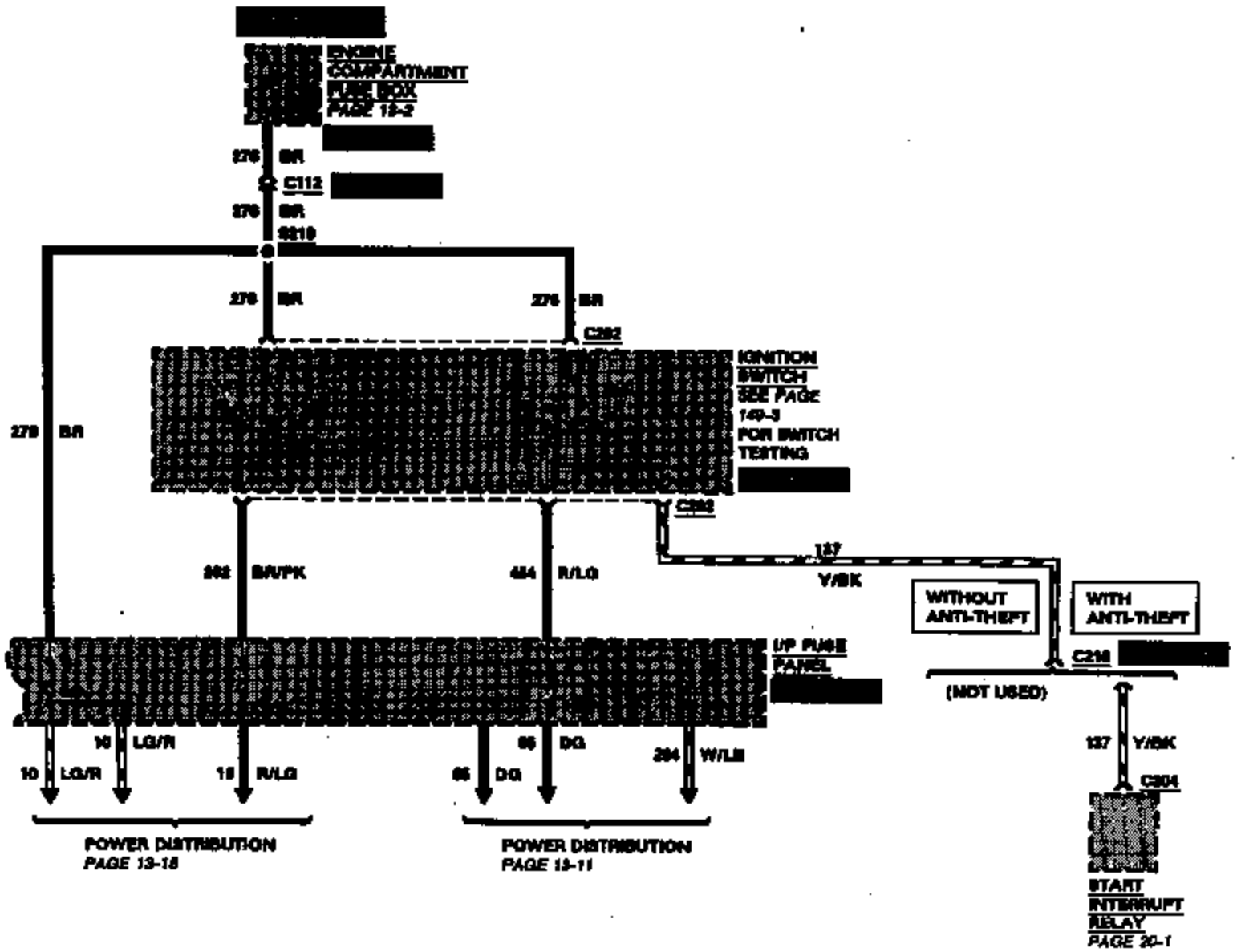
12-1 CHARGING SYSTEM

For Circuit Operation, refer to page 7-1.
For diagnostic information, refer to Section 14-09 of the Service Manual.

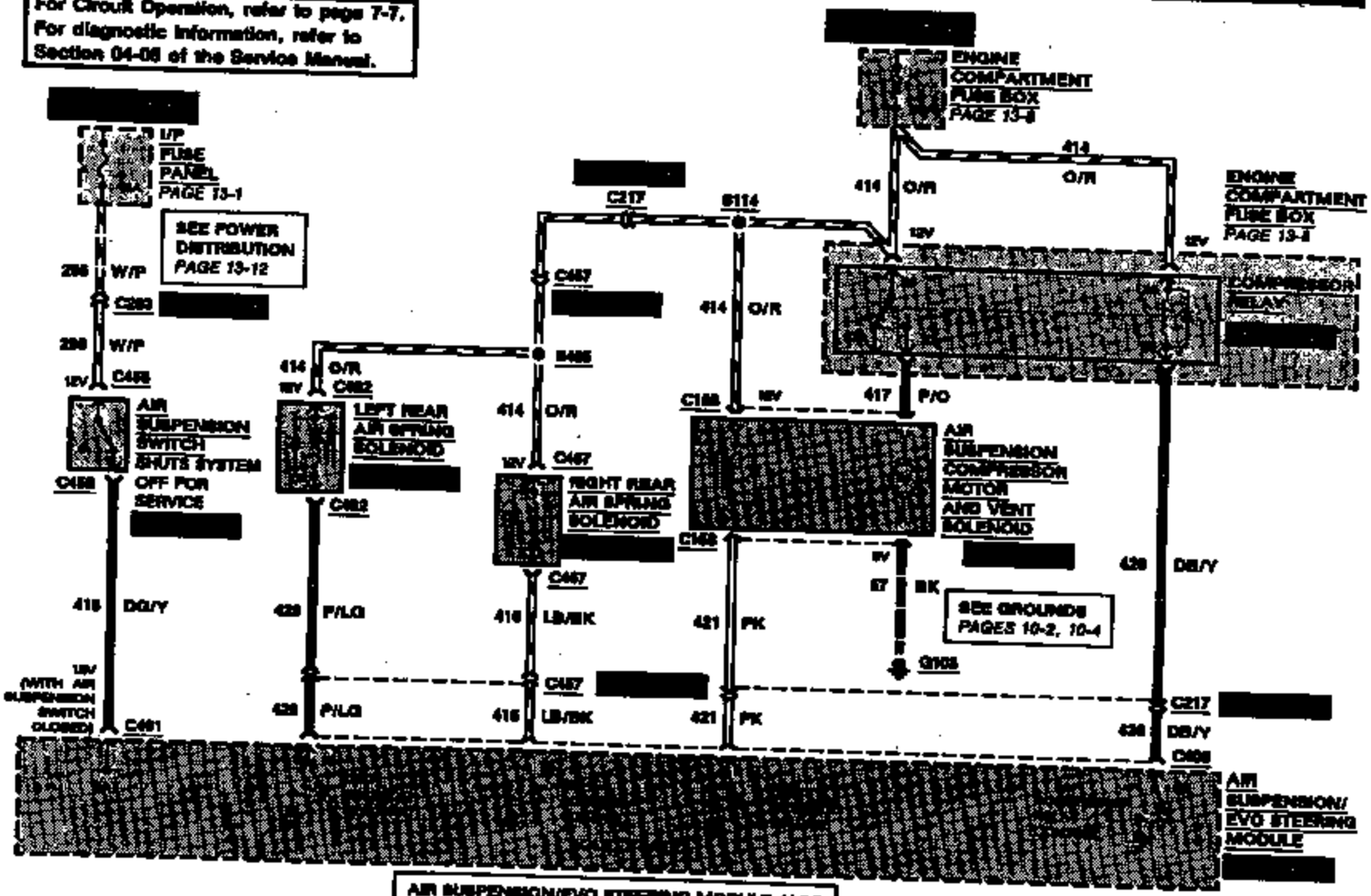



ENGINE COMPART-MENT FUSE BOX
TO CIRCUIT BREAKER
WINDOW REGULATOR FUSE PANEL
T/Y
LG
BK/Y
C210
S272
C113
ANTI-LOCK BRAKE MOTOR RELAY
PAGE 43-3
C282
IGNITION SWITCH
PAGE 13-9
C2009
REAR WINDOW DEFROST CONTROL
PAGE 55-1
BR
C112
S219
C283
IGNITION SWITCH
PAGE 13-10
I/P FUSE PANEL
PAGE 13-10
BK/O
I/P FUSE PANEL
C284
MAIN LIGHT SWITCH
PAGE 13-3
LB/W
T/W
LG/Y
LG/R
POWER DISTRIBUTION
PAGES 13-13, 13-14
POWER DISTRIBUTION
PAGE 13-16

