



# **VOLVO PROBLEM SOLVER**

**ADVANCED EDITION**

**THE ULTIMATE VOLVO  
REPAIR GUIDE!**

**LET RNG BE YOUR INSIDE SOURCE FOR  
VOLVO INFORMATION!**

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# VOLVO PROBLEM SOLVER

## **'QUICK CHECK' - USE FOR PARTIAL TESTING**

REFER TO 'BASIC CHECK' FOR MORE COMPREHENSIVE TESTS.

05	011	SET BASE IDLE SPEED __ 1982-ON __ CONSTANT IDLE SYSTEM
05	201	BOSCH POINTLESS IGNITION __ QUICK CHECK
05	501	MPG IGNITION __ COMPUTER CONTROL IGNITION __ QUICK CHECK
05	701	EZK IGNITION __ COMPUTER CONTROL IGNITION __ QUICK CHECK

## **'VITAL SIGNS' - USE FOR POOR RUNNING CONDITION TESTING**

REFER TO COMPLETE SYSTEM & COMPONENT INFORMATION IN THE AFFECTED GROUPS IN MANUAL FOR MORE COMPREHENSIVE TESTS.

7	201	'VITAL SIGNS' __ INTRODUCTION TO ALL MODELS
7	251	'76-85 K-JETRONIC INJECTION __ POOR RUNNING
7	261	'83-84 LH-JETRONIC INJECTION __ POOR RUNNING
7	271	'85-88 LH-JETRONIC INJECTION __ POOR RUNNING

**'BASIC CHECK' THIS SHOULD BE THE FIRST CHECK YOU MAKE WHEN A 'NO START' CONDITION EXISTS. IT WILL HELP PINPOINT IF THE FAULT IS IN EITHER THE FUEL INJECTION SYSTEM OR THE IGNITION SYSTEM.**

**11- 001 ENGINE WON'T START \_\_ 1979-ON \_\_ BASIC CHECK**

**OTHER 'BASIC CHECK' TOPICS - USE FOR NO START CONDITION MORE COMPREHENSIVE THAN 'QUICK CHECK'.**

11	021	FUEL INJ RELAYS __ TESTING __ 1974-77 __ K-JETRONIC
11	031	FUEL INJ RELAY __ TESTING __ 1978-ON __ K-JETRONIC
11	041	FUEL INJ RELAYS __ TESTING __ 1983-84 __ LH-JETRONIC
11	051	FUEL INJ RELAY __ TESTING __ 1985-ON __ LH-JETRONIC
11	201	BOSCH POINTLESS IGN __ FAULT TRACING
11	501	MPG IGN __ COMPUTER CONTROL IGNITION __ FAULT TRACING
11	701	EZK IGN __ COMPUTER CONTROL IGNITION __ FAULT TRACING



## **GROUP 20      GENERAL INFORMATION**

- 20-            11            TEST POINT TERMINALS [C-O, STARTER BYPASS, IDLE DISABLE]
- 20-            31            SERVICE REMINDER LITES [EGR, LAMBDA]

## **GROUP 21           ENGINE MECHANICAL**

- 21-            211            SIEZED CAMSHAFT REPAIR [B-21, 23, 230]
- 21-            311            CAMSHAFT REPLACEMENT TIME SAVER [B-18, 20, 30]
- 21-            400            ENGINE 'KNOCKING NOISE' [B-18, 20, 30], TIMING GEARS
- 21-            501            REAR CRANKSHAFT SEAL LEAKS [B-18, 20]
- 21-            511            ENGINE OIL LEAKS DIAGNOSIS
- 21-            531            ENGINE FLAME ARRESTOR, NOTES, LOCATION & REPLACEMENT
- 21-            711            ENGINE TIMING BELT \_\_ TIPS & REPLACEMENT

## **GROUP 22           OXYGEN SENSOR, LAMBDA SOND, FUEL PUMP**

- 22-            001            O2 SENSORS \_\_ LAMBDA SOND COMPONENTS  
                                 K-JETRONIC    LH-INJECTION
- 22-            003            O2 SENSOR THEORY OF OPERATION
- 22-            111            CO CHECKING AT O2 SENSOR   [VOLTAGE TESTING]
- 22-            121            TEST POINT \_\_    LAMBDA SOND DUTY CYCLES [CHECKING CO]  
                                 COLD ENG, ACCELERATION & TURBO ENRICHMENT
- 22-            131            K-JETRONIC \_\_    SEVERE IDLE HUNTING [COLD ENG]
- 22-            133            K-JETRONIC LAMBDA SOND \_\_    PROBLEM CHECK ITEMS
- 22-            200            'WHAT IS NEEDED TO TURN THE FUEL PUMP ON'
- 22-            321            HARD HOT START \_\_ LONG CRANKING [F/P CHECK VALVE]
- 22-            331            FUEL PUMP & FILTER LOCATION \_\_ Ground[-] circuit NOTES
- 22-            711            SURGING \_\_ LOSS OF POWER [PRE PUMP & PRE PUMP HOSE]
- 22-            721            PRE PUMP \_\_    QUICK CHECK

## **GROUP 23           CARB & D-JETRONIC EFI**

- 23-            111            SU CARB PROBLEMS \_\_ ADJUSTMENTS \_\_ CHECK POINTS
- 23-            211            ZENITH/STROM CARB PROBLEMS \_\_ DIAPHRAMS \_\_ ADJUSTMENTS  
                                 TEMP COMPENSATOR, BYPASS VALVE \_\_ CHECK POINTS

23-	411	E.F.I. COLD START INJECTION FUNCTION TESTING THERMAL TIME SWITCH & VALVE
23-	431	E.F.I. COLD START INJECTION PROBLEMS __ COLD START VALVE __ THERMAL TIME SWITCH WIRING
23-	511	D-JETRONIC INJECTION SYSTEM CHECKS
23-	521	D-JET SYSTEM FAULT LIST
23-	531	D-JET SYS RELAYS __ CHECKING MAIN & FUEL PUMP RELAYS
23-	541	D-JET DISTRIBUTOR TRIGGER CONTACTS __ PROBLEMS
23-	551	D-JET THROTTLE SWITCH __ IDLE & ACCEL PROBLEMS
23-	561	D-JET PRESSURE SENSOR __ TESTING
23-	581	D-JET TEMP SENSORS [AIR & COOLANT] __ PROBLEMS
23-	591	AUX AIR SLIDE[FAST IDLE] __ EGR PIPE__ PROBLEMS

## GROUP 24

## K-JETRONIC INJECTION

24-	001	K-JET FUEL INJECTION COMPONENTS
24-	007	K-JET __ POOR & NO RUN CHECK ITEMS
24-	011	FUEL DISTRIBUTOR __ OPERATION
24-	021	CONTROL PRESSURE REGULATOR [CPI] __ OPERATION
24-	031	AIR FLOW SENSOR PLATE __ OPERATION & PROBLEMS
24-	041	AIR SLIDE [FAST IDLE] __ OPERATION __ PROBLEMS __ TIPS
24-	131	K-JET FUSES - CHECKING - BYPASSING RELAY
24-	151	K-JET RELAYS __ LOCATIONS __ FUNCTION
24-	171	K-JET CORRECT WIRING LOCATIONS __ RUNNING PROBLEMS
24-	211	K-JET C/O SETTING
24-	301	K-JET FUEL PRESSURES __ CHECKING __ PROBLEMS LINE PRESS - CONTROL PRESS - REST PRESS
24-	351	K-JET INJECTOR TESTING __ SPRAY PATTERNS
24-	411	K-JET POOR IDLE __ INJECTOR SEAL __ VACUUM LEAK CHECK & SEAL REPLACEMENT
24-	521	IDLE & C/O ADJUSTMENT __ B-27, 28 __ Without 'CIS'

## GROUP 25

## LH-JETRONIC INJECTION

25-	001	LH-INJECTION SYSTEM COMPONENTS
25-	004	LH-INJ SYSTEM THEORY OF OPERATION __ LIMP HOME MODE
25-	011	LH-INJ __ POOR & NO RUN CHECK ITEMS
25-	021	MAKING THE FUEL PUMPS 'RUN' [BYPASSING RELAYS]



25-	051	LH-INJ __ ERRATIC PROBLEMS __ 25 AMP FUSE __ PROBLEMS
25-	071	LH-INJ __ POOR IDLE __ CHECKING FOR FOULED INJECTORS
25-	111	LH-INJ __ RELAY TERMINALS __ FUNCTION & WIRING
25-	131	LH-INJ BASIC WIRING & NOTES __ ERRATIC STALLING
25-	151	LH-INJ C/O ADJUSTING __ A.M.M. 1985-88
25-	161	LH-INJ CHECKING TERMINAL PROCEDURE__ A.M.M. & C/U
25-	171	AIR MASS METER __ TERMINAL FUNCTIONS __ TESTING
		1985-88 B-230 1985-89 B-230 TURBO
25-	181	LH-INJ CONTROL UNIT __ TERMINAL FUNCTIONS __ QUICK CHK
25-	501	'83-84 LH-INJ RELAYS __ TERMINALS__ FUNCTION & CHECKS
25-	511	'83-84 LH-INJ FUSES __ FUNCTION, PROBLEMS & CHECKS
25-	521	'83-84 LH-INJ FUSES & RELAYS __ PROBLEMS _ BYPASSING
25-	541	LH-INJ C/O ADJUSTING __ A.M.M. 1983-84
25-	551	AIR MASS METER __ TERMINAL FUNCTIONS __ TESTING
		1983-84 B-23 1983-84 B-23 TURBO
25-	571	LH-INJ CONTROL UNIT __ TERMINAL FUNCTIONS __ QUICK CHK
		'83-84 B-23 __ FLAT SPOT ON ACCELERATION

## **GROUP 26 WATER PUMPS, BELTS ETC**

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26-	121	A/C BELT & CRANK PULLEY REPLACEMENT TIPS

## **GROUP 27 DIESEL INJECTION**

27-	001	VOLVO DIESEL
27-	004	DIESEL TUNE UP CHECK LIST
27-	100	DIESEL GLOW PLUG & ENG TEMP SENSOR LOCATIONS
		GLOW PLUG CONTROL UNIT __ GLOW PLUG TESTING
27-	110	POOR PERFORMANCE __ FUEL STARVATION __ FUEL FILTER
27-	120	VALVE ADJUSTMENT
27-	130	DIESEL INJECTION PUMP __ ADJUSTING PUMP TIMING
27-	140	COOLANT SYSTEM __ BLEEDING TO PREVENT OVERHEATING
27-	151	R&R CYLINDER HEAD __ PREVENTING ENGINE DAMAGE
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## **ELECTRONIC IGNITION SYSTEMS**

28-	201	BOSCH POINTLESS IGNITION [BPI] SYSTEM COMPONENTS
28-	207	BPI THEORY OF OPERATION
28-	209	BPI POOR & NO RUN __ CHECK ITEMS
28-	221	STALLING/NO START __ DIST INDUCTION COIL __ TESTING
28-	271	BPI __ IGNITION TIMING 'OFF' __ POOR RUN __ STAR LOCK PIN
28-	501	'MPG' COMPUTER CONTROLLED IGNITION SYSTEM
28-	504	MPG __ IGNITION NOT OPERATING __ CHECK POINTS
28-	511	MPG __ THEORY OF OPERATION __ HALL SWITCH OPERATION
28-	521	MPG __ POOR & NO RUN __ CHECK ITEMS
28-	531	MPG __ CONTROL UNIT TERMINALS __ HALL SW __ TESTING
		BASIC WIRING & TIPS
28-	701	'EZK' BOSCH COMPUTER CONTROLLED IGNITION SYSTEM
28-	711	EZK __ THEORY OF OPERATION
28-	717	EZK __ HALL SWITCH OPERATION __ VOLTAGES
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## **GROUP 29**

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29-	001	IDLE CONTROL SYSTEMS __ UP TO '81 __ '81-ON
29-	101	A/C IDLE INCREASE __ SOLENOIDS __ EARLY VERSIONS
29-	131	A/C IDLE INCREASE __ SOLENOIDS & BYPASS VALVES up to '81
29-	301	CONSTANT IDLE SYS [CIS] __ THEORY OF OPERATION
		K-JETRONIC SYS      LH-INJECTION SYS
29-	311	CIS __ SETTING IDLE SPEED
29-	321	CIS __ CHECKING IDLE VALVE & THROTTLE SWITCH
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29-	351	BASIC THROTTLE VALVE ADJUSTMENT [STOP SCREW]
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## **GROUP 30**

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31-	011	PROPER & SAFE JUMPING, CHARGING PROCEDURES
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33-	031	SLOW CRANK _ NO CRANK _ TESTING & REPAIR
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36-	101	245 TAILGATE ACCESSORY PROBLEMS __ REPAIRS
37-	011	RELAY & COMPONENT LOCATIONS __ '73-80 200 SERIES
37-	021	RELAY & COMPONENT LOCATIONS __ '81-ON 200 SERIES
37-	031	RELAY & COMPONENT LOCATIONS __ '83-ON 700 SERIES
37-	041	RELAY & COMPONENT LOCATIONS __ '88-ON 760 SERIES
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## **GROUP 40**

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41-	231	OVERDRIVE PROBLEMS [MANUAL] __ '81-ON __ TESTING
43-	101	AUTO TRANS LEAKS
43-	201	PARK DOESN'T HOLD __ RATCHETING WHEN MOVING
45-	101	DRIVESHAFT ALIGNMENT, VIBRATION, CENTER SUPPORT
47-	240	PINION SEAL REPLACEMENT__ PREVENTING DAMAGE
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<b>60-</b>	<b>211</b>	<b>KNOCKS &amp; RATTLES _ FRONT END</b>
<b>62-</b>	<b>101</b>	<b>FRONT AXLE SEAL _ PROPER REPLACEMENT</b>
<b>63-</b>	<b>111</b>	<b>STEERING &amp; SUSPENSION CHECKS _ TIPS</b>
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<b>65-</b>	<b>611</b>	<b>KNOCKS &amp; RATTLES _ REAR SUSPENSION</b>

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<b>81-</b>	<b>211</b>	<b>DOOR LOCK PROBLEMS _ LOCKING _ LATCHING</b>
<b>81-</b>	<b>331</b>	<b>CENTRAL LOCKING PROBLEMS _ COMPONENTS _ 200 SERIES</b>
<b>81-</b>	<b>337</b>	<b>CENTRAL LOCKING PROBLEMS _ COMPONENTS _ 700 SERIES</b>
<b>82-</b>	<b>101</b>	<b>HEAT WON'T TURN OFF _ HTR VALVE CHECKS &amp; PROBLEMS</b>
<b>82-</b>	<b>201</b>	<b>AIR CONDITIONING _ CHECKS &amp; PROBLEMS _ WET CARPETS</b>
<b>85-</b>	<b>131</b>	<b>SEAT HEATER _ PROBLEMS &amp; REPAIRS</b>



## **HOW SAFE IS SAFE?**

**WHEN IT COMES TO BEING SAFE, NOTHING ELSE MATTERS.**

1

WE HAVE TRIED TO HELP YOU IN THIS MANUAL TO BE BETTER EQUIPPED TO REPAIR THE VOLVOs THAT COME INTO YOUR SHOP. THIS HAS BEEN OUR PRIMARY CONCERN, BUT NOT OUR ONLY ONE. YOU SEE, IN ORDER TO REPAIR ANY VEHICLE PROPERLY, YOU MUST ALWAYS QUESTION THE METHODS USED. "IS IT SAFE?" YOU SHOULD NOT TAKE ANY UNNECESSARY RISKS, IN BOTH THE METHODS USED AS WELL AS THE FINISHED PRODUCT. USING COMMON SENSE IS A MUST. WORKING AROUND HEAVY MACHINERY, GASOLINE, ELECTRICITY AND MOVING PARTS PRESENTS AN OPPORTUNITY FOR BOTH DAMAGE TO ONESELF, TO OTHERS, TO THE VEHICLE AND THE SURROUNDING PREMISES.



**IS IT SAFE ???**

WE WANT YOU AND YOUR CUSTOMER TO STICK AROUND WITH US FOR A LONG TIME. THAT WON'T HAPPEN BY ACCIDENT, SO DON'T PUT YOURSELF IN THE POSITION OF HAVING ONE. PLAY IT SAFE.

**WORKING SAFE IS NOT JUST  
AN OPTION, BUT A FIRST  
PRIORITY.**

## **LIABILITY DISCLAIMER**

2

WE HAVE COMPILED THIS MANUAL TO HELP ASSIST YOU IN THE DIAGNOSING AND REPAIRING OF NUMEROUS MODELS OF CARS VOLVO HAS SOLD IN THE U.S.A. . SINCE WE ARE OBVIOUSLY UNABLE TO DETERMINE THE VARYING SKILL LEVELS OF THE INDIVIDUAL TECHNICIANS WHO WILL USE THIS MANUAL POSSESS, WE WILL HAVE TO RELY ON THEIR OWN GOOD JUDGEMENT AS TO THE LEVEL OF REPAIRS THEY WILL ATTEMPT.

THE DIAGNOSIS AND REPAIR PROCEDURES LAID OUT IN THIS MANUAL HAVE BEEN HONED FROM MANY YEARS OF MECHANICAL EXPERIENCE SPECIFICALLY ON VOLVOS. THE PROCEDURES COME FROM THE SERVICE DEPARTMENTS OF FOUR VOLVO DEALERSHIPS IN A VERY LARGE METROPOLITAN MARKET. WE HAVE ALSO TAKEN SOME FROM INDEPENDENT IMPORT REPAIR FACILITIES THAT DO A LOT OF WORK ON VOLVOS. THESE PROCEDURES WORK FOR US, AND IF PROPERLY AND RESPONSIBLY APPLIED THEY WILL WORK FOR YOU.

BEFORE ANY REPAIRS ARE ATTEMPTED, PLEASE TAKE ANY TIME THAT IS NEEDED TO FULLY UNDERSTAND THE REPAIR PROCEDURE. YOU SHOULD REVIEW THE REPAIR PROCEDURE COMPLETELY BEFORE BEGINNING. THE USE OF THE MOST PRACTICAL SAFETY PRECAUTIONS IS AN ABSOLUTE MUST, THERE IS NO SUBSTITUTE FOR THE SAFETY OF YOU, YOUR CO-WORKERS, THE VEHICLES OWNER AND OF COURSE THE VEHICLE ITSELF.

WE CANNOT BE LIABLE FOR ANY DAMAGE TO PERSON OR PROPERTY IN ANY WAY, SHAPE OR FORM. THE END RESULT ULTIMATELY RESTS WITH YOU, THIS RESPONSIBILITY SHOULD FOREVER REMAIN AS A BENCHMARK IN DETERMINING YOUR ACTIONS. USE COMMON SENSE AND WORK SAFELY, IT IS THE ONLY PROFITABLE WAY TO WORK. RNG & ASSOCIATES CANNOT ASSUME RESPONSIBILITY FOR ANY OMISSIONS, OR ERRORS THAT FOR WHATEVER REASON MAY HAVE OCCURRED IN THE PROCESS OF COMPILATION OF THE MANUAL.

WE HAVE SET UP THE 'VOLVO PROBLEM SOLVER' MANUAL IN A SERVICE BULLETIN FORMAT. THE LOOSE LEAF DESIGN ALLOWS FOR A VARIETY OF OPTIONS IN THE WAY YOU MAY WANT TO USE IT.

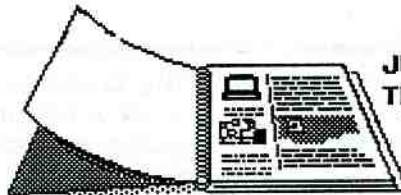
YOU CAN PULL OUT A PAGE OR SECTION AND TAKE IT IN THE CAR WITH YOU, SO IT WILL BE CLOSE AT HAND. YOU MAY ALSO WANT TO TAKE AN OFTEN USED SECTION OR PAGE AND PUT IT IN A 'QUICK LOOK' AREA OF THE BINDER. WE HAVE FOUND EVERYONE HAS THERE OWN APPROACH, SO FEEL FREE TO ADAPT IT TO YOUR OWN METHOD.

MORE IMPORTANT, THE LOOSE LEAF DESIGN ALLOWS FOR EXPANSION AND UPDATES. YOU CAN ALSO MAKE UP YOUR OWN NOTE PAGES, JUST ADD THEM TO THE 'V P S' MANUAL. FOR THIS REASON WE SUGGEST EVERY TECHNICIAN HAS HIS OWN 'VOLVO PROBLEM SOLVER'. SINCE IT'S LIKE ANY OTHER TOOL IN YOUR BOX, IT WILL ALWAYS BE WITH YOU ON THE JOB.

TO GET STARTED WE SUGGEST THAT YOU FAMILIARIZE YOURSELF WITH THE 'TOOL' EVEN BEFORE YOU HAVE TO USE IT. THAT IS BROWSE THROUGH IT AT YOUR LEISURE, WHEN YOU HAVE SOME SPARE TIME JUST TO GET AN OVERVIEW OF WHAT IS CONTAINED IN IT. THIS WILL PLANT IN THE BACK OF YOUR MIND LITTLE REMINDERS THAT WILL POP UP WHEN YOU ARE WORKING ON THE DIFFERENT ITEMS COVERED.

WHEN A PROBLEM CAR COMES IN, YOU'LL SAY TO YOURSELF, 'I REMEMBER SEEING SOMETHING IN THE 'VOLVO PROBLEM SOLVER' ON THIS PROBLEM. THEN GO AND GET THE MANUAL, REFER TO THE GROUP IN QUESTION, LET'S SAY THE 'FUEL GROUP'. THE INDEX CAN THEN DIRECT YOU TO THE DIFFERENT TYPES OF FUEL SYSTEMS COVERED.

THERE ARE 'CHECK ITEMS' LISTS, AS WELL AS OPERATING THEORIES ON THE MAJOR SYSTEMS [IGNITION, FUEL ETC.]. THE 'CHECK ITEMS' LISTS COVER THE MOST LIKELY CAUSES & COMPONENTS FOR THE PROBLEMS WE HAVE EXPERIENCED ON THE VOLVO MODELS.



**JUST BROWSE  
THROUGH IT,  
THERES SO  
MUCH TO IT!**

THERE ARE ALSO DIAGNOSIS AIDS LIKE BASIC & QUICK CHECK SHEETS, ALONG WITH VARIOUS COMPONENT TEST SHEETS. YOU'LL FIND NUMEROUS COMMON FAULT AND QUICK REPAIR HINTS. WHEN YOU HAVE LOCATED THE TOPIC YOU NEED INFO ON, READ THAT PAGE OR PAGES FULLY BEFORE YOU BEGIN THE REPAIR. DOING THIS BEFORE YOU BEGIN WILL GIVE YOU A BETTER UNDERSTANDING OF THE REPAIR, ALONG WITH THE STEPS NEEDED TO COMPLETE THE REPAIR.

YOU WILL FIND THE 'QUICK CHECKS' TO BE EXTREMELY HELPFUL IF USED AT THE INITIAL STAGE OF DIAGNOSIS. WHEN YOU HAVE A VEHICLE THAT WILL NOT START, WE RECOMMEND THAT YOU USE THE 'BASIC QUICK CHECK' TO DETERMINE IF THE IGNITION OR THE FUEL INJECTION SYSTEM IS MOST LIKELY AT FAULT.

USE THE 'VITAL SIGNS' CHECK SHEET WHEN YOU HAVE AN ENGINE THAT IS NOT RUNNING PROPERLY. ALSO USE IT ON AN ENGINE THAT YOU WANT TO MAKE A CHECK OF ITS' ENGINE MANAGEMENT SYSTEMS.

#### **A SPECIAL CAUTION:**

**NEVER DISCONNECT ANY CONTROL UNIT, AIR MASS METER, POWER STAGE etc. WITH THE KEY IN THE 'ON' POSITION [KP II]. DAMAGE TO UNITS WILL RESULT.  
TURN KEY OFF [KP O] & REMOVE ANY FUSES IN THE SYSTEM THAT IS BEING AFFECTED BEFORE DISCONNECTING.**



**KNOWING HOW SOMETHING ACTS WHEN IT OPERATES  
PROPERLY, WILL HELP YOU SPOT A POOR PERFORMER.**

5

THE MOST TRIED AND TRUE DIAGNOSIS METHOD EVER DEVELOPED IS BOTH A VERY BASIC AND UNIVERSALLY HELD PREMISE.

IF YOU KNOW HOW SOMETHING PERFORMS WHEN IT IS IN NORMAL WORKING ORDER, THEN USE IT AS A BENCHMARK TO COMPARE THE 'VITAL SIGNS' WITH THE SAME TYPE OF UNIT WHEN IT MALFUNCTIONS.

THE MEDICAL PROFESSION HAS LONG STUDIED HEALTHY CELLS, COMPARING THEM WITH THOSE THAT ARE DISEASED TO HELP DETERMINE THE STATE OF HEALTH OF ANOTHER SIMILAR CELL. THEY ARE THEN ABLE TO DIAGNOSIS AND PRESCRIBE THE TREATMENT FOR THE DISEASE.

YOU CAN DO THE SAME THING IN A WAY. WHEN YOU HAVE A VEHICLE WITH A SYSTEM IN IT THAT YOU WOULD LIKE TO BECOME MORE FAMILIAR WITH, YOU CAN DO THE SAME THING. CHECK HOW IT PERFORMS UNDER CERTAIN CONDITIONS, ITS' VITAL SIGNS [VOLTAGES, AMPS, RESISTANCES, OUTPUTS, AND VARIOUS OTHER READINGS ETC.] AT DIFFERENT POINTS.

MAKE NOTES ON YOUR FINDINGS FOR FUTURE REFERENCE. USE YOUR IMAGINATION AND TECHNICAL EXPERTISE TO DETERMINE WHAT AND WHERE TO CHECK.

**MOST OF ALL, USE YOUR BEST JUDGEMENT, WE DON'T WANT YOU TO BY MISTAKE, DESTROY ANYONE'S \$600 FUEL INJECTION CONTROL UNIT.**

**A TRAPEZE ARTIST WORST NIGHTMARE,  
MY HANDS ARE SLIPPERY!!!.**

6

**'MY HANDS ARE SLIPPERY!!!'.**

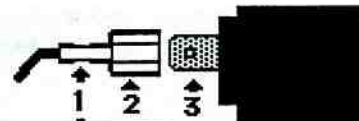
THOSE COULD BE THE LAST WORDS OF A TRAPEZE ARTIST. THAT COULD ALSO SPELL DOOM FOR ANY ELECTRICAL CIRCUIT IF YOU THINK OF THOSE 'HANDS' AS THE WIRE TERMINALS. ONLY INSTEAD OF BEING SLIPPERY THINK OF THEM AS NOT MAKING GOOD CONTACT OR NO CONTACT AT ALL.

THE STRESS THAT A CAR'S ELECTRICAL SYSTEM IS SUBJECTED TO IS UNREAL. THE HEAT, THE COLD, THE VIBRATION, THE EXPANSION AND CONTRACTION CAN REALLY TAKE A TOLL. THE NEW TECHNOLOGY NOW BEING USED IN THE VEHICLE'S ELECTRICAL SYSTEMS IS EVEN MORE TOUCHY.