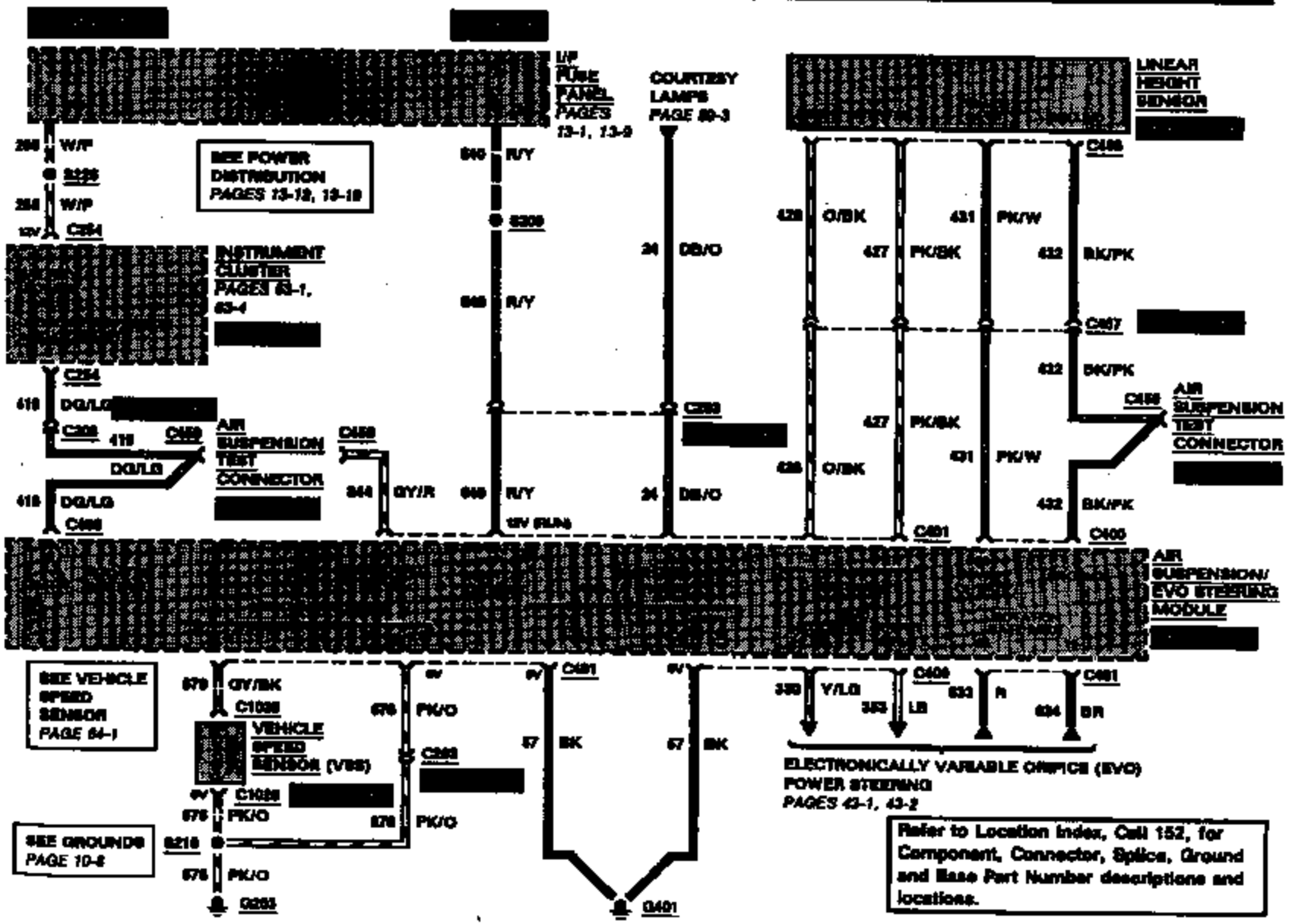

ENGINE COMPARTMENT FUSE BOX
PAGES 13-2, 13-4
SEE POWER DISTRIBUTION PAGE 13-4
LG
C218
LG
S272
LG
LG
C262
IGNITION SWITCH SEE PAGE 149-3 FOR SWITCH TESTING
S231
33 W/PK
W/PK
33 W/PK
C186
C212
33 W/PK
S119
33 W/PK
C168
33 W/PK
PK/BK
S278
BK/LG
BK/LG
C288
S286
BK/LG
BK/LG
BK/LG
MANUAL LEVER POSITION (MLP) SENSOR
PAGE 30-2
MEMORY SEAT MODULE
PAGE 123-2
INSTRUMENT CLUSTER
PAGE 55-6
LB/PK
R/Y
LB/O
P/O
LB/PK
BR/O
POWER DISTRIBUTION
PAGE 13-15
POWER DISTRIBUTION
PAGE 13-16
POWER DISTRIBUTION
PAGE 13-17


ENGINE COMPARTMENT FUSE BOX
PAGE 13-2
276 BR
C112
276 BR
S219
276 BR
276 BR
C282
IGNITION SWITCH
SEE PAGE 14-3 FOR SWITCH TESTING
279 BR
C282
137 Y/BK
WITHOUT ANTI-THEFT
WITH ANTI-THEFT
C216
(NOT USED)
I/P FUSE PANEL
10 LG/R
10 LG/R
15 R/LG
65 DG
65 DG
294 W/LB
137 Y/BK
C304
POWER DISTRIBUTION
PAGE 13-18
POWER DISTRIBUTION
PAGE 13-11
START INTERRUPT RELAY
PAGE 20-1

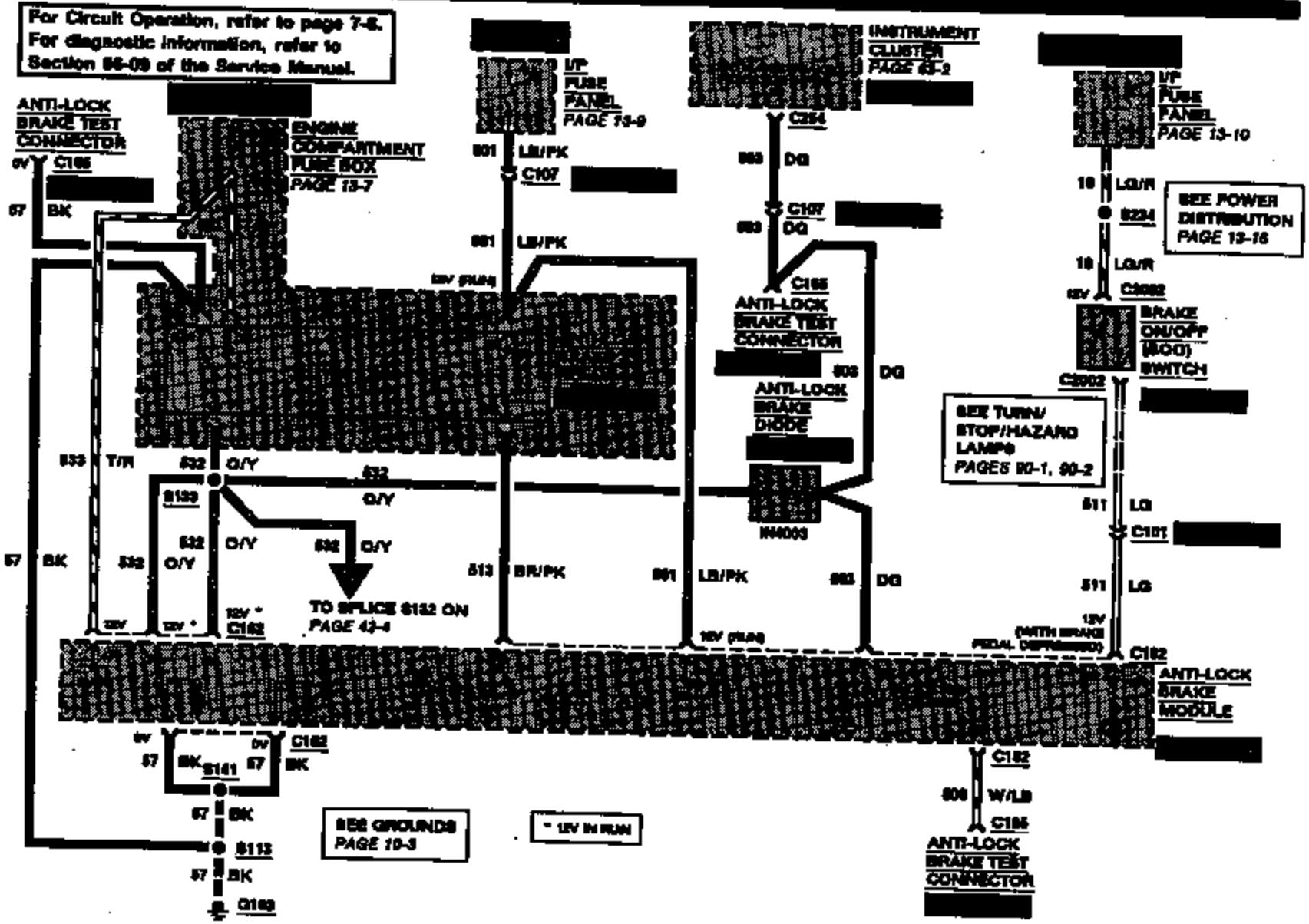
For Circuit Operation, refer to page 7-7.
For diagnostic information, refer to Section 04-06 of the Service Manual.