DUE TO THE FACT THAT THEIR MICRO CIRCUITS ARE LOW CURRENT CONSUMERS. MANY USE THE RESISTANCE TO GROUND[-] IN A CIRCUIT TO DETERMINE HOW, WHEN AND IF ANOTHER CIRCUIT IS PROVIDED CURRENT. A POOR CONNECTION AT ANY POINT WILL SEVERELY IMPAIR OR PREVENT A CIRCUIT'S OPERATION.

THE SLIGHTEST RESISTANCE AT A TERMINAL IN A CIRCUIT COULD SPELL DEATH OR ERRATIC PERFORMANCE FOR THE INVOLVED COMPONENT.

WHENEVER YOU ARE FACED WITH AN ERRATIC ELECTRICAL PROBLEM YOU MAY JUST SAVE YOURSELF A LOT OF TIME AND TROUBLE CHECKING THE AFFECTED TERMINALS. A GOOD, CAREFUL LOOK IS A MUST. CHECK THE TERMINAL'S CONTACT WITH WHAT IT CONNECTS UP TO. A TIGHT AND CLEAN CONNECTION IS NECESSARY. CHECK THAT THE WIRE IS NOT LOOSE IN THE TERMINAL.



**1-WIRE TIGHT IN THE TERMINAL.**

**2-TERMINAL FITS TIGHT.**

**3-TERMINALS ARE CLEAN.**



**THE IMPORTANCE OF GROUNDS[-] ,  
OR 'YOU CAN'T GET THERE FROM HERE!!!'.**

7

**'YOU CAN'T GET THERE FROM HERE!!!'**

THAT'S THE PUNCH LINE TO A JOKE I ONCE HEARD. WHEN I HEARD IT AS PART OF THE JOKE IT MADE ME LAUGH. WHEN IT BECOMES PART OF THE PROBLEM OF THE CARS' ELECTRICAL SYSTEM THAT I HAPPEN TO BE WORKING ON, BELIEVE ME I'M NOT LAUGHING.

LET ME TELL YOU WHAT I'M TALKING ABOUT. THE FIRST THING YOU HAVE TO GET A GOOD STRONG GRIP ON IS THAT AN ELECTRICAL SYSTEM DOESN'T REALLY HAVE A BEGINNING AND END. THE CIRCUIT IS A COMPLETE ONE THAT JUST KEEPS 'REVOLVING'. THE CIRCUIT STARTS AT THE POSITIVE[+] BAT TERMINAL AND THEN IT WILL CONTINUE ON TO THE NEGATIVE[-] TERMINAL. IT GOES 'FULL CIRCLE' BECAUSE IT HAS TO GO 'FULL CIRCLE', OR ELSE IT JUST WON'T GO ANYWHERE. A CIRCUIT THAT DOESN'T GO ANYWHERE, IS A NOT A 'CIRCUIT'.

THERE IS JUST NO GETTING AROUND THE FACT THAT THE CIRCUIT HAS TO GET AROUND. YOU JUST THINK HOW MUCH FUN IT WOULD BE FOR YOU TO GO TO WORK IN THE MORNING, WORK HARD ALL DAY ONLY TO FIND THERE IS NO WAY TO GET BACK HOME AT THE END OF THE DAY. YES, THAT 'YOU CAN'T GET THERE FROM HERE!!!'. DOOMED TO THE FATE OF FOREVER STAYING AT WORK! THAT'S NOT MY IDEA OF FUN. I DOUBT IF IT IS YOURS EITHER.

WELL THE SAME HOLDS TRUE FOR THE ELECTRICAL SYSTEM OF THAT CAR IN YOUR STALL. THAT CAR WILL SPEND A VERY LONG TIME IN YOUR STALL IF YOU OVERLOOK THE GROUND[-] PART OF THE FAILED CIRCUIT. YOU SAY THAT YOU DON'T OVERLOOK THE GROUND[-] CIRCUIT, BUT THINK ABOUT THIS A FOR MOMENT. WHAT IS THE FIRST THING YOU DO AFTER CHECKING THE FUSE WHEN THE WIPERS DON'T WORK?

YOU GO AND GRAB YOUR TEST LITE OR VOLT METER AND CHECK FOR CURRENT AT THE WIPER MOTOR. THERE IS NOTHING WRONG WITH THAT, IT IS JUST THAT IS ONLY HALF OF THE STORY. THERE MAY BE CURRENT AT THE WIPER MOTOR, BUT NO WAY FOR IT TO GET BACK TO THE BATTERY. THERE ISN'T AN ELECTRICAL COMPONENT THAT WILL OPERATE WITH THAT TYPE OF CIRCUIT.

SO WHAT DO I WANT YOU TO DO? I SUGGEST USING THE GROUND[-] WIRE FOR THE WIPER MOTOR AS YOUR GROUND[-] PICKUP FOR THE TEST LITE OR VOLT METER. THIS WAY YOU WILL AT LEAST HAVE A BETTER IDEA IF THERE IS A GROUND[-] CIRCUIT THERE. HOWEVER, YOU CAN'T STOP THERE. YOU MUST ALSO INSURE THE GROUND[-] CIRCUIT IS A GOOD HEALTHY ONE. USE AN OHM METER FOR THIS. YOU CAN ALSO USE THE TEST LITE IF YOU CONNECT IT TO A KNOWN GOOD GROUND[-], AND THE OTHER END TO THE GROUND[-] WIRE FOR THE WIPERS. NOW IF THE TEST LITE IS 'LIT' WHEN YOU OPERATE THE WIPERS, THE GROUND[-] CIRCUIT IS BAD.

TODAY'S MICRO CIRCUITS, THOSE REAL TOUCHY COMPUTER CIRCUITS HAVE MADE THE GROUND[-] CIRCUIT ALL THE MORE IMPORTANT. POOR CONNECTIONS ON BOTH SIDES OF THE CIRCUIT, POSITIVE[+] OR NEGATIVE[-] REALLY GET MAGNIFIED. THE VOLTAGE AND AMPERAGE THAT IS BEING CONSUMED BY THESE CIRCUITS IS USUALLY VERY LOW. THEREFORE, ANY DISRUPTION CAN PLAY 'MIND' GAMES IN THE COMPUTER CIRCUITS.

I CONTEND THE ONLY THING WORSE THAN NO GROUND[-] AT ALL IS A GROUND[-] THAT IS ERRATIC. AN ERRATIC GROUND[-] CAN BE A CIRCUIT THAT IS EITHER COMING AND GOING AT TIMES, OR A CIRCUIT THAT HAS A HIGH RESISTANCE TO GROUND[-]. THESE KINDS OF GROUND[-] CIRCUITS WILL DRIVE THAT COMPUTER CRAZY. REMEMBER THE GROUND[-] CIRCUIT MUST BE THERE FOR THE RETURN ROUTE WITHOUT ANY ROAD BLOCKS OR DETOURS.

**KEEPING THE IMPORTANCE OF THE GROUND[-] CIRCUIT IN MIND MAY JUST ALLOW YOU AND THAT CAR IN YOUR STALL TO GO HOME A LITTLE EARLY SOMEDAY.**



YEARS	BODY/CHASSIS	4 CYL ENGINE	FUEL	IGNITION
1962 - 66 —	444, 544, 122, 130, 1800	— B -14,16,18	— CARBS	— POINTS
1967 - 68 —	122, 140, 1800	— B - 18	— CARBS	— POINTS
1969 - 73 —	140, 1800	— B - 20	— CARBS	— POINTS
1970 - 73 —	140, 1800	— B - 20	— D - JET	— POINTS

YEARS	BODY/CHASSIS	4 CYL ENGINE	FUEL	IGNITION
1974 —	140	— B - 20	— K - JET	— Bosch Pointless
1975 —	240	— B - 20	— K - JET	— Bosch Pointless

YEARS	BODY/CHASSIS	4 CYL ENGINE	FUEL	IGNITION
1976 - 81 —	240	— B - 21	— K - JET	— Bosch Pointless
1981 - 82 —	240	— B - 21	— K - JET	— 'MPG' computer
1983 - 84 —	240	— B - 23	— LH INJ	— 'MPG' computer
1985 - 88 —	240	— B - 230	— LH INJ	— 'MPG' computer
1989 - on —	240	— B - 230	— LH INJ	— EZK computer
1985 - on —	740	— B - 230	— LH INJ	— EZK computer
1981 - 85 —	240	— B- 21 Turbo	— K - JET	— Bosch Pointless
1984 —	700	— B - 23 Turbo	— LH INJ	— EZK computer
1985 - on —	700, 900	— B - 230 Turbo	— LH INJ	— EZK computer

YEARS	BODY/CHASSIS	6 CYL ENGINE	FUEL	IGNITION
1969 - 72 —	164	— B - 30	— CARBS	— POINTS
1973 - 75 —	164	— B - 30	— D - JET	— Bosch Pointless
1976 - 79 —	260 V6	— B - 27	— K - JET	— Bosch Pointless
1980 - 82 —	260 V6	— B - 28	— K - JET	— Bosch Pointless
1983 - 86 —	760 V6	— B - 28	— K - JET	— Bosch Pointless
1987 - 90 —	760 V6	— B - 280	— LH INJ	— EZK computer

YEARS	BODY/CHASSIS	6 CYL DIESEL	FUEL
1980 - 85 —	200	— D - 24	— DIESEL
1983 - 86 —	700	— D - 24 Turbo	— DIESEL

**'QUICK CHECK' - USE FOR PARTIAL TESTING**  
REFER TO 'BASIC CHECK' FOR MORE COMPREHENSIVE TESTS.

**VITAL  
SIGNS**

- 5 - 011 SET BASE IDLE SPEED \_\_\_ 1982-ON \_\_\_ CONSTANT IDLE SYSTEM
- 5 - 201 BOSCH POINTLESS IGNITION \_\_\_ QUICK CHECK
- 5 - 501 MPG IGNITION \_\_\_ COMPUTER CONTROL IGNITION  
QUICK CHECK
- 5 - 701 EZK IGNITION \_\_\_ COMPUTER CONTROL IGNITION  
QUICK CHECK

**BASIC  
CHECK**

**'VITAL SIGNS' - USE FOR POOR RUNNING CONDITION TESTING**  
REFER TO COMPLETE SYSTEM & COMPONENT INFORMATION IN THE  
AFFECTED GROUPS IN MANUAL FOR MORE COMPREHENSIVE TESTS.

- 7- 201 'VITAL SIGNS' \_\_\_ INTRODUCTION TO ALL MODELS
- 7- 251 '76-85 K-JETRONIC INJECTION \_\_\_ POOR RUNNING
- 7- 261 '83-84 LH-JETRONIC INJECTION \_\_\_ POOR RUNNING
- 7- 271 '85-88 LH-JETRONIC INJECTION \_\_\_ POOR RUNNING

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**'BASIC CHECK' THIS SHOULD BE THE FIRST CHECK YOU MAKE**  
WHEN A 'NO START' CONDITION EXISTS. IT WILL HELP PINPOINT IF  
THE FAULT IS IN EITHER THE FUEL INJECTION SYSTEM OR THE  
IGNITION SYSTEM.

- 11- 001 ENGINE WON'T START \_\_\_ 1979-ON \_\_\_ BASIC CHECK

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**OTHER 'BASIC CHECK' TOPICS - USE FOR NO START CONDITION**  
MORE COMPREHENSIVE THAN 'QUICK CHECK'.

- 11 - 021 FUEL INJ RELAYS \_\_\_ TESTING \_\_\_ 1974-77 \_\_\_ K-JETRONIC
- 11 - 031 FUEL INJ RELAY \_\_\_ TESTING \_\_\_ 1978-ON \_\_\_ K-JETRONIC
- 11 - 041 FUEL INJ RELAYS \_\_\_ TESTING \_\_\_ 1983-84 \_\_\_ LH-JETRONIC
- 11 - 051 FUEL INJ RELAY \_\_\_ TESTING \_\_\_ 1985-ON \_\_\_ LH-JETRONIC
  
- 11 - 201 BOSCH POINTLESS IGN \_\_\_ FAULT TRACING
- 11 - 501 MPG IGN \_\_\_ COMPUTER CONTROL IGNITION  
FAULT TRACING
- 11 - 701 EZK IGN \_\_\_ COMPUTER CONTROL IGNITION  
FAULT TRACING



**QUICK CHECK**

THE CONSTANT IDLE SYSTEM IS IMPORTANT FOR MORE THAN JUST SETTING ENGINE IDLE SPEED. THE CIS WILL ALSO AFFECT HOW THE ENGINE RUNS OR DOESN'T RUN WHEN THE ENGINE IS COLD, PUT IN A DRIVE GEAR [DRIVE or REVERSE], OR WHEN A/C IS OPERATING. YOU BETTER BELIEVE THAT A LOT OF COLD START/RUN PROBLEMS MAY ONLY BE A POORLY ADJUSTED BASE IDLE OR A STICKING IDLE MOTOR VALVE.

**.... SETTING & TESTING BASE IDLE ....**

**1 - TURN THROTTLE LEVER BACK & FORTH FROM ITS' IDLE STOP, TWO[2] CLICKS, THAT IS, A 'CLICK' CLOCKWISE & A 'CLICK' COUNTER CLOCKWISE SHOULD BE HEARD FROM THE T/SW WHEN THE THROTTLE IS NEARING ITS' STOP. \* IF NOT, ADJUST THROTTLE ROD, T/SW OR THROTTLE CABLE ETC AS NEEDED.**

**2 - RUN ENGINE TO OPERATING TEMP WITH ALL ACCESSORIES 'OFF' [ A/C SWITCHED OFF]**  
LOCATE THE C.I.S. TEST POINT AND GROUND[-] IT WITH A JUMPER LEAD.  
[ON '81 & EARLY 82, GROUND[-] WHITE WIRE AT IDLE VALVE OR C.I.S. CONTROL UNIT]

**3 - IDLE SHOULD DROP TO 720 RPMs[early 4 cyl TURBOs 850 RPMs] [V6 800-900 RPMs]**  
**NOTE;** IF IDLE IS HIGHER, PINCH 'CLOSE' ONE OF THE HOSES GOING TO IDLE VALVE, IF IDLE NOW GOES DOWN FURTHER, IDLE VALVE STICKING, IF CLEANING WITH WD-40 DOESN'T FREE VALVE, REPLACE IDLE MOTOR VALVE.

**4 - ADJUST IDLE RPMs to 720 RPMs [early 4 cyl TURBOs 850 RPMs] [V6 800-900 RPMs]**

**K-JET ..... USE THROTTLE STOP SCREW [BOTH 4cyl & '81-86 V6]**

**LH II INJ ..... USE PLASTIC THUMB SCREW [BOTH 4cyl & '87 - on V6]**

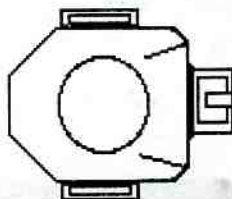
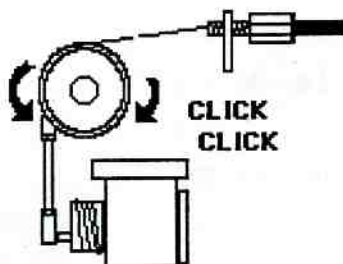
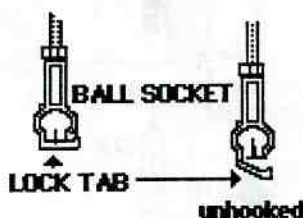
**... ANY PROBLEMS SETTING, CHECK C.I.S SECTION OF THIS MANUAL ...**

**WITH THE ENGINE 'OFF', MOVE THE THROTTLE LEVER BACK & FORTH A 1/4 OF AN INCH.**

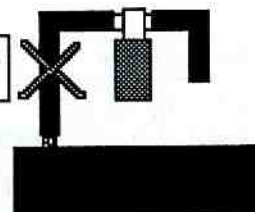
A 'CLICK' SHOULD BE HEARD FROM THROTTLE SW ON ACCEL AND ANOTHER CLICK JUST BEFORE RETURNING TO THE THROTTLE STOP. IF YOU DON'T HEAR THE 'CLICK/CLICK', THE THROTTLE ROD, THROTTLE SWITCH MAY BE OUT OF ADJUSTMENT OR THE THROTTLE PLATE MAY BE DIRTY.

SOMETIMES IT WON'T ALWAYS 'CLICK' ON THE RETURN TO THE THROTTLE STOP, THE THROTTLE ROD MAY BE OUT OF ADJUSTMENT. UNHOOK LOCK TAB ON THE BALL SOCKET, DISCONNECT THE ROD, THEN RE-CHECK. IF YOU NOW GET THE 'CLICK/CLICK', THEN ADJUST THE ROD SO IT WILL FREELY CONNECT TO THE THROTTLE. THEN CHECK IT ONCE AGAIN A FEW TIMES TO BE SURE IT IS OK.

THE LOCK NUTS MUST BE TIGHTENED SO THEY WILL NOT LOOSEN UP, CAUSING THE ROD TO BE OUT OF ADJUSTMENT AGAIN.



**PINCH HOSE TO CHECK VALVE**

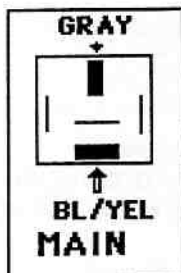


**QUICK CHECK**

THIS TEST IS TO DETERMINE IF THE F-INJ RELAYS ARE ELECTRICALLY SOUND. IF THE RELAYS PASS THIS TEST, IT IS WORKING NORMALLY. HOWEVER IT SHOULD BE KEPT IN MIND THAT ERRATIC PROBLEMS CAN CAUSE FOR A 'PASSED TEST'. THAT LATER A FAILURE OF A RELAY CAN HAPPEN DUE TO VIBRATION, HEAT AND/OR COLD CONDITIONS. •NOTE: RELAYS ARE NOT INTERCHANGEABLE•

**• HOW TO TELL WHICH RELAY IS WHICH •**

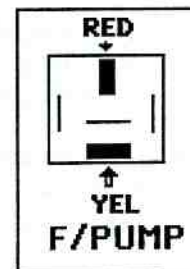
- MAIN RELAY HAS THE 'GRAY' WIRE AT TOP TERM #30  
THE 'BL/YEL' WIRE AT THE BOTTOM TERM #87



- F/PUMP RELAY HAS THE 'RED' WIRE AT TOP TERM #30  
THE 'YEL' WIRE AT THE BOTTOM TERM #87

SEE DRAWINGS

\*\* RELAYS MUST BE CONNECTED \*\*

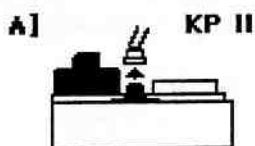

**A] MAIN RELAY - CHECKING RUN CIRCUIT**

TURN KEY 'ON' KP II ...

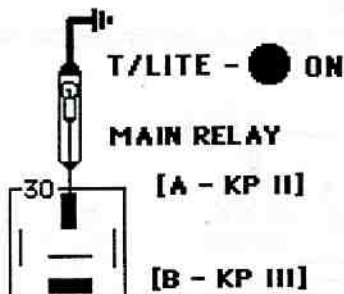
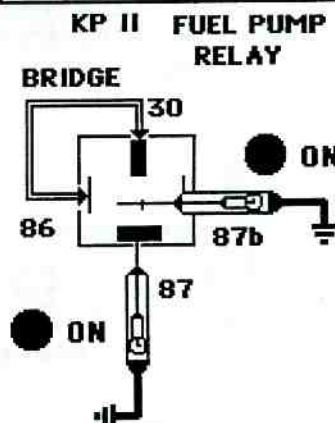
REMOVE CONNECTOR FROM AIRFLOW SENSOR SWITCH (REMOVES GROUND[-] FROM M/RELAY)

CHECK TERM #30 ... TEST LITE DOES NOT LITE, RELAY BAD

TEST LITE IS LIT ... GO TO B



**MAIN RELAY TEST  
[A]  
DISCONNECT AIR/  
FLOW SENSOR SW**

**MAIN RELAY TEST  
A & B**

**FUEL PUMP RELAY  
TEST C**

**B] MAIN RELAY - CHECK CRANK CIRCUIT**

'CRANK' ENG KP III ...

CHECK TERM #30 ..... TEST LITE DOES NOT LITE, RELAY BAD

TEST LITE IS LIT ... GO TO C



THE FUEL PUMP RELAY OUTPUT TERM<sup>s</sup> ARE #87 & 87b.

TERM #87 & 87b WILL BE FED CURRENT FROM FUSE #7 THRU RELAY TERM #30 WHEN ENG IS RUNNING [KP II] AND WHILE ENG IS CRANKED [KP III].

### C] CHECKING FUEL PUMP RELAY

TURN KEY 'OFF' KP 0 ...

REMOVE CONNECTOR FROM MAIN RELAY, LEAVE FUEL PUMP RELAY CONNECTED.

USE A JUMPER WIRE BETWEEN TERMINALS #30 -TO- #86 [WILL TURN RELAY 'ON']

CHECK BOTH TERMINALS #87 & 87b, THEY MUST BOTH GET 'HOT' OR THE RELAY IS BAD.

CHECK TERM #87 ... TEST LITE SHOULD LITE ... FUEL PUMP SHOULD RUN

- IF NO LITE, SEE C/1

CHECK TERM #87b ... TEST LITE SHOULD LITE ...

- IF NO LITE, SEE C/1

C/1 • IF RELAY DOESN'T WORK... CONNECT T/LITE TO TERM #85 TO CHECK F/PUMP RELAY GROUND[-], WHILE JUMPING CURRENT TO TERM#86 THE T/LITE SHOULD NOT LITE OR THE GROUND[-] IS BAD.

- IF T/LITE 'ON' REPAIR GROUND[-] CIRCUIT IF NEEDED.

- IF T/LITE 'OFF' RELAY IS BAD.

NOTE: IF TERM #87 GETS 'HOT'... TEST LITE 'ON' BUT F/PUMP DOESN'T RUN ... CHECK THE F/PUMP WIRING, GROUND[-] AND ALL CONNECTIONS

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\*NOTES\*

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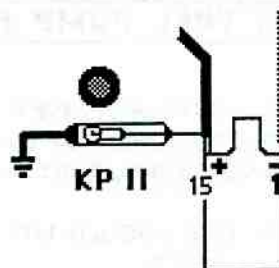
## QUICK CHECK

## CHECKING POWER SUPPLY

CHECK C/TERM #15 [+]

KEY 'ON' [KP II]

PASS TEST LITE 'DIM'



## • LITE 'OFF' •

- ✓ IGN RESISTOR
- ✓ ALL TERMINALS
- ✓ IGN SWITCH

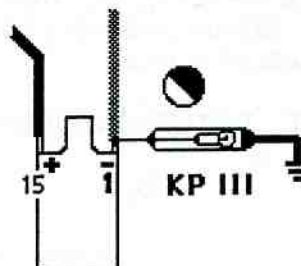
● DIM ● FLASH

## CHECK GROUNDING IMPULSES

CHECK C/TERM #1 [-]

CRANK ENG [KP III]

PASS TEST LITE 'FLASHES'



## DOES NOT FLASH

- ✓ DIST INDUCT COIL
- ✓ ALL TERMINALS
- ✓ IGN C/U

CHECK THAT DISTRIBUTOR INDUCTION COIL IS NOT 'OPEN /  $\infty$ ' OR SHORTED TO GROUND[-].

DISCONNECT THE TWO[2] WIRE CONNECTOR BETWEEN THE IGN DISTRIBUTOR &amp; THE IGN C/U.

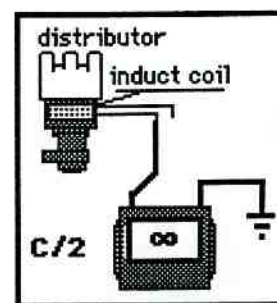
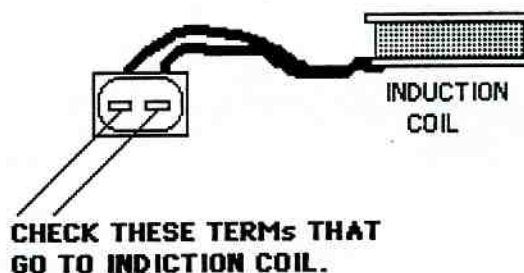
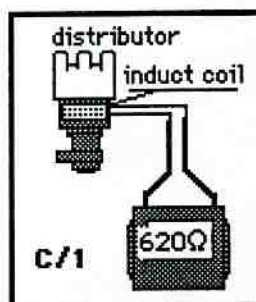
C/1 USE A DIGITAL OHM METER CONNECTED TO THE TWO TERMINALS OF THE CABLE THAT GOES TO THE DIST. CHECK RESISTANCE ...

4CYL 950 - 1250  $\Omega$  6CYL 530 - 680  $\Omega$ 

IF THE RESISTANCE IS HIGHER THAN THESE SPECS, THE DIST INDUCTION COIL IS BAD.

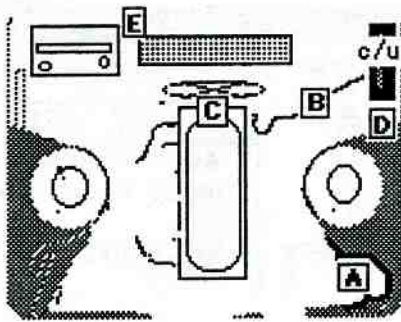
C/2 CHECK FOR A GROUNDED INDUCTION COIL. CONNECT AN OHM METER LEAD TO A GOOD ENG GROUND[-] AND THE OTHER LEAD TO A TERM OF THE DIST INDUCTION COIL CABLE. THE RESISTANCE SHOULD BE INFINITY [OPEN].

IF OHMS ARE LESS, CABLE OR DIST INDUCTION COIL IS GROUNDED[-] OUT &amp; MUST BE REPLACED.





## IMPORTANT IGNITION CONNECTIONS & AREAS



A) HARNESS PLUG & RESISTOR 4 CYL ... POWER FOR C/U & COIL BY R. H/HINGE.

B) CONNECTOR FOR DIST INDUCTION COIL [2 WIRES]  
[BN & GN]

C) CHECK FOR RUB THRU, DIST INDUCTION COIL HARNESS  
UNDER ENG BY CRANK & ALONG DIST AREA.

D) GROUND[-] CONNECTION FOR IGN C/U [on w/wash brckt]  
THE IGN C/U ALSO GROUNDS[-] THRU ITS' MOUNTING  
BRACKET, SO MAKE SURE THAT BOTH THE C/U IS  
SCREWED DOWN TIGHT AS WELL AS THE BRACKET IT  
IS MOUNTED TO IS TIGHT.

E) [2] RESISTORS 6 CYL

USE - BASIC TEST - TO FURTHER CHECK IGNITION SYSTEM

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\*NOTES\*

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**QUICK CHECK**

**CHECKING POWER SUPPLY**

CHECK C/TERMs #15 [+] & #1 [-]  
 KEY 'ON' [KP II]

TEST LITE 'BRITE' [both terms]

IF TERM #1[-] IS 'DIM' or 'OFF' CHECK FOR A  
 WORN & SHORTED GREY  
 WIRE. GROUNDED[-] OUT.