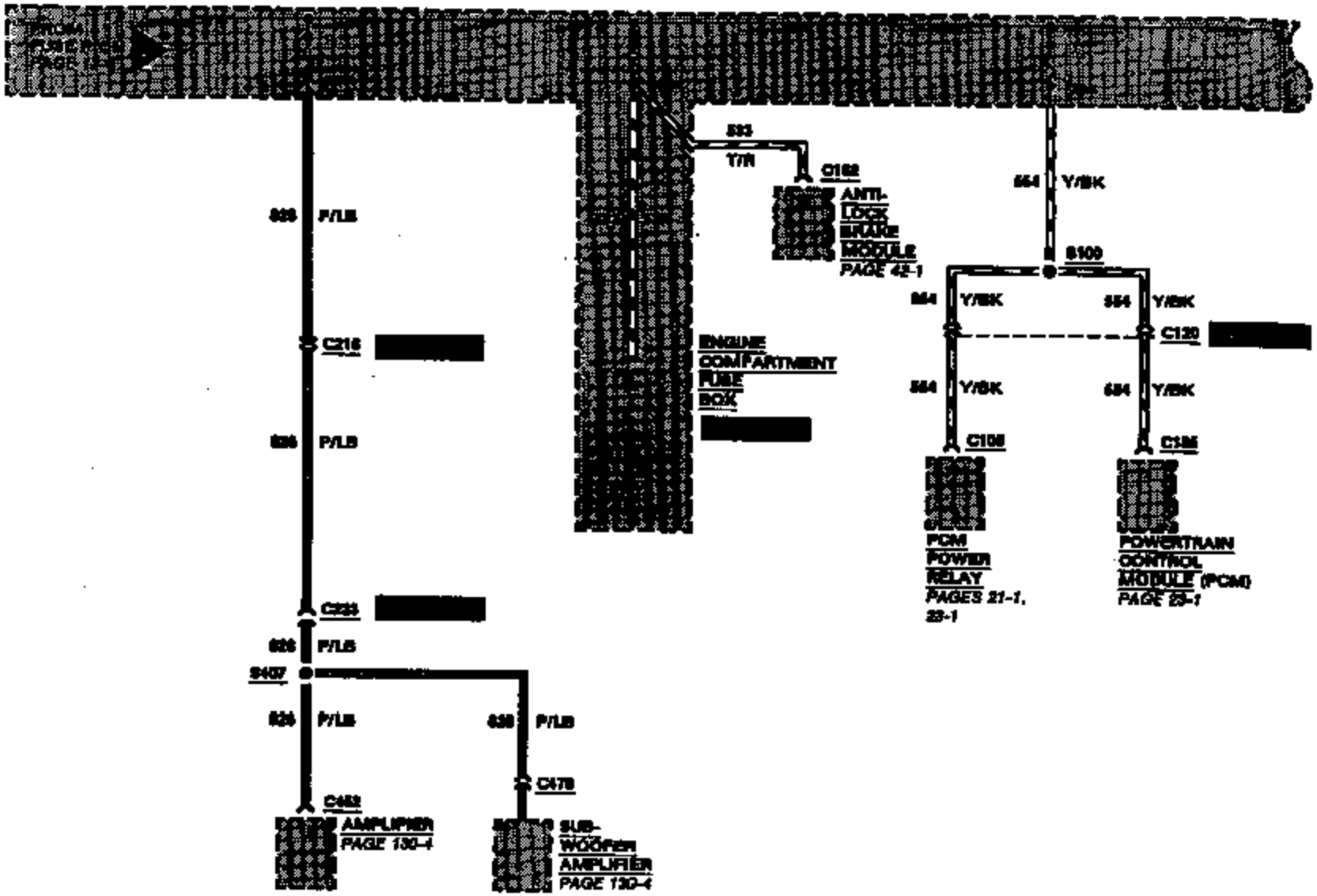


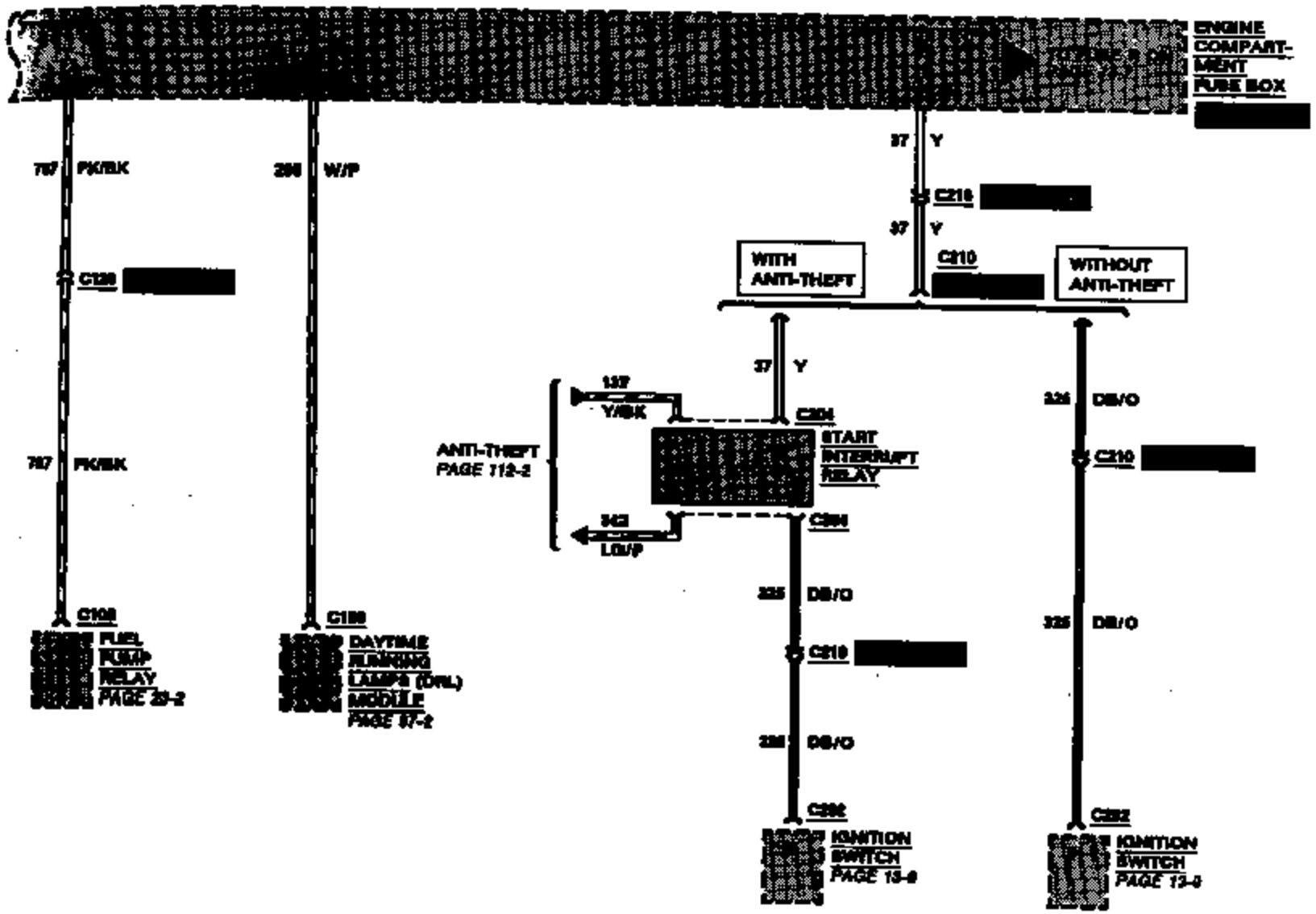
AIR SUSPENSION/EVO STEERING MODULE ALSO CONTROLS ELECTRONICALLY VARIABLE ORIFICE (EVO) POWER STEERING. SEE PAGE 43-1.