ON

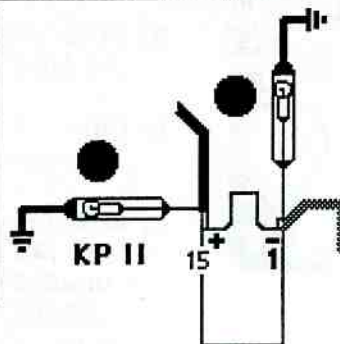


FLASH

**CHECKING GROUND IMPULSES**

CHECK C/TERM #1 [-]  
 CRANK ENG [KP III]

TEST LITE 'FLASHES'



• **LITE 'OFF'** •

✓ ALL TERMINALS  
 [RIGHT HOOD HINGE]

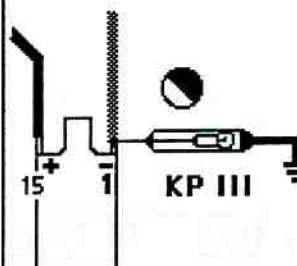
✓ IGN SWITCH

**DOES NOT FLASH**

✓ DIST HALL SWITCH

✓ ALL TERMINALS

✓ IGN C/U



**C/TERM #1 ... KP III ... T/LITE WON'T 'FLASH' ... BYPASS HALL SW**

\*\*\* BYPASS HALL SWITCH \*\*\*

1. TURN 'OFF' KEY KP O

2. UNPLUG HALL SWITCH CONNECTOR[by DIST].

3. TURN KEY 'ON' KP II

BRIDGE CONTACTS B-to-C FOR 1 SECOND. DISCONNECT.

• IF EVERYTHING IS WORKING OK, THE COIL WILL  
 'SPARK' & THE FUEL PUMP WILL RUN FOR A SECOND.

IF NOT CHECK A,B & C

A. CHECK FOR MAIN VOLTAGE FROM C/U

approx 12.5v [TERM 'A' GN]

[if no voltage, check wire & connection at C/U]

B. CHECK FOR CONTROL VOLTAGE FROM

C/U approx 5.0v [TERM 'B' YEL]

[if no voltage, check wire & connection at C/U]

[if voltage TO HIGH, check GROUND[-] wire & connection  
 for C/U, grounded[-] at INTAKE MANIFOLD]

C. USE OHM METER TO CHECK GROUND[-]

[TERM 'C' SB] LESS THAN 1  $\Omega$

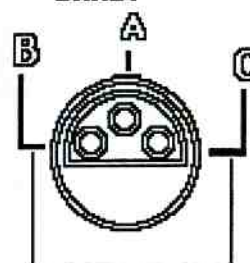
[check GROUND[-] wire & connection at C/U] & ground[-]  
 at INTAKE MANIFOLD]

• IF VOLTAGES ARE CORRECT, BUT IGN WON'T 'SPARK'  
 THE IGN C/U IS BAD.

• **BYPASS HALL SWITCH** •

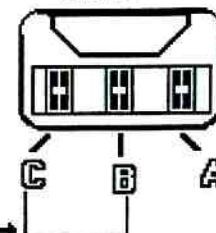
BRIDGE TERMS  
 B - to - C OF  
 THE HARNESS  
 GOING TO THE  
 IGN C/U.

EARLY



BRIDGE FOR 1 sec

LATE

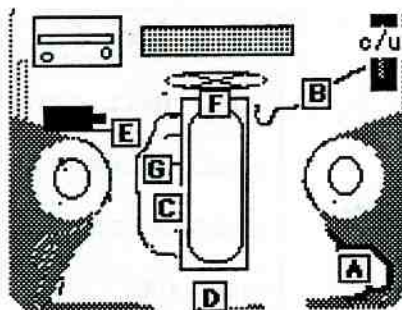


BRIDGE FOR 1 sec →



## USE - BASIC TEST - TO FURTHER CHECK IGNITION

**A SPECIAL CAUTION: NEVER DISCONNECT ANY CONTROL UNIT, AIR MASS METER, POWER STAGE etc. WITH THE KEY IN THE 'ON' POSITION [KP II]. DAMAGE TO UNITS WILL RESULT. TURN KEY OFF [KP O].**



### IMPORTANT IGNITION CONNECTIONS & AREAS

- A) HARNESS PLUG ... POWER FOR C/U & COIL BY H/HINGE
- B) CONNECTOR FOR COIL TERM #1 WIRE[GRAY WIRE]
- C) '85-on CONNECTOR for IGN SIGNAL to F/INJ[under/man]
- D) MAIN ENG HARNESS CONNECTOR, POWER FOR C/TERM #15
- E) CHECK FOR RUB THRU, GROUND OUT OF C/TERM #1 WIRE.
- F) CHECK FOR RUB THRU, GROUND OUT OF C/TERM #1 WIRE.  
UNDER ENG BY CRANK & ALONG DIST AREA.
- G) GROUND[-] CONNECTION FOR IGN C/U on intake manifold.

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### \*NOTES\*

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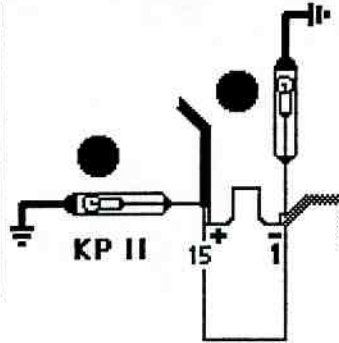
## QUICK CHECK

## CHECKING POWER SUPPLY

CHECK C/TERMS #15 [+] & #1 [-]  
KEY 'ON' [KP II]

TEST LITE 'BRITE' [both terms]

IF TERM #1[-] IS 'DIM' or 'OFF' CHECK FOR A  
BAD POWER STAGE. [GROUNDED OUT]



## • LITE 'OFF' •

- ✓ POWER STAGE
- ✓ ALL TERMINALS
- ✓ IGN SWITCH



ON

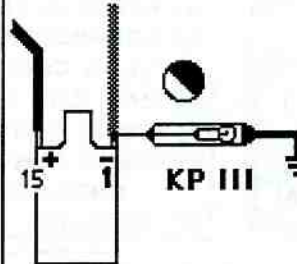


FLASH

## CHECKING GROUND IMPULSES

CHECK C/TERM #1 [-]  
CRANK ENG [KP III]

TEST LITE 'FLASHES'



## DOES NOT FLASH

- ✓ DIST HALL SWITCH
- ✓ ALL TERMINALS
- ✓ POWER STAGE
- ✓ IGN C/U

## CHECKING C/U IMPULSES AT P/STAGE

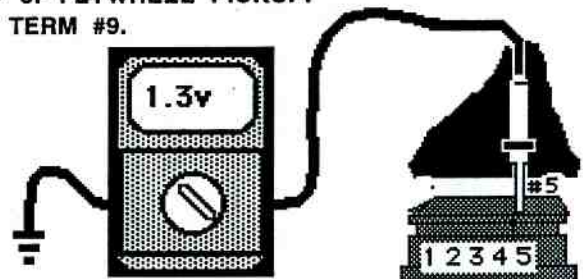
USE A DIGITAL VOLT METER TO CHECK FOR THE GROUNDING IMPULSES COMING TO THE  
POWER STAGE FROM THE IGNITION C/U. SET METER FOR 2.0v DC SCALE.

1. PEEL THE RUBBER BOOT OFF THE BACK OF THE P/STAGE HARNESS PLUG.
2. INSERT THE POS[+] PROBE INTO #5 TERMINAL [GRAY WIRE].
3. CRANK ENG [KP III].
4. VOLTAGE SHOULD OSCILLATE BETWEEN APPROX 0.8v to 1.8v.

IF VOLTAGE DOESN'T OSCILLATE, CHECK THE HALL SW or FLYWHEEL PICKUP.  
ALSO CHECK WIRING BETWEEN P/STAGE #5 & IGN C/U TERM #9.  
IF THESE CHECK OUT OK, THE IGNITION C/U IS BAD.



POWER STAGE HARNESS PLUG



ENG CRANKING [KP II]

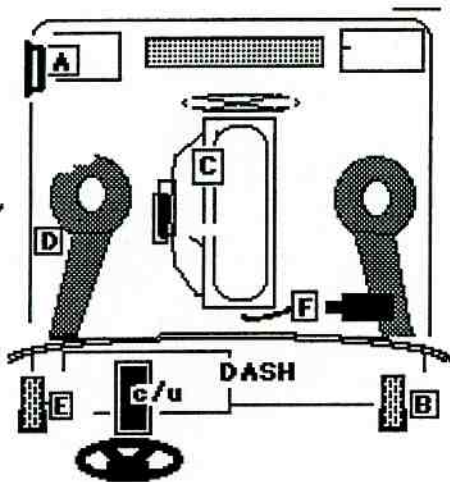
## ••• COMMON PROBLEM •••

IF TERM #1[-] IS 'DIM' or 'OFF' WITH KEY 'ON' [KP II] CHECK FOR A BAD POWER STAGE  
[GROUNDED OUT]. TO CHECK TO SEE IF THE POWER STAGE IS GROUNDING OUT THE IGNITION  
COIL, TURN THE IGNITION 'OFF' [KP O]. UNPLUG THE POWER STAGE, TURN IGNITION BACK  
'ON' [KP II]. IF T/LITE IS NOW 'ON' BRITE, THE POWER STAGE IS BAD. IF THE T/LITE IS STILL  
'OFF' OR 'DIM' THE WIRE TO COIL TERM #1 MUST BE GROUNDED OUT. [KP II].



## • EZK IGNITION SYSTEM - - IMPORTANT CONNECTIONS & AREAS •

ALL CONNECTIONS SHOULD BE CHECKED FOR CLEAN & TIGHT CONTACT. THE CONNECTIONS MUSN'T BE OVERLOOKED AS THE SOURCE OF THE PROBLEMS IN THE SYSTEM.



A] POWER STAGE - GROUNDS IGN COIL - AMPLIFIES THE IMPULSE SIGNAL FROM C/U.

B] MAIN POWER TO C/U TERM #6  
MAIN POWER TO POWER STAGE TERM #4  
28 PIN HARNESS PLUG [BL wire term 28]

C] KNOCK SENSOR[on block between cyl 1 & 2]

D] HARNESS PLUG  
[TURBO]MAIN POWER TO IGN COIL TERM#15 term #7  
GROUND[-] FOR C/U HARN/PLUG term #3  
THROTTLE SW HARN/PLUG term #6

E] [NON-TURBO]MAIN POWER TO IGN COIL TERM#15  
28 PIN HARNESS PLUG [BL wire term 6]

F] IGNITION COIL & PLUG CABLES  
G] HARNESS PLUG

### USE - BASIC TEST - TO FURTHER CHECK IGNITION SYSTEM

05

705

### \*NOTES\*

A SPECIAL CAUTION: NEVER DISCONNECT ANY CONTROL UNIT, AIR MASS METER, POWER STAGE etc. WITH THE KEY IN THE 'ON' POSITION [KP II]. DAMAGE TO UNITS WILL RESULT. TURN KEY OFF [KP O].

05

707

WHEN YOU HAVE A RUNNING PROBLEM, THERE ARE A FEW 'VITAL SIGNS' YOU SHOULD CHECK TO HELP PINPOINT THE POSSIBLE CAUSES OF THE POOR RUNNING CONDITION. WHEN YOU FIND THAT THE PROPER 'VITAL SIGN' VALUES ARE PRESENT FOR VARIOUS COMPONENTS, YOU WILL BE ABLE TO ELIMINATE THEM AS A POSSIBLE CAUSE. THOSE ITEMS THAT DON'T MEET THE PROPER VALUE ARE WHERE YOU SHOULD FOCUS YOUR ATTENTION.

ALSO, SINCE THIS IS A BASIC TEST, IT IS ENTIRELY POSSIBLE THAT THE VALUES THAT ARE CHECKED MAY ALL BE CORRECT AND NO FAULTS FOUND. IN THOSE CASES, YOU WILL HAVE TO USE YOUR TECHNICAL EXPERTISE TO CHECK COMPONENTS AND AREAS MOST LIKELY CAUSING THE POOR RUNNING CONDITION.

**\*\* REMEMBER ERRATIC, NORMAL THAN POOR RUNNING CONDITIONS, CAN GIVE YOU GOOD, THAN POOR TEST RESULTS. SO DOUBLE CHECKING SHOULD ALWAYS BE DONE.**

START WITH THE MOST COMMON 'VITAL SIGNS' AND CHECKS, THOSE ARE: IGNITION TIMING & TIMING ADVANCE, IDLE SPEED, THROTTLE SWITCH[CLICK-CLICK].  
YOU SHOULD ALSO CHECK ENGINE TEMP[COLD - COOL- WARM - NORMAL OPERATING TEMP- HOT]

**\*\*\*\*\* ADDITIONAL ITEMS TO CHECK \*\*\*\*\***

VACUUM LEAKS  
DIST CAP & IGN WIRES  
IDLE MOTOR  
EGR VALVE  
CAMSHAFT TIMING  
25 AMP FUSE [LH INJECTION]  
HIGH ALCOHOL CONTENT FUEL[over 10%]

FUEL INJECTION FUSES  
FUEL PRESSURES  
MAIN & PRE-PUMP DELIVERY  
CLOGGED INJECTORS  
CONTAMINATED FUEL  
CLOGGED FUEL FILTER  
IS K-JET FREQUENCY VALVE BUZZING ?

**USE DIGITAL VOLT METER TO CHECK FOR 'VITAL SIGNS' THAT SHOULD SHOW IF BASIC FUNCTION IS OK, OR IF A FAULT IS PRESENT.**

**\*\*\* CHECK SPARK PLUGS \*\*\***

- ARE THEY-
- ✓ WORN OUT ???
  - ✓ GAS FOULED, WET, OR CARBON BLACK [RUNNING RICH]
  - ✓ WHITE, BURNED CLEAN [RUNNING LEAN]
  - YOU MUST KNOW IF YOU ARE LOOKING FOR A LEAN OR A RICH CONDITION???