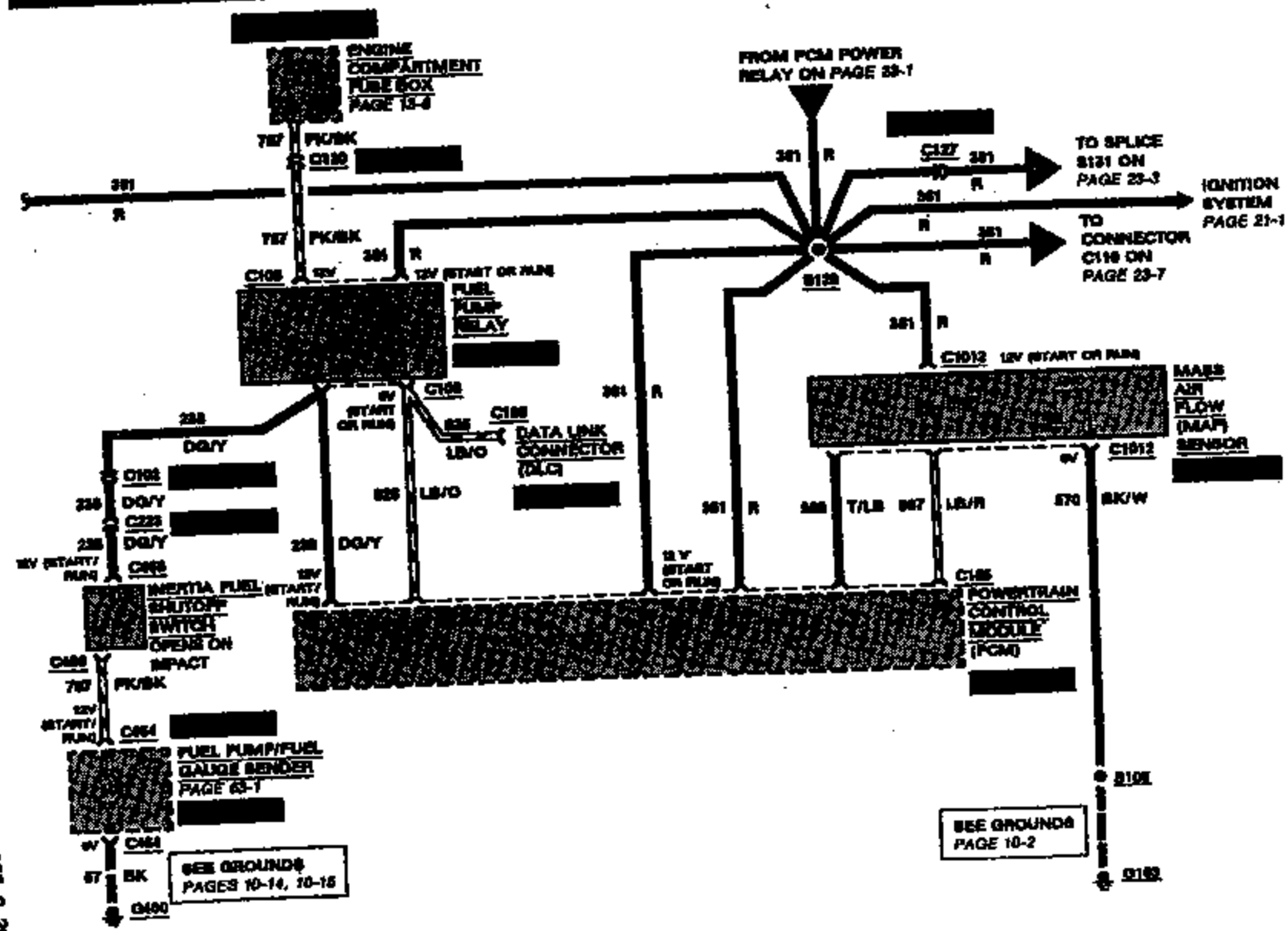

[redacted]
[redacted]
I/P FUSE PANEL PAGES 13-1, 13-9
COURTESY LAMPS PAGE 89-3
LINEAR HEIGHT SENSOR
[redacted]
SEE POWER DISTRIBUTION PAGES 13-12, 13-19
INSTRUMENT CLUSTER PAGES 63-1, 63-4
[redacted]
AIR SUSPENSION TEST CONNECTOR
[redacted]
AIR SUSPENSION TEST CONNECTOR
[redacted]
AIR SUSPENSION/ EVO STEERING MODULE
[redacted]
SEE VEHICLE SPEED SENSOR PAGE 64-1
VEHICLE SPEED SENSOR (VSS)
[redacted]
SEE GROUNDS PAGE 10-6
ELECTRONICALLY VARIABLE ORIFICE (EVO) POWER STEERING PAGES 43-1, 43-2
Refer to Location Index, Call 152, for Component, Connector, Splice, Ground and Base Part Number descriptions and locations.

42-1 ANTI-LOCK BRAKE SYSTEM (WITH OR WITHOUT TRACTION ASSIST)

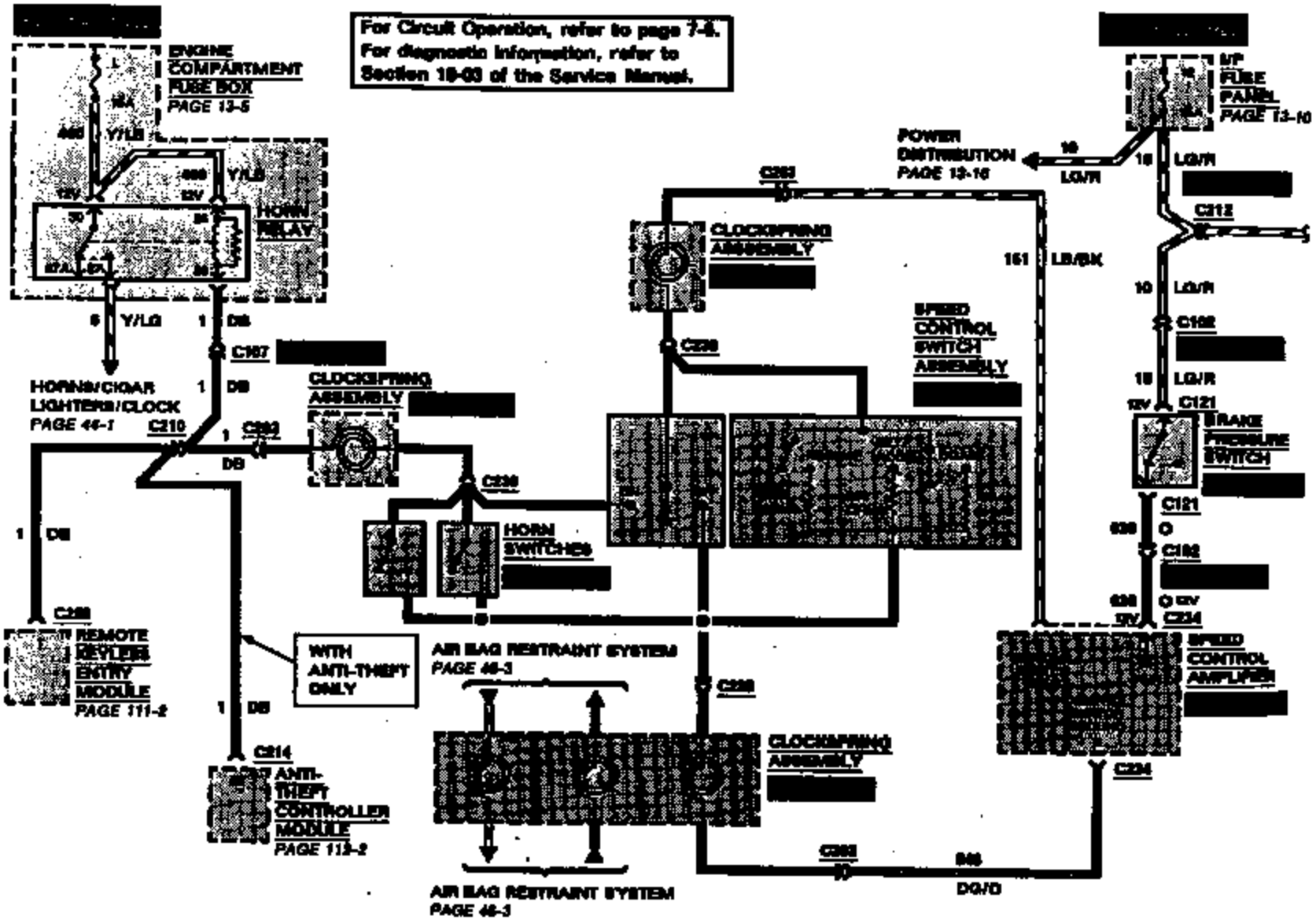



P/LB
C216
P/LB
C233
P/LB
S407
P/LB
P/LB
C452
AMPLIFIER
PAGE 130-4
C478
SUB-WOOFER AMPLIFIER
PAGE 130-4
T/R
C162
ANTI-LOCK BRAKE MODULE
PAGE 42-1
ENGINE COMPARTMENT FUSE BOX
Y/BK
S100
Y/BK
Y/BK
C120
Y/BK
Y/BK
C108
PCM POWER RELAY
PAGES 21-1, 23-1
C136
POWERTRAIN CONTROL MODULE (PCM)
PAGE 23-1

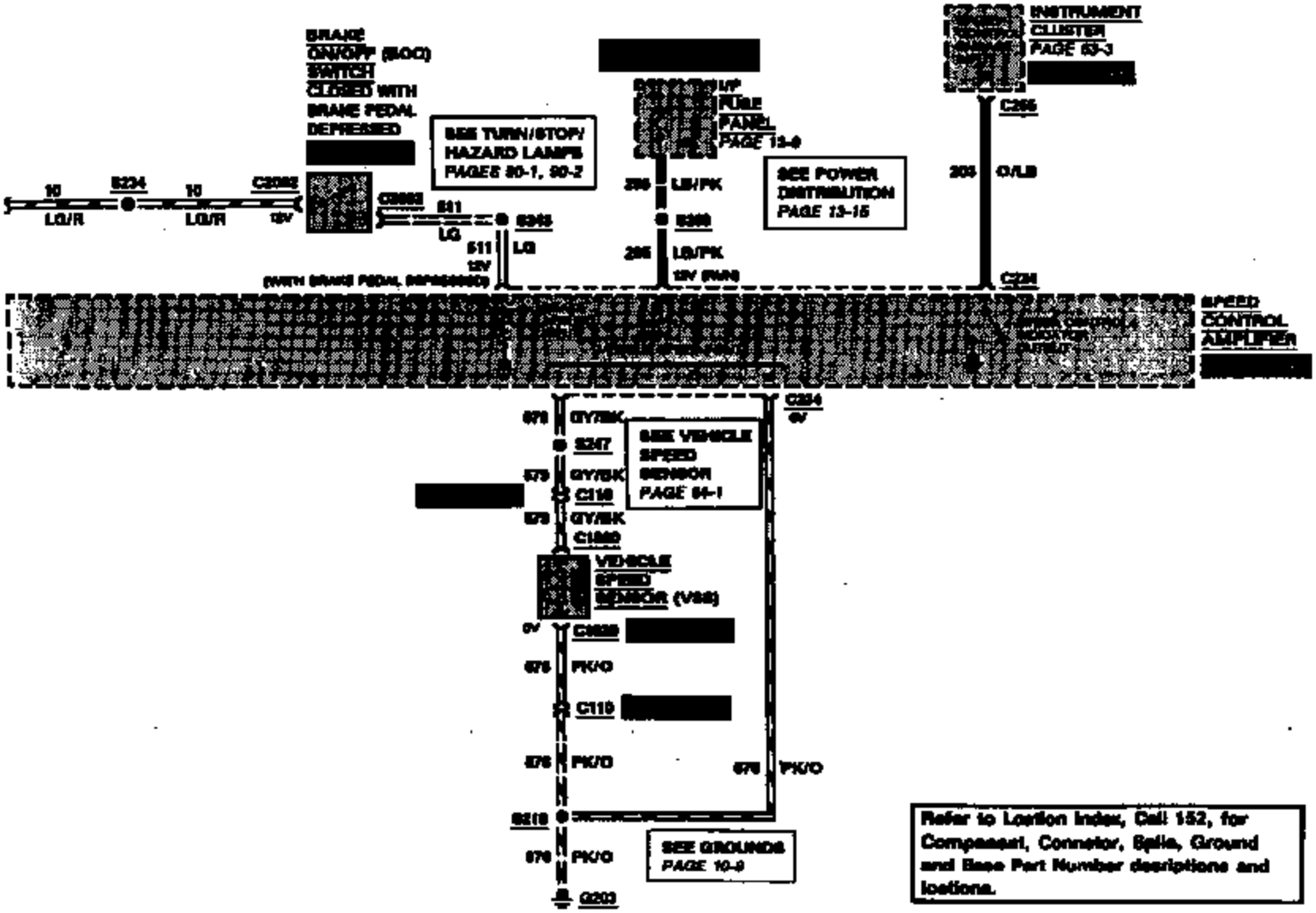

ENGINE COMPART-MENT FUSE BOX
[redacted]
37 Y
C216 [redacted]
37 Y
C210 [redacted]
WITH ANTI-THEFT
WITHOUT ANTI-THEFT
787 PK/BK
C120 [redacted]
787 PK/BK
C108
FUEL PUMP RELAY
PAGE 39-2
298 W/P
C199
DAYTIME RUNNING LAMPS (DRL) MODULE
PAGE 87-2
37 Y
137 Y/BK
C204
START INTERRUPT RELAY
ANTI-THEFT PAGE 112-2
343 LG/P
C204
325 DB/O
C210 [redacted]
325 DB/O
C210 [redacted]
325 DB/O
C282
IGNITION SWITCH
PAGE 13-8
325 DB/O
C282
IGNITION SWITCH
PAGE 13-8


ENGINE COMPARTMENT FUSE BOX PAGE 13-4
FROM PCM POWER RELAY ON PAGE 23-1
TO SPLICE S131 ON PAGE 23-3
IGNITION SYSTEM PAGE 21-1
TO CONNECTOR C116 ON PAGE 23-7
FUEL PUMP RELAY
DATA LINK CONNECTOR (DLC)
MASS AIR FLOW (MAF) SENSOR
INERTIA FUEL SHUTOFF SWITCH OPENS ON IMPACT
POWERTRAIN CONTROL MODULE (PCM)
FUEL PUMP/FUEL GAUGE SENDER PAGE 63-1
SEE GROUNDS PAGES 10-14, 10-15
SEE GROUNDS PAGE 10-2

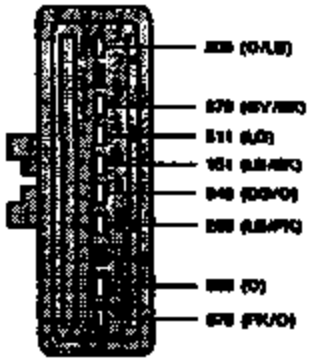
31-1 SPEED CONTROL



PRODUCED BY FORD



PRODUCED BY FORD



C234

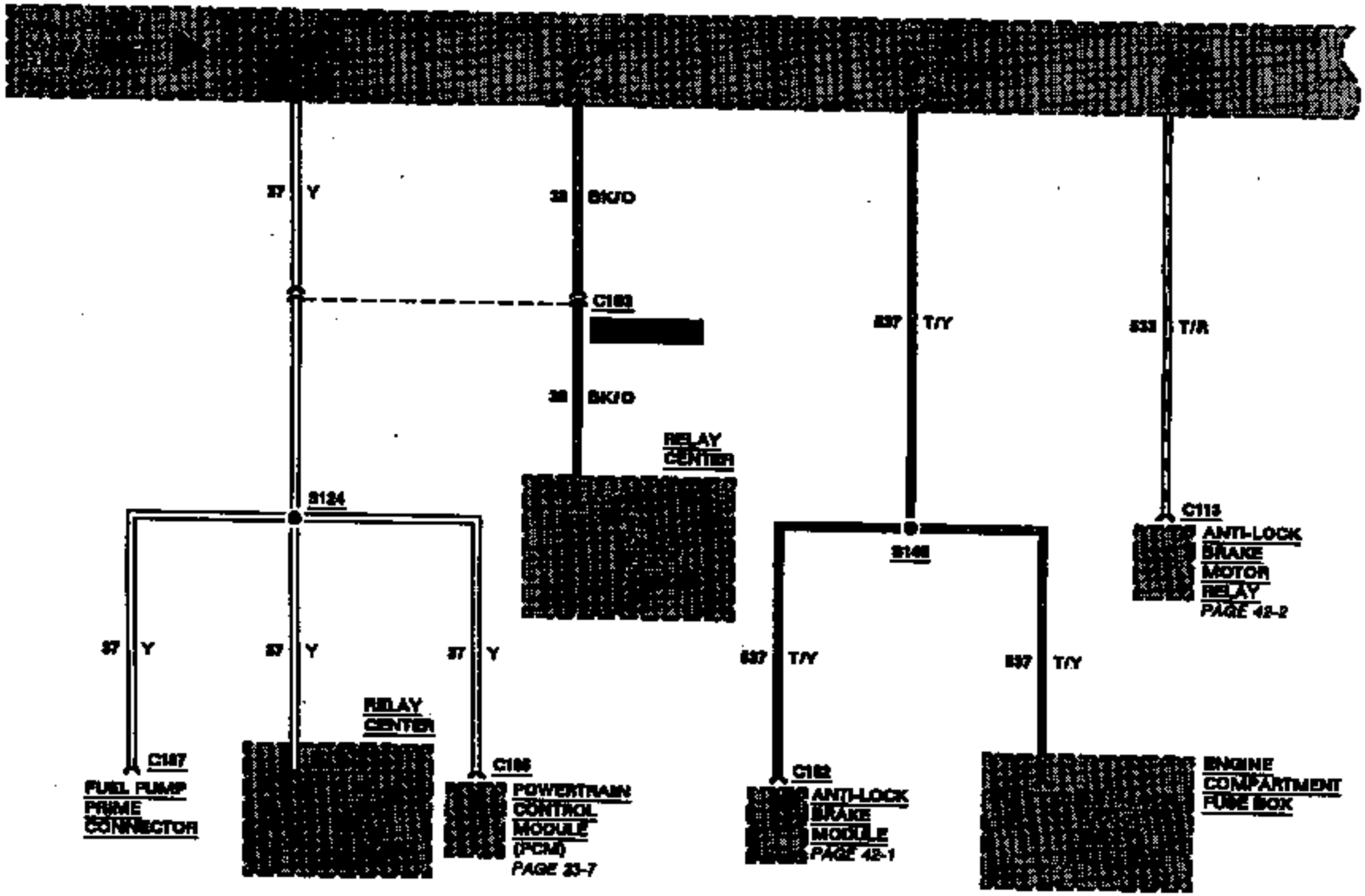
SPEED CONTROL AMPLIFIER

PIN NUMBER	CIRCUIT	CIRCUIT FUNCTION
1	203 (O/LB)	Speed Control Indicator Lamp Output
2	—	NOT USED
3	679 (GY/BK)	Vehicle Speed Signal Input
4	511 (LG)	Brake On/Off (BOO) Switch Output
5	151 (LB/BK)	Speed Control Switch Input
6	549 (DG/O)	Speed Control Switch Ground
7	295 (LB/PK)	Hot in RUN
8	—	NOT USED
9	636 (O)	Brake Pressure Switch Output
10	678 (PK/O)	Ground