**A SPECIAL CAUTION: NEVER DISCONNECT ANY CONTROL UNIT, AIR MASS METER, HALL SWITCH, POWER STAGE etc. WITH THE KEY IN THE 'ON' POSITION [KP II]. DAMAGE TO UNITS WILL RESULT. TURN KEY OFF [KP O].**



THESE ARE THE INITIAL CHECKS TO MAKE ON AN ENGINE THAT IS RUNNING POORLY.  
THE THREE[3] TESTS WILL PINPOINT THE MOST COMMON FAULTS. **THE TESTS ARE:**

- 1) **INJECTOR SEAL VACUUM LEAKS**
- 2) **OXYGEN SENSOR OUTPUT VOLTAGE** [if equipped]      [CO CONTENT... AIR/FUEL MIXTURE]
- 3) **EGR VALVE OPERATION** [if equipped]      [IF THE EGR VALVE STAYS OPEN, ENG WILL BE VERY LEAN]

**\*\*\* ALSO CHECK:**

- ✓ F/INJECTOR SPRAY PATTERNS, TO DETERMINE IF INJECTORS ARE CLOGGED.
- ✓ FUEL PRESSURES, CONTROL PRESS REG.
- ✓ AUXILIARY AIR SLIDE[POOR FAST IDLE FOR COLD ENGINE]
- ✓ PRE-PUMP DELIVERY [POOR IDLE AND CRUISING, BUCKING ENGINE]

**\*\* REMEMBER ERRATIC, NORMAL THAN POOR RUNNING CONDITIONS, CAN GIVE YOU GOOD, THAN POOR TEST RESULTS. SO DOUBLE CHECKING SHOULD ALWAYS BE DONE.**

**1] INJECTOR SEAL VACUUM LEAKS**

**2] OXYGEN SENSOR OUTPUT VOLTAGE &  
C/U [GRN] OXY SENSOR TERM VOLTAGE**

**3] EGR VALVE OPERATION**

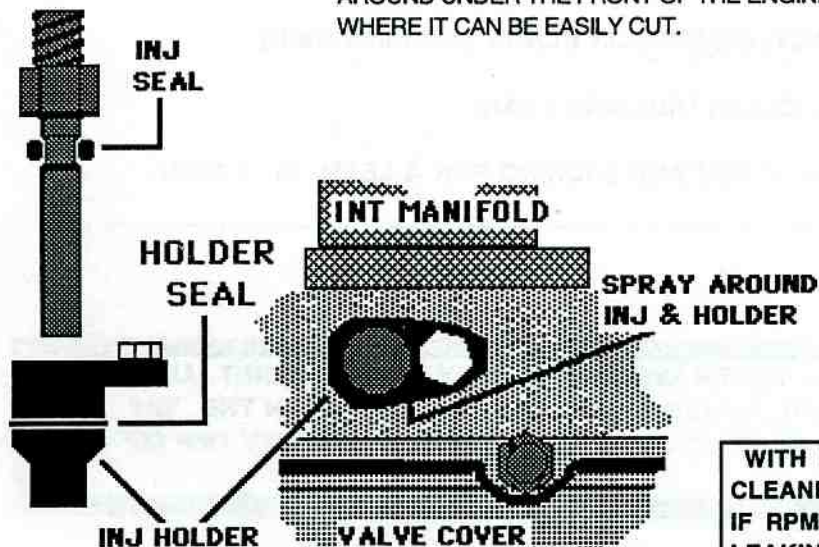
**TEST #1  
K-JETRONIC INJ  
INJECTOR SEAL  
VACUUM LEAKS**

USE A CARB CLEANER, AEROSOL PENETRATING OIL  
[WD-40] ETC TO HELP LOCATE LEAKS.

**7  
253**

--- USE CAUTION WITH FLAMMABLE FLUIDS ---

CHECK ALL VAC HOSE CONNECTIONS AT BOTH ENDS FOR  
CRACKING. CHK 'MPG' IGN VAC ADVANCE DIAPHRAGM ON IGN C/U  
TO ENSURE THERE IS VACUUM PRESENT. THE HOSE ROUTES  
AROUND UNDER THE FRONT OF THE ENGINE BY CRANK PULLEY,  
WHERE IT CAN BE EASILY CUT.



**WITH ENG RUNNING SPRAY CARB  
CLEANER AROUND INJ & HOLDER,  
IF RPMs CHANGE THE SEALS ARE  
LEAKING AND MUST BE REPLACED.**

## 2] OXYGEN SENSOR OUTPUT VOLTAGE & C/U [GRN] OXY SENSOR TERM VOLTAGE

7  
255

2] OXYGEN SENSOR OUTPUT VOLTAGE & C/U [GRN] OXY SENSOR TERM VOLTAGE  
IF THE CORRECT VOLTAGES ARE PRESENT, OXY SENSOR AND CONTROL UNIT MOST LIKELY ARE TROUBLE FREE.  
[IF AN EXHAUST GAS ANALYZER AVAILABLE, USE TO MONITOR C/O] ENGINE AT OPERATING TEMP

### 2a] OXYGEN SENSOR OUTPUT VOLTAGE

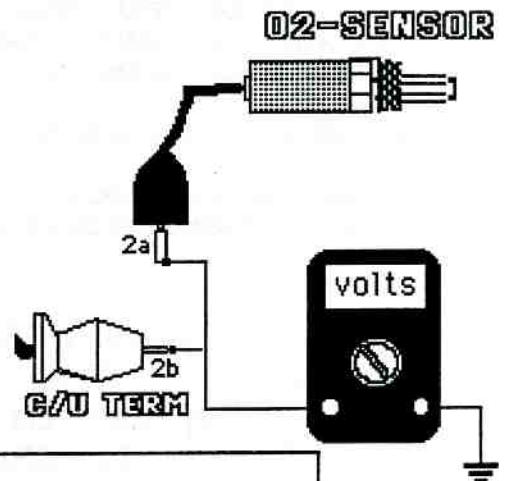
DISCONNECT OXY SENSOR, CHECK AT OXY SENSOR [BLACK] WIRE  
STEADY or oscillates between --- 0.45 to 0.65v [with correct C/O]

\* TO CHECK OXY SENSOR & C/U FUNCTION, PERFORM THE FOLLOWING TESTS:

→ FULL RICH TEST [maximum OXY SENSOR output]  
GROUND[-] C/U OXY SENSOR[GRN] TERM  
OXY SENSOR OUTPUT SHOULD BE ——— 0.9v  
[ENG SPEED SHOULD INCREASE SLIGHTLY]

→ FULL LEAN TEST [minimum OXY SENSOR output]  
WITH ONE HAND HOLD C/U OXY SENSOR[GRN] TERM  
WITH OTHER HAND HOLD POS[+] BAT TERM  
OXY SENSOR OUTPUT SHOULD BE ——— 0.1v  
[ENG SPEED SHOULD DECREASE SLIGHTLY]

\* THESE READINGS SHOW OXY SENSOR & C/U IS — OK  
IF NOT, GO TO TEST - 2b



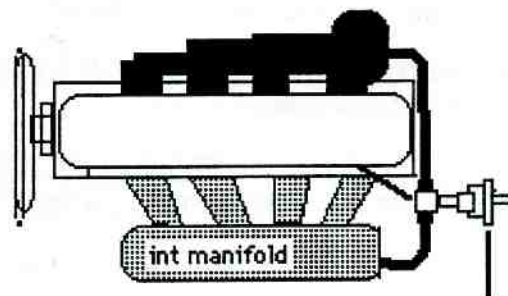
### 2b] CHECK LAMBDA C/U AT [GREEN] OXY SENSOR TERM

THE KEY 'ON' [KP II] APPROX (4CYL K-JET 2.2v '78-80) (V6 K-JET 0.5v '77-86)  
(4CYL K-JET 0.5v '81-85)

## TEST #3 EGR VALVE TEST '74-79 MODELS without LAMBDA SOND

7  
257

\*CHECK THAT ALL LINES AND  
PIPES ARE NOT PLUGGED  
\*CHECK ALL HOSES FOR DRY ROT



THE EGR VALVE MUST NOT STICK OPEN OR CLOSED. IT MUST ONLY OPEN DURING ACCELERATION NOT AT IDLE OR THE ENG WILL WANT TO DIE.

USE A HAND VACUUM PUMP OR A VAC HOSE THAT HAS VAC AT IDLE TO CHK EGR. IT MUST OPEN WITH VAC, THE ENG WILL WANT TO DIE, WHEN VAC IS REMOVED EGR MUST CLOSE, ENG WILL THEN RUN NORMALLY AGAIN.

YOU SHOULD BE ABLE TO LOOK AT THE EGR VALVE AND SEE THE PISTON MOVE IN WHEN VACUUM IS SUPPLIED AND SEE THE PISTON MOVE OUT WHEN THE VACUUM SUPPLY IS CUT OFF.

IF NO MOVEMENT WITH VACUUM SUPPLIED, VALVE IS STICKING IN THE OPEN OR SHUT POSITION.



THESE IMPORTANT FUEL INJECTION 'VITAL SIGNS' CAN HELP YOU DETERMINE IF THE FUEL INJECTION SYSTEM IS AT LEAST GETTING THE PROPER INFORMATION, ALONG WITH TELLING YOU THE TESTED COMPONENTS ARE OPERATING NORMALLY.

THE THREE[3] SENSORS TELL THE FUEL INJECTION C/U THE MOST VITAL INFORMATION IT NEEDS TO BOTH MONITOR ENGINE NEEDS AND F/INJECTION SYSTEM OPERATION.

**THE SENSORS AND FUNCTIONS ARE:**

- |                                  |                                   |
|----------------------------------|-----------------------------------|
| 1] AIR MASS METER OUTPUT TERM #7 | [VOLUME OF AIR ENGINE IS USING]   |
| 2] OXYGEN SENSOR OUTPUT VOLTAGE  | [C/O CONTENT... AIR/FUEL MIXTURE] |
| 3] ENG TEMP SENSOR OPERATION     | [ENGINE TEMPERATURE]              |

IF THESE VALUES ARE CORRECT, THE F/INJECTION SYSTEM IS PROBABLY OPERATING OK.

• REMEMBER ERRATIC, NORMAL THAN POOR RUNNING CONDITIONS, CAN GIVE YOU GOOD, THAN POOR TEST RESULTS. SO DOUBLE CHECKING SHOULD ALWAYS BE DONE.

**1] AIR MASS METER OUTPUT TERM #7**

**2] OXYGEN SENSOR OUTPUT VOLTAGE &  
C/U [GRN] OXY SENSOR TERM VOLTAGE**

**3] ENG TEMP SENSOR OPERATION [VOLTAGE]**

**1] AIR MASS METER OUTPUT - TERM #7  
APPROXIMATE VOLTAGES SHOW A.M.M. IS - OK**

7  
263

**1] AIR MASS METER OUTPUT - TERM #7**

• IF THE CORRECT VOLTAGES ARE PRESENT, THE AIR MASS METER AND THE FUEL INJECTION CONTROL UNIT MOST LIKELY ARE TROUBLE FREE.

CHECK FROM BACK OF CONNECTOR [connector hooked up]  
THE KEY 'ON' [KP II] APPROXIMATE VOLTAGES  $\pm 0.1v$

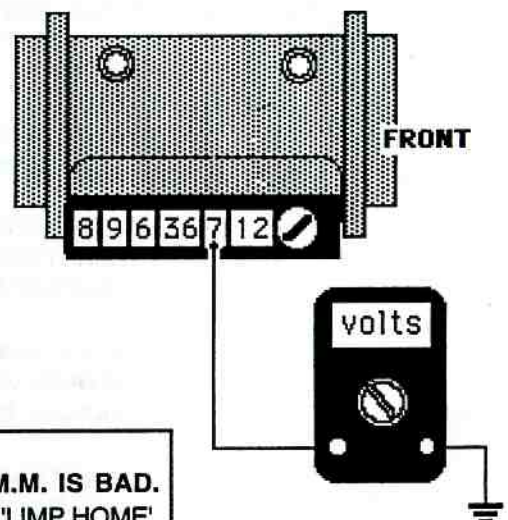
1a] [KP II] ENG STALLED ----- 1.6v

1b] [KP II] ENG RUNNING IDLE 750 RPM — 2.6v

1c] [KP II] ENG RUNNING 3,500 RPM -- up to 3.5v

READINGS MORE THAN  $\pm 0.3v$ , FAULT IN A.M.M., ITS GROUND[-]  
WIRES TERMS #6 & #36 OR FUEL INJECTION C/U

AMBIENT TEMPERATURE WILL INFLUENCE READINGS SOMEWHAT.



**IF YOU THINK A.M.M. IS BAD, JUST DISCONNECT  
A.M.M. HARNESS, IF ENG WILL NOW START & RUN THE A.M.M. IS BAD.  
NOTE; HARD ACCEL WILL KILL ENG SINCE THE INJ SYSTEM IS IN 'LIMP HOME'  
MODE.**

## 2] OXYGEN SENSOR OUTPUT VOLTAGE & C/U [GRN] OXY SENSOR TERM VOLTAGE

7  
265

2] OXYGEN SENSOR OUTPUT VOLTAGE & C/U [GRN] OXY SENSOR TERM VOLTAGE.  
IF THE CORRECT VOLTAGES ARE PRESENT, OXY SENSOR AND CONTROL UNIT MOST LIKELY ARE TROUBLE FREE.  
[IF AN EXHAUST GAS ANALYZER AVAILABLE, USE TO MONITOR C/O]

### DISCONNECT OXY SENSOR

#### 2a] CHECK AT OXY SENSOR [BLACK] WIRE

##### • OXYGEN SENSOR OUTPUT VOLTAGE

ENG AT OPERATING TEMP[with correct C/O]

oscillates between ——— 0.4 to 0.7v

\* TO CHECK OXY SENSOR & C/U FUNCTION, PERFORM THE FOLLOWING TESTS:

##### • FULL RICH TEST [maximum OXY SENSOR output]

GROUND[-] C/U OXY SENSOR[GRN] TERM

OXY SENSOR OUTPUT SHOULD BE ——— 0.9v

[ENG SPEED SHOULD INCREASE SLIGHTLY]

##### • FULL LEAN TEST [minimum OXY SENSOR output]

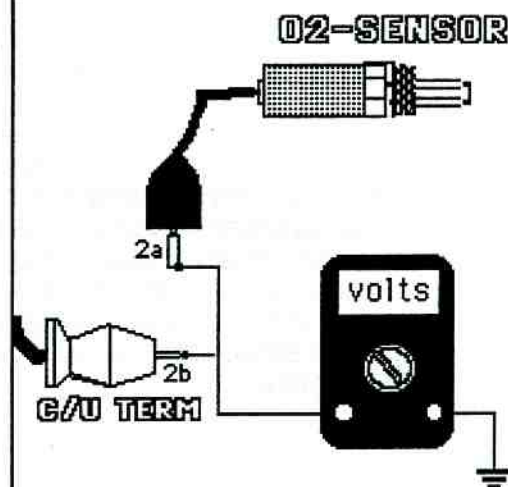
WITH ONE HAND HOLD C/U OXY SENSOR[GRN] TERM

WITH OTHER HAND HOLD POS[+] BAT TERM

OXY SENSOR OUTPUT SHOULD BE ——— 0.1v

[ENG SPEED SHOULD DECREASE SLIGHTLY]

\* THESE READINGS SHOW OXY SENSOR & C/U IS --- OK



2b] CHECK AT C/U [GREEN] OXY SENSOR TERM THE KEY 'ON' [KP II] APPROX 0.5v

## 3] ENG TEMP SENSOR OPERATION [VOLTAGE]

TO CHECK probe[BL] wire to temp sensor or C/U TERM #2

7  
267

3] ENG TEMP SENSOR OPERATION [VOLTAGE] C/U TERM #2

IF THE CORRECT VOLTAGES ARE PRESENT, THE ENG TEMP SENSOR OPERATION AND THE FUEL INJECTION CONTROL UNIT MOST LIKELY ARE TROUBLE FREE. IF THE VOLTAGES ARE INCORRECT, CHECK VOLTAGE SUPPLIED TO ENG TEMP SENSOR FROM C/U, IT SHOULD BE APPROX 4.5 to 5.0 VOLTS WITH THE TEMP SENSOR CONNECTOR DISCONNECTED. IF VOLTAGE CORRECT TEMP SENSOR MOST LIKELY BAD.

### THE KEY 'ON' [KP II] ENGINE RUNNING OR STALLED

[APPROXIMATE VOLTAGES SHOWING PROPER OPERATION]

IF ENG IS 20°F, VOLTAGES WILL BE HIGH ——— approx— 3.2v

IF ENG IS 68°F, VOLTAGES WILL BE ——— approx— 1.4v

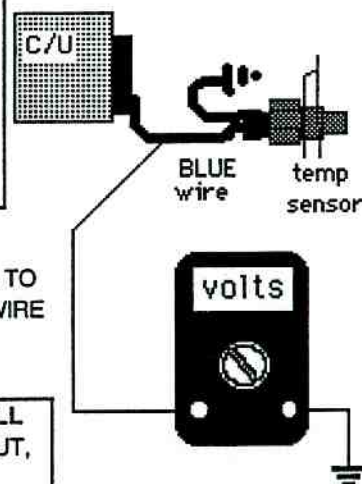
IF ENG IS OPER TEMP 190°F, VOLT WILL BE ——— approx— 0.1v

IF VOLTAGE IS 4.5v, THE SENSOR IS DISCONNECTED, BAD OR WIRES OR TERMINALS BROKEN.

• THE TEMP SENSOR [BL] WIRE IS IN THE TAPED UP HARNESS THAT RUNS ALONG FIREWALL BEHIND ENG. UNWRAP SOME OF THE TAPE TO EXPOSE WIRING, USE A PIN TO PROBE THRU BLUE WIRE TO CHECK VOLTAGE. BE SURE GOOD CONTACT IS MADE & WIRE IS TEMP SENSOR WIRE, SOLID BLUE.

NOTE - WHEN ENGINE IS RUNNING, IF SENSOR IS UNPLUGGED, ENG WILL RUN A BIT ERRATIC. IT MAY RUN RICHER & FASTER, OR IT MAY START FOULING OUT, CAUSING IT TO RUN VERY POORLY.

• WHEN ENGINE IS WARM & 'OFF', IF SENSOR IS UNPLUGGED, THE ENG WON'T RESTART OR WILL BE VERY HARD TO RESTART.





# TEMP SENSOR WIRE PROBE LOCATIONS

200 SERIES -- BLUE WIRE

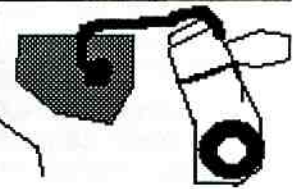
700 SERIES -- GRAY WIRE

7  
268

## ... 200 SERIES ...

• THE TEMP SENSOR [BL] WIRE IS IN THE TAPED UP HARNESS THAT RUNS ALONG FIREWALL BEHIND ENG. UNWRAP SOME OF THE TAPE TO EXPOSE WIRING, USE A PIN TO PROBE THRU BLUE WIRE TO CHECK VOLTAGE. BE SURE GOOD CONTACT IS MADE & WIRE IS TEMP SENSOR WIRE, SOLID BLUE.

• The harness goes along rear firewall, it enters thru a rubber grommet in right side panel. The harness is the one that is taped up. PROBE BLUE WIRE

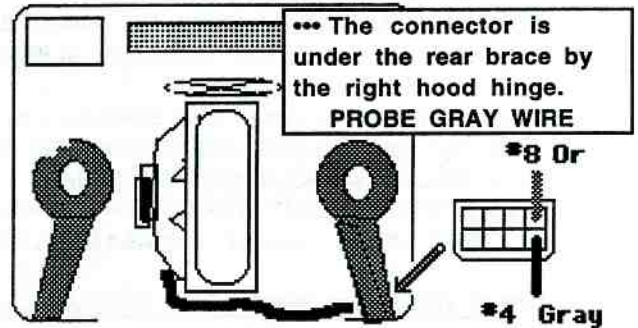


## ... 700 SERIES ...

## 700 SERIES

• THE TEMP SENSOR [GR] WIRE IS IN THE HARNESS THAT RUNS ALONG FIREWALL BEHIND ENG TO AN EIGHT[8] TERM CONNECTOR BELOW BRACE NEAR RIGHT HOOD HINGE. USE A PIN TO PROBE THRU GRAY WIRE [TERM #4] TO CHECK VOLTAGE. BE SURE GOOD CONTACT IS MADE & WIRE IS TEMP SENSOR WIRE, SOLID GRAY NEXT TO ORANGE[Or] WIRE.

• The connector is under the rear brace by the right hood hinge. PROBE GRAY WIRE



## \*NOTES\*

THESE IMPORTANT FUEL INJECTION 'VITAL SIGNS' CAN HELP YOU DETERMINE IF THE FUEL INJECTION SYSTEM IS AT LEAST GETTING THE PROPER INFORMATION, ALONG WITH TELLING YOU THE TESTED COMPONENTS ARE OPERATING NORMALLY.

THE THREE[3] SENSORS TELL THE FUEL INJECTION C/U THE MOST VITAL INFORMATION IT NEEDS TO BOTH MONITOR ENGINE NEEDS AND F/INJECTION SYSTEM OPERATION.

**THE SENSORS AND FUNCTIONS ARE:**

- |                                  |                                   |
|----------------------------------|-----------------------------------|
| 1] AIR MASS METER OUTPUT TERM #3 | [VOLUME OF AIR ENGINE IS USING]   |
| 2] OXYGEN SENSOR OUTPUT VOLTAGE  | [C/O CONTENT... AIR/FUEL MIXTURE] |
| 3] ENG TEMP SENSOR OPERATION     | [ENGINE TEMPERATURE]              |

IF THESE VALUES ARE CORRECT, THE F/INJECTION SYSTEM IS PROBABLY OPERATING OK.

• REMEMBER ERRATIC, NORMAL THAN POOR RUNNING CONDITIONS, CAN GIVE YOU GOOD, THAN POOR TEST RESULTS. SO DOUBLE CHECKING SHOULD ALWAYS BE DONE.

**1] AIR MASS METER OUTPUT TERM #3**

**2] OXYGEN SENSOR OUTPUT VOLTAGE &  
C/U [GRN] OXY SENSOR TERM VOLTAGE**

**3] ENG TEMP SENSOR OPERATION [VOLTAGE]**

**1] AIR MASS METER OUTPUT - TERM #3  
APPROXIMATE VOLTAGES SHOW A.M.M. IS - OK**

**7  
273**

**1] AIR MASS METER OUTPUT - TERM #3**

• IF THE CORRECT VOLTAGES ARE PRESENT, THE AIR MASS METER AND THE FUEL INJECTION CONTROL UNIT MOST LIKELY ARE TROUBLE FREE.

CHECK FROM BACK OF CONNECTOR [connector hooked up]  
THE KEY 'ON' [KP II] APPROXIMATE VOLTAGES  $\pm 0.1v$

1a] [KP II] ENG STALLED ----- 1.4v

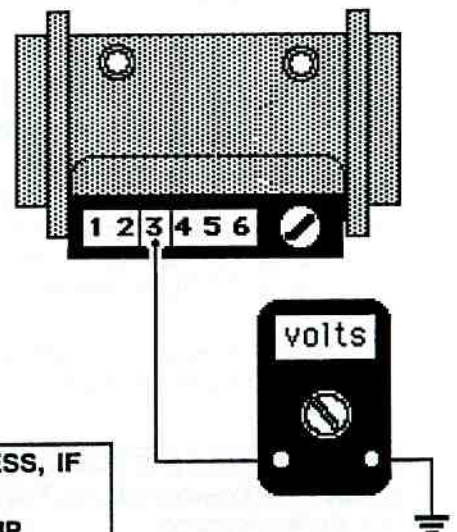
1b] [KP II] ENG RUNNING IDLE 750 RPM — 2.2v

1c] [KP II] ENG RUNNING 3,500 RPM – up to 3.0v

READINGS MORE THAN  $\pm 0.3v$ , FAULT IN A.M.M., ITS GROUND[-] WIRES  
TERMS #1 & #2 OR FUEL INJECTION C/U

AMBIENT TEMPERATURE WILL INFLUENCE READINGS SOMEWHAT.

IF YOU THINK A.M.M. IS BAD, JUST DISCONNECT A.M.M. HARNESS, IF  
ENG WILL NOW START & RUN THE A.M.M. IS BAD.  
NOTE; HARD ACCEL WILL KILL ENG SINCE THE INJ SYSTEM IS IN 'LIMP  
HOME' MODE.





## 2] OXYGEN SENSOR OUTPUT VOLTAGE & C/U [GRN] OXY SENSOR TERM VOLTAGE

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275

- 2] OXYGEN SENSOR OUTPUT VOLTAGE & C/U [GRN] OXY SENSOR TERM VOLTAGE  
IF THE CORRECT VOLTAGES ARE PRESENT, OXY SENSOR AND CONTROL UNIT MOST LIKELY ARE TROUBLE FREE.  
[IF AN EXHAUST GAS ANALYZER AVAILABLE, USE TO MONITOR C/O]

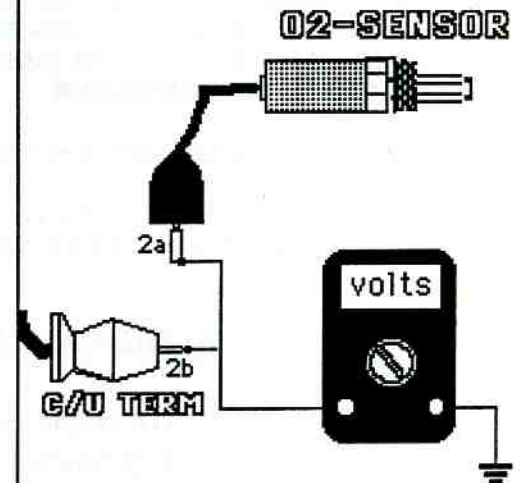
### DISCONNECT OXY SENSOR

- 2a] OXYGEN SENSOR OUTPUT VOLTAGE  
CHECK AT OXY SENSOR [BLACK] WIRE  
ENG AT OPERATING TEMP [with correct C/O]  
oscillates between ----- 0.4 to 0.7v

\* TO CHECK OXY SENSOR & C/U FUNCTION, PERFORM THE FOLLOWING TESTS:

- FULL RICH TEST [maximum OXY SENSOR output]  
GROUND[-] C/U OXY SENSOR[GRN] TERM  
OXY SENSOR OUTPUT SHOULD BE ----- 0.9v  
[ENG SPEED SHOULD INCREASE SLIGHTLY]
- FULL LEAN TEST [minimum OXY SENSOR output]  
WITH ONE HAND HOLD C/U OXY SENSOR[GRN] TERM  
WITH OTHER HAND HOLD POS[+] BAT TERM  
OXY SENSOR OUTPUT SHOULD BE ----- 0.1v  
[ENG SPEED SHOULD DECREASE SLIGHTLY]

\* THESE READINGS SHOW OXY SENSOR & C/U IS --- OK



2b] CHECK AT C/U [GREEN] OXY SENSOR TERM THE KEY 'ON' [KP II] APPROX 0.5v

## 3] ENG TEMP SENSOR OPERATION [VOLTAGE] TO CHECK probe wire to temp sensor or C/U TERM #2

7  
277

- 3] ENG TEMP SENSOR OPERATION [VOLTAGE] C/U TERM #2  
IF THE CORRECT VOLTAGES ARE PRESENT, THE ENG TEMP SENSOR OPERATION AND THE FUEL INJECTION CONTROL UNIT MOST LIKELY ARE TROUBLE FREE.