CONNECTOR REFERENCE LIST

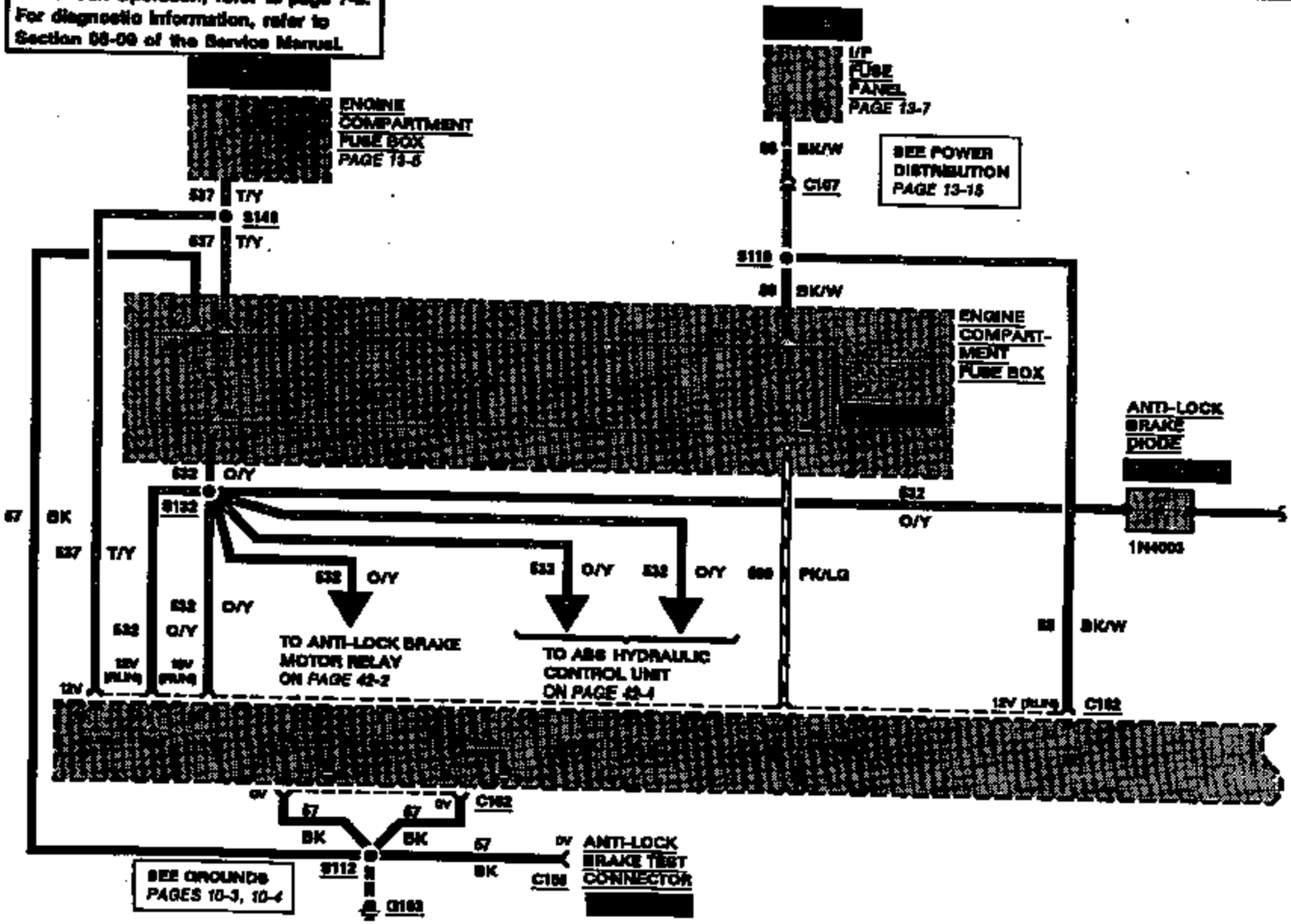
CONNECTOR	SECTION
C214	112
C255	63
C259	111

PRODUCED BY FORD


37 Y
38 BK/O
C163
38 BK/O
RELAY CENTER
S124
37 Y
37 Y
37 Y
RELAY CENTER
C147
FUEL PUMP PRIME CONNECTOR
C186
POWERTRAIN CONTROL MODULE (PCM)
PAGE 23-7
S37 T/Y
S148
S37 T/Y
S37 T/Y
C162
ANTI-LOCK BRAKE MODULE
PAGE 42-1
ENGINE COMPARTMENT FUSE BOX
S33 T/R
C113
ANTI-LOCK BRAKE MOTOR RELAY
PAGE 42-2

42-1 ANTI-LOCK BRAKE SYSTEM WITH TRACTION ASSIST

For Circuit Operation, refer to page 7-9.
For diagnostic information, refer to Section 08-09 of the Service Manual.



EW2-025-A 20178

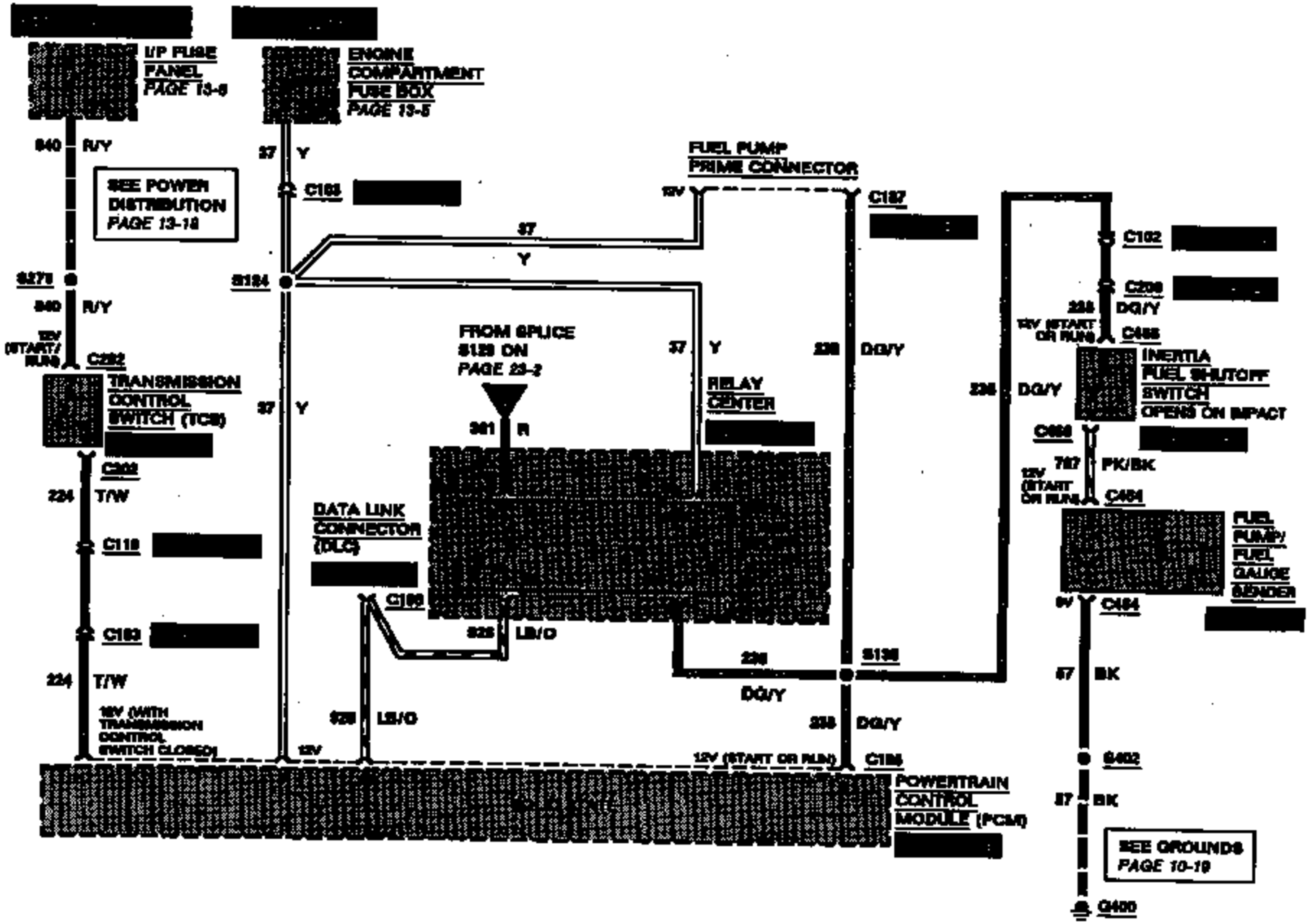
the schematic depicting circuit number 554 installed in
1993 Grand Marquis vehicles

No circuit 554 installed on 1993 Grand Marquis vehicles

the schematic depicting circuit number 787 installed in
1993 Grand Marquis vehicles

EVTM pages:

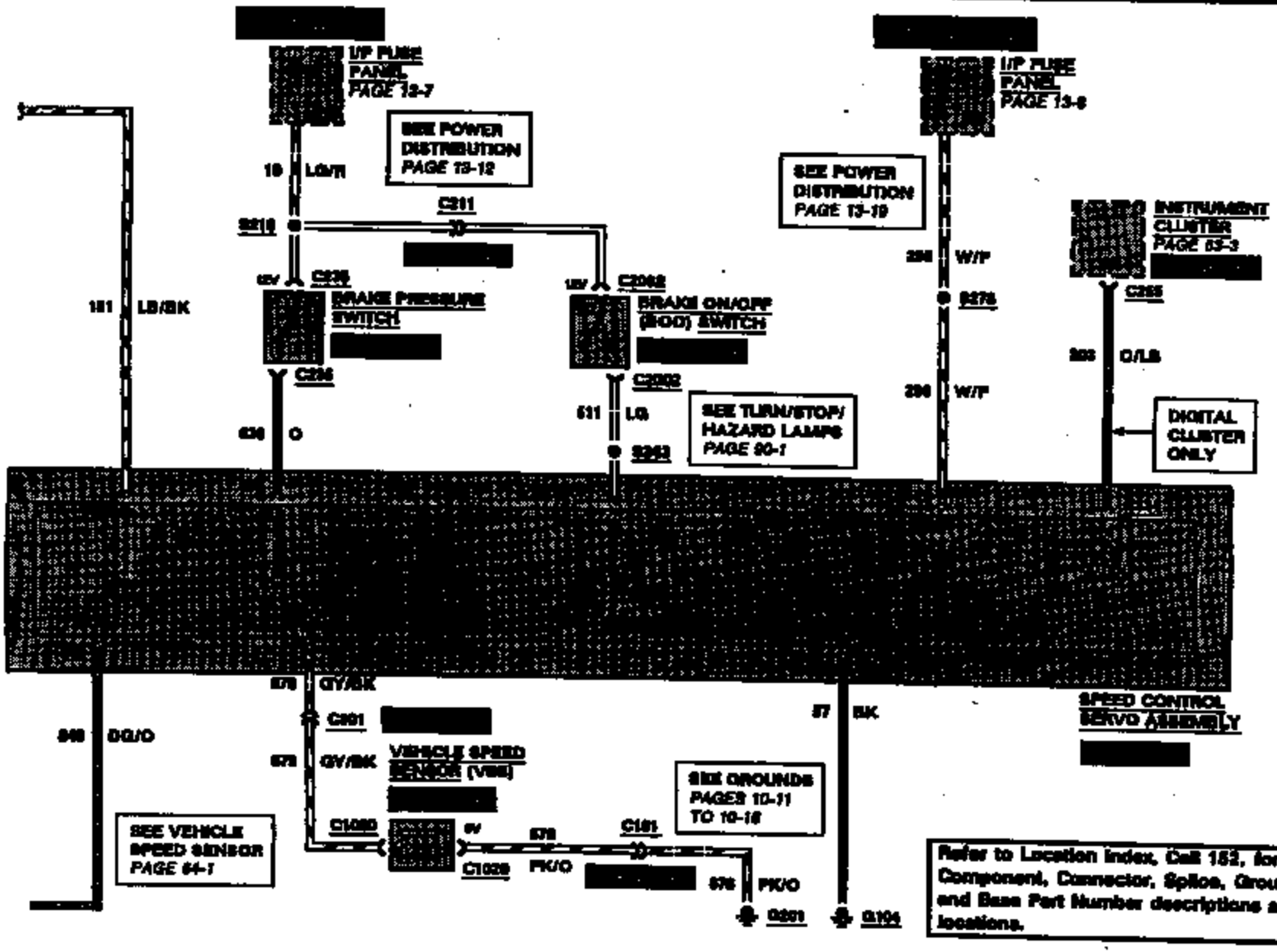
23-7 Electronic Engine Control


I/P FUSE PANEL
PAGE 13-6
ENGINE COMPARTMENT FUSE BOX
PAGE 13-5
840 R/Y
37 Y
SEE POWER DISTRIBUTION
PAGE 13-18
C165
FUEL PUMP PRIME CONNECTOR
12V
C187
37
Y
S278
S124
840 R/Y
12V (START/RUN)
C282
TRANSMISSION CONTROL SWITCH (TCS)
37 Y
FROM SPLICE S128 ON
PAGE 23-2
37 Y
238 DG/Y
RELAY CENTER
361 R
C102
C208
238 DG/Y
12V (START OR RUN)
C466
INERTIA FUEL SHUTOFF SWITCH
OPENS ON IMPACT
236 DG/Y
C468
767 PK/BK
12V (START OR RUN)
C464
FUEL PUMP/FUEL GAUGE SENDER
224 T/W
C118
DATA LINK CONNECTOR (DLC)
C189
C183
224 T/W
12V (WITH TRANSMISSION CONTROL SWITCH CLOSED)
12V
928 LB/O
928 LB/O
238
S136
DG/Y
238 DG/Y
12V (START OR RUN)
C186
POWERTRAIN CONTROL MODULE (PCM)
9V
C464
57 BK
G402
57 BK
SEE GROUNDS
PAGE 10-19
G400

the schematic depicting circuit I/P fuse panel to the brake pressure switch installed in 1993 Grand Marquis vehicles

EVTM page:

31-2 Speed Control

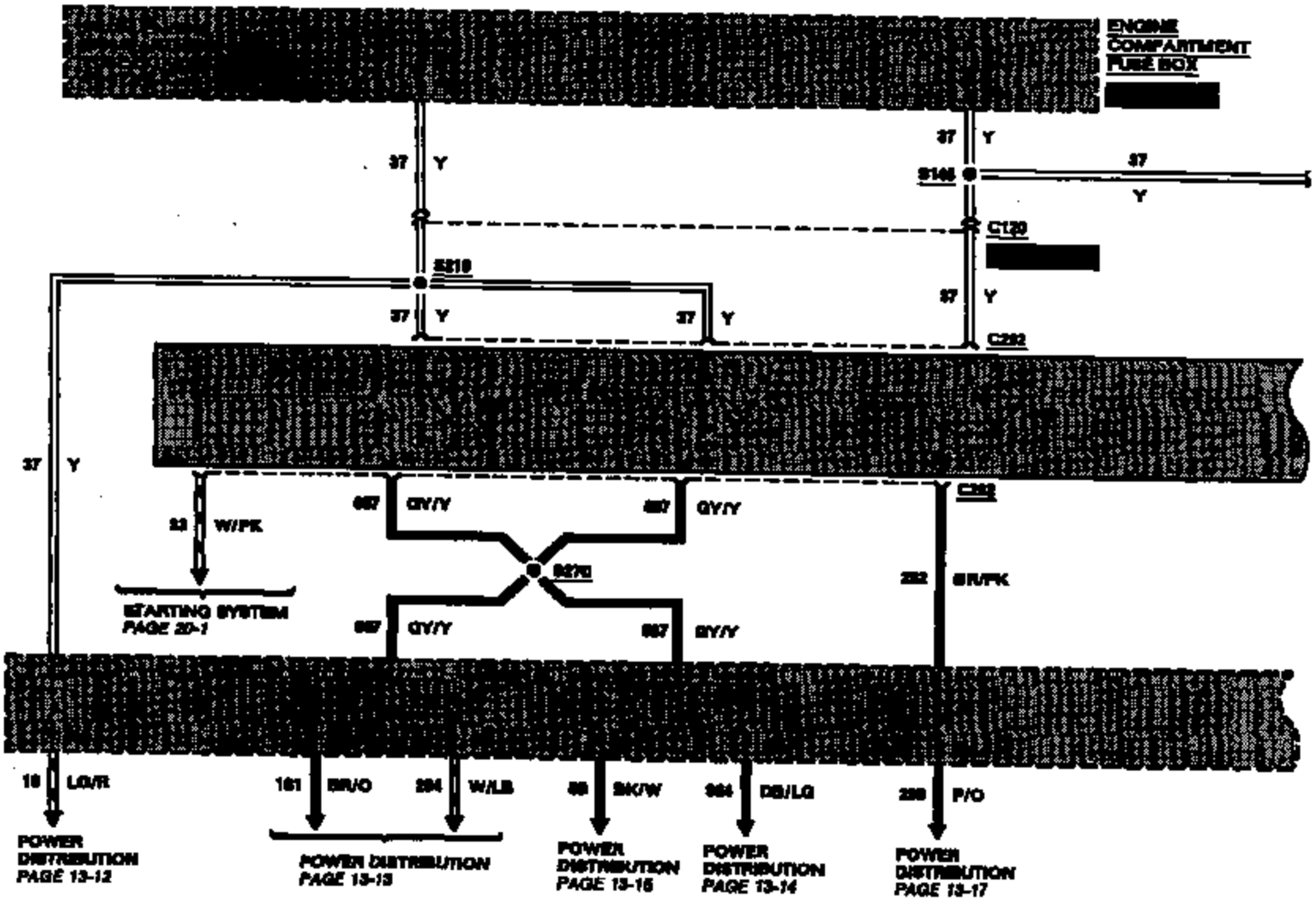

I/P FUSE PANEL PAGE 13-7
SEE POWER DISTRIBUTION PAGE 13-12
19 LG/R
C211
S210
12V C236
BRAKE PRESSURE SWITCH
C236
181 LB/BK
12V C2062
BRAKE ON/OFF (BOO) SWITCH
C2062
511 LG
S243
SEE TURN/STOP/ HAZARD LAMPS PAGE 30-1
I/P FUSE PANEL PAGE 13-8
SEE POWER DISTRIBUTION PAGE 13-19
296 W/P
S276
296 W/P
INSTRUMENT CLUSTER PAGE 53-3
C265
303 O/LB
DIGITAL CLUSTER ONLY
SPEED CONTROL SERVO ASSEMBLY
GY/BK
C201
GY/BK
VEHICLE SPEED SENSOR (VSS)
C1020
C1020
PK/O
C101
PK/O
G201
G104
87 BK
SEE GROUNDS PAGES 10-11 TO 10-18
SEE VEHICLE SPEED SENSOR PAGE 64-1
Refer to Location Index, Cell 152, for Component, Connector, Splice, Ground and Base Part Number descriptions and locations.

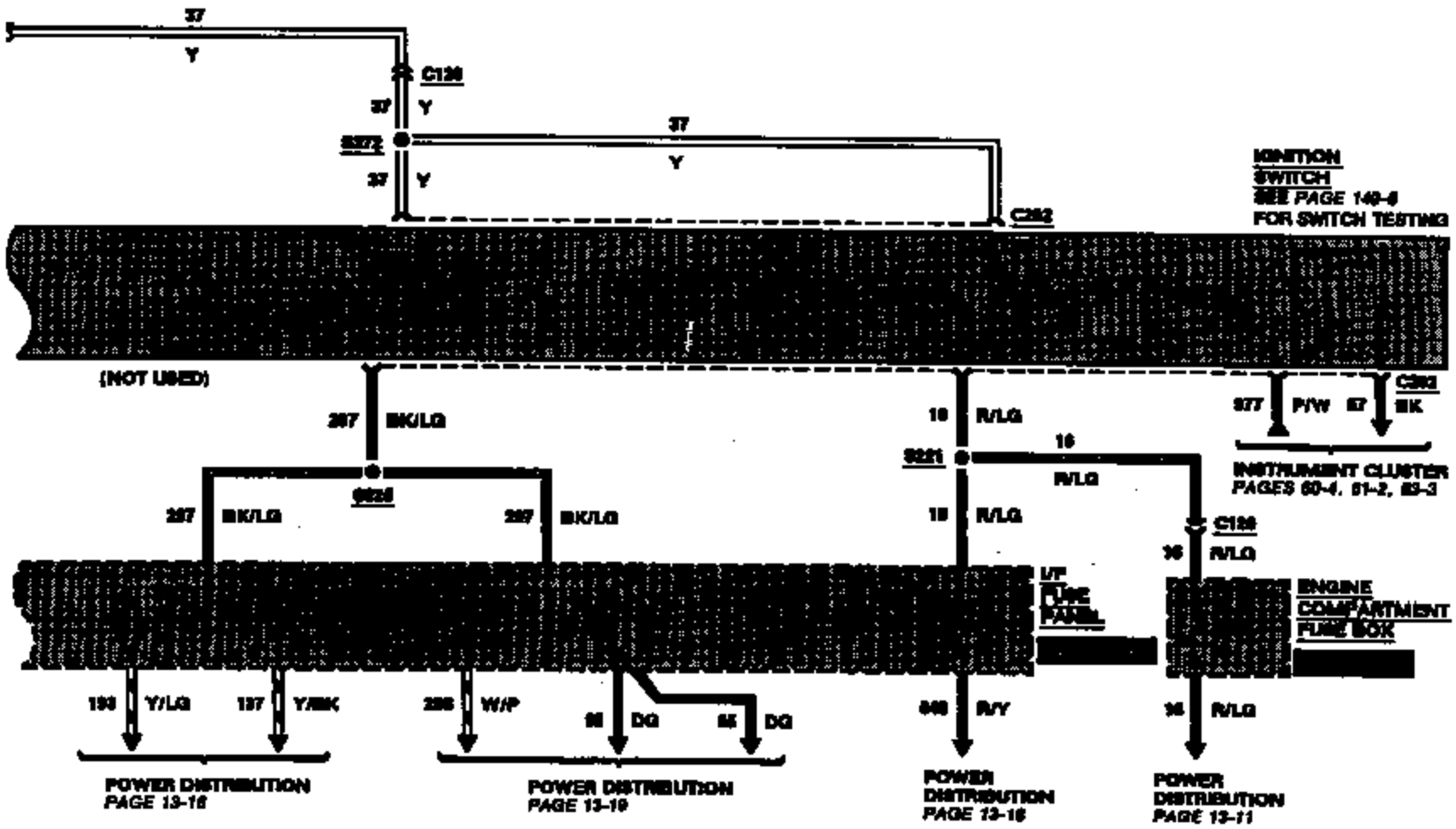
the schematic depicting circuit PDB to the ignition switch installed in 1993 Grand Marquis vehicles

EVTM pages:

13-7 Power Distribution
13-8 Power Distribution

13-7 POWER DISTRIBUTION



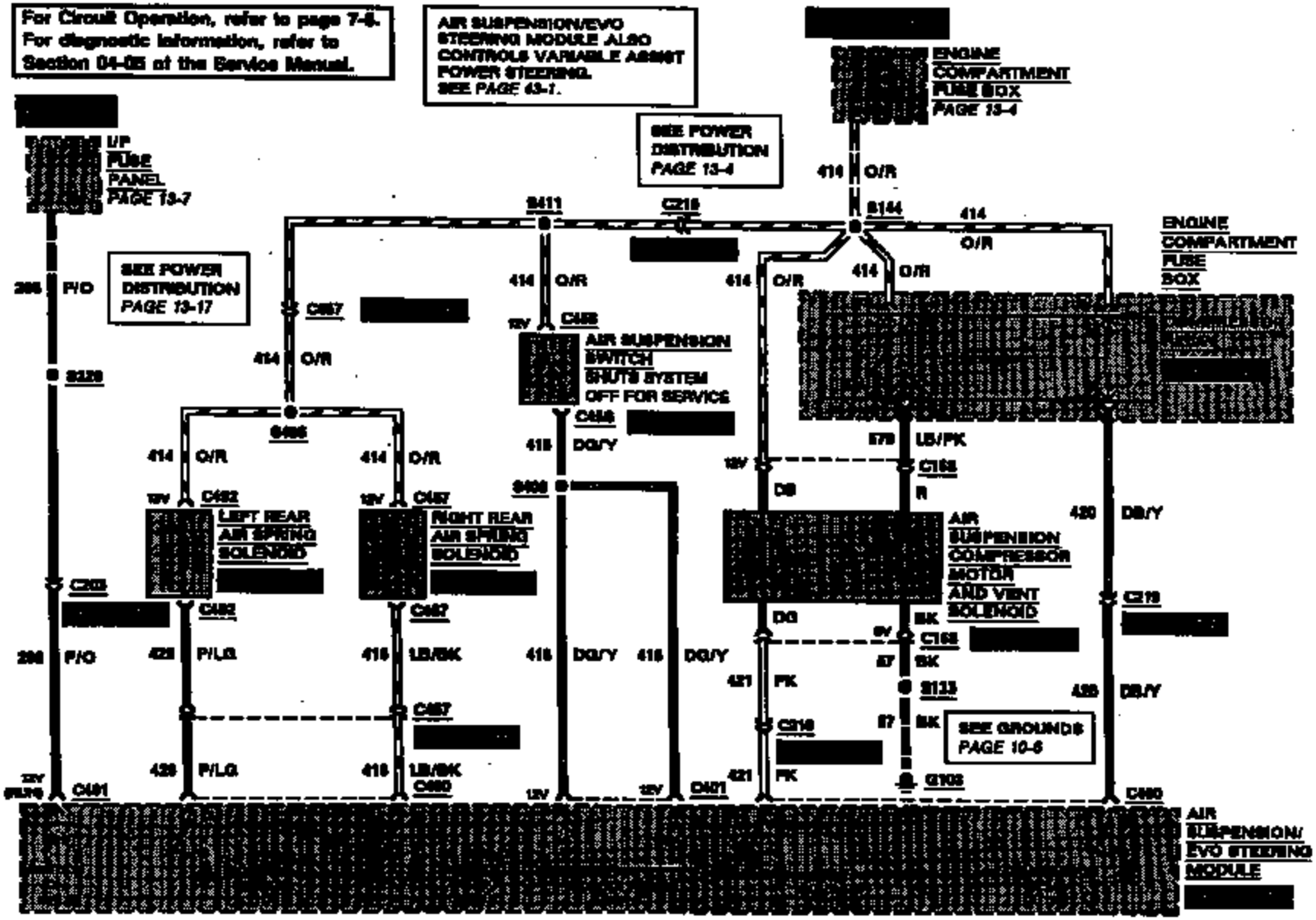

37
Y
C126
37
Y
S272
37
Y
37
Y
C262
IGNITION SWITCH
SEE PAGE 14B-8
FOR SWITCH TESTING
(NOT USED)
287
BK/LG
S226
287
BK/LG
287
BK/LG
18
R/LG
S221
18
R/LG
18
R/LG
C126
16
R/LG
S77
P/W
67
BK
C360
INSTRUMENT CLUSTER
PAGES 60-4, 61-2, 63-3
I/P FUSE PANEL
ENGINE COMPARTMENT FUSE BOX
193
Y/LG
197
Y/BK
295
W/P
DG
DG
R/Y
16
R/LG
POWER DISTRIBUTION
PAGE 13-16
POWER DISTRIBUTION
PAGE 13-19
POWER DISTRIBUTION
PAGE 13-16
POWER DISTRIBUTION
PAGE 13-11

the schematic depicting the air suspension compressor motor and vent circuit installed in 1993 Grand Marquis vehicles

EVTM page:

41-1 Air Suspension

41-1 AIR SUSPENSION

For Circuit Operation, refer to page 7-6.
For diagnostic information, refer to Section 04-05 of the Service Manual.

AIR SUSPENSION/EVO STEERING MODULE ALSO CONTROLS VARIABLE ASSIST POWER STEERING. SEE PAGE 43-1.