IF THE VOLTAGES ARE INCORRECT, CHECK VOLTAGE SUPPLIED TO ENG TEMP SENSOR FROM C/U, IT SHOULD BE APPROX 4.5 to 5.0 VOLTS WITH THE TEMP SENSOR CONNECTOR DISCONNECTED.  
IF VOLTAGE CORRECT TEMP SENSOR MOST LIKELY BAD.

IF THE C/U IS GETTING THE WRONG INFO ON ENG TEMP, THE C/U WILL BE UNABLE TO ADJUST THE AIR/FUEL MIXTURE PROPERLY.

### TEMP SENSOR TEST

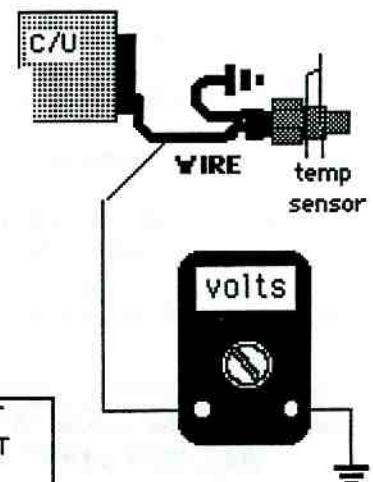
THE KEY 'ON' [KP II] ENGINE RUNNING OR STALLED  
[APPROXIMATE VOLTAGES SHOWING PROPER OPERATION]

- IF ENG IS 20°F, VOLTAGES WILL BE HIGH ----- approx--- 3.5v
- IF ENG IS 68°F, VOLTAGES WILL BE -----approx--- 2.2v
- IF ENG IS OPER TEMP 190°F, VOLT WILL BE -----approx--- 0.4v

IF VOLTAGE IS 4.5v, THE SENSOR IS DISCONNECTED, BAD OR WIRES AND/OR TERMINALS TO IT ARE BROKEN.

NOTE - WHEN ENGINE IS RUNNING, IF SENSOR IS UNPLUGGED, ENG WILL RUN A BIT ERRATIC. IT MAY RUN RICHER & FASTER, OR IT MAY START FOULING OUT, CAUSING IT TO RUN VERY POORLY.

• WHEN ENGINE IS WARM & 'OFF', IF SENSOR IS UNPLUGGED, THE ENG WON'T RESTART OR AT LEAST, BE VERY HARD TO RESTART.



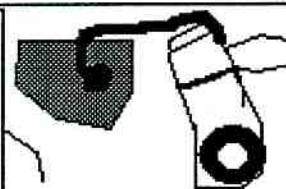
# **TEMP SENSOR WIRE PROBE LOCATIONS** **200 SERIES -- BLUE WIRE**      **700 SERIES -- GRAY WIRE**

7  
278

## ... 200 SERIES ...

• THE TEMP SENSOR [BL] WIRE IS IN THE TAPED UP HARNESS THAT RUNS ALONG FIREWALL BEHIND ENG. UNWRAP SOME OF THE TAPE TO EXPOSE WIRING, USE A PIN TO PROBE THRU BLUE WIRE TO CHECK VOLTAGE. BE SURE GOOD CONTACT IS MADE & WIRE IS TEMP SENSOR WIRE, SOLID BLUE.

• The harness goes along rear firewall, it enters thru a rubber grommet in right side panel. The harness is the one that is taped up. PROBE BLUE WIRE

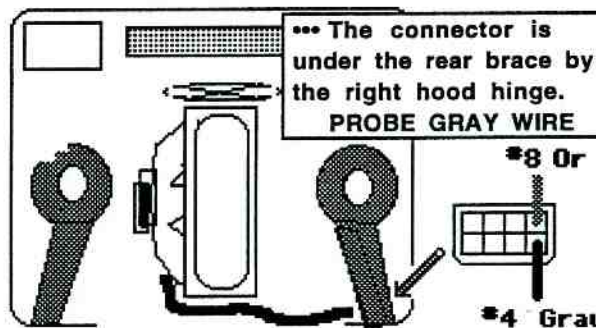


## ... 700 SERIES ...

## **700 SERIES**

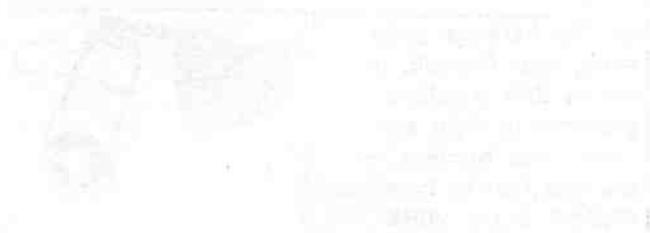
• THE TEMP SENSOR [GR] WIRE IS IN THE HARNESS THAT RUNS ALONG FIREWALL BEHIND ENG TO AN EIGHT[8] TERM CONNECTOR BELOW BRACE NEAR RIGHT HOOD HINGE. USE A PIN TO PROBE THRU GRAY WIRE [TERM #4] TO CHECK VOLTAGE. BE SURE GOOD CONTACT IS MADE & WIRE IS TEMP SENSOR WIRE, SOLID GRAY NEXT TO ORANGE[Or] WIRE.

• The connector is under the rear brace by the right hood hinge. PROBE GRAY WIRE



## **\*NOTES\***





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**BASIC CHECK**

THIS TEST SHOULD BE THE FIRST STEP YOU TAKE IN DIAGNOSING A NO START PROBLEM. IT WILL GIVE YOU A CLUE IN WHAT DIRECTION YOU SHOULD HEAD TO FIND THE PROBLEM, THE IGNITION OR THE FUEL INJECTION SYSTEMS.

• NOTE: ERRATIC PROBLEMS CAN STILL EXIST IN A SYSTEM THAT CHECKS OUT GOOD, THEY WILL ONLY FAIL THE TEST WHEN THE SYSTEM FAILS AND THE ENGINE WON'T START.

**\*\*\* WHAT DOES A 'PASSED' TEST TELL US \*\*\***

LISTED BELOW ARE THE COMPONENTS THAT MUST BE 'OK' IN ORDER TO 'PASS' BASIC TEST:

**• K-JET FUEL INJECTION & BOSCH IGNITION:**

200 SERIES .... FUSES #7, 13...IGN INDUCTION COIL...IGN C/U & WIRING...FUEL INJ RELAY

700 SERIES .... FUSE #1...IGN INDUCTION COIL...IGN C/U & WIRING...FUEL INJ RELAY

**• LH II FUEL INJECTION & MPG 'HALL EFFECT' IGNITION:**

200 SERIES['83-84] .. FUSES 25 AMP[under hood], #12 ['83], #13 ['84]... IGN HALL SW..

IGN PRIMARY WIRING & C/U... BASIC F-INJ C/U FUNCTION... FUEL INJ RELAY

200 SERIES ['85-88]... FUSE 25 AMP[under hood], ... IGN HALL SW.. IGN PRIMARY

WIRING & C/U... BASIC F-INJ C/U FUNCTION.... FUEL INJ RELAY

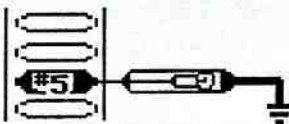
**• LH II FUEL INJECTION & MPG EZK IGNITION:**

700 SERIES...FUSE #1... IGN HALL SW... EZK IGN C/U & PRIMARY CIRCUIT WIRING ...

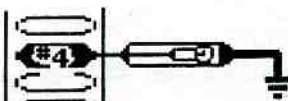
BASIC F-INJ C/U FUNCTION.... FUEL INJ RELAY

760 SERIES '88-ON ...FUSE#31... ['88-89 TURBO] HALL SW... [V6 & '90 TURBO] IGN FLYWHEEL SPEED SENSOR

EZK IGN C/U & PRIMARY CIRCUIT ...WIRING ... BASIC F-INJ C/U FUNCTION.... FUEL INJ RELAY

**..... BASIC TEST .....****200 SERIES  
PRE-PUMP FUSES**

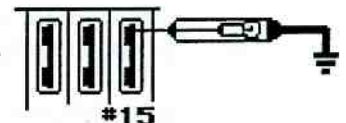
'79-84 K-JETRONIC  
'83-84 LH INJECTION



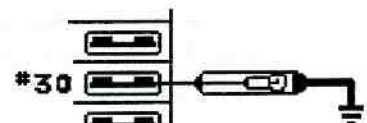
'85 TURBO K-JETRONIC  
'85- on LH INJECTION

**700/900 SERIES  
PRE-PUMP FUSES**

'84-ON LH INJECTION



'83-87 K-JETRONIC



'88-ON 760 & 960  
LH INJECTION

1 - CONNECT TEST LITE TO THE PROPER FUSE SHOWN IN CHART ABOVE & A GOOD GROUND[-]

2 - CRANK ENGINE [KP III] [ENG DOESN'T START]

TEST LITE \_ 'ON' \_ PASS TEST \_\_\_\_\_ SEE • PASS CHECK LIST •

TEST LITE \_ 'OFF' \_ FAIL TEST \_\_\_\_\_ GO TO 'A' BASIC IGNITION TEST

**NOTE: IF YOU SUPPLY BAT VOLTAGE TO THESE FUSES, YOU WILL BE ABLE TO RUN THE FUEL PUMP. THIS WOULD TELL YOU THAT THE F/PUMP & THE WIRING TO IT IS 'OK'.**



# PASS TEST CHECK LIST

## ALL MODELS CHECK:

✓ FUEL PUMP & WIRING, CONNECTIONS FOR FUEL PUMP[POWER & GROUND]

✓ IGNITION SECONDARY [PLUGS, ROTOR, DIST CAP, IGN CABLES ETC.]

### ... 200 SERIES ...

'85-88 ✓ COIL TERMS #1 & 15 & WIRING, CONNECTIONS.

'89-ON ✓ COIL TERMS #1 & 15, POWER STAGE & WIRING, CONNECTIONS

### ... 700 & 900 SERIES ...

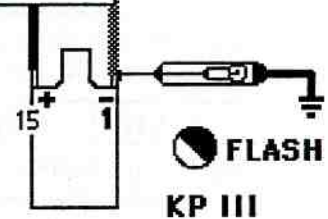
✓ COIL TERMS #1 & 15, POWER STAGE & WIRING, CONNECTIONS

'87-ON ✓ RADIO SUPPRESSION RELAY

ALL TURBOs ✓ FUEL INJECTOR RESISTOR BLOCK

## ..... [A] BASIC IGNITION TEST .....

ALL TYPES OF IGNITION  
TEST/LITE TO COIL TERM #1



A) CONNECT TEST LITE TO COIL TERM #1

B) CRANK ENGINE [KP III]

T/LITE FLASHES IGN PRIMARY SYSTEM IS 'OK' \_\_\_\_\_ SEE • FAIL CHECK LIST #1 [FUEL]

T/LITE DOESN'T FLASH \_\_\_\_\_ SEE • FAIL CHECK LIST #2 [IGN]

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## FAIL TEST CHECK LISTS

## • MAIN ITEMS TO CHECK •

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007

### FAIL CHECK LIST #1 [FUEL]

#### -- K-JETRONIC --

#### ... 200 SERIES ...

✓ FUSE #7 & SMALL Supply Wire Pos[+] Bat term

✓ FUSE #13[POWER FOR F/INJ RELAY]

✓ FUEL INJ RELAY

✓ 'MPG' IGNITION CONNECTIONS AT Right HOOD HINGE

#### ... 700 SERIES ...

✓ FUSE # 1 & Supply Wire Pos[+] Bat term

✓ FUEL INJ RELAY

#### -- LH INJECTION SYS --

#### ... 200 SERIES ...

✓ 25 AMP FUSE & Supply Wire Pos[+] Bat term

✓ 'MPG' IGNITION CONNECTIONS AT Right HOOD HINGE

✓ '85-88 IGN SIGNAL TO TURN ON INJ RELAY  
[Under int manifold by starter Grey wire]

✓ FUEL INJ RELAY

✓ C/U & RELAY POWER SUPPLY CONNECTOR  
below glovebox ['83-84 3wire]['85-on 4 wire]

#### ... 700 & 900 SERIES ...

✓ FUSE #1 or #31 & small Supply Wire Pos[+] Bat term

✓ FUEL INJ RELAY

✓ '87-on RADIO SUPPRESSION RELAY

✓ ALL TURBOs - ✓ FUEL INJ RESISTOR BLOCK

### FAIL CHECK LIST #2 [IGNITION]

#### ... BOSCH IGNITION ...

✓ DIST INDUCTION COIL

✓ IGNITION C/U

✓ IGNITION COIL TERM CONNECTIONS

#### ... 'MPG' CHRYSLER IGNITION ...

✓ DIST HALL SW & ALL CONNECTORS

✓ IGNITION C/U

#### ... EZK IGNITION ...

#### ALL MODELS

✓ POWER STAGE

✓ IGNITION TERMS & ALL CONNECTIONS

✓ DIST HALL SW OR FLYWHEEL SPEED SENSOR

✓ IGNITION C/U

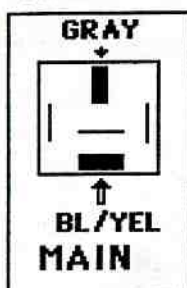
200 SERIES '89-on ✓ 25 AMP FUSE under hood

700 & 940 SERIES ✓ FUSE #1

760 & 960 SERIES '88-on ✓ FUSE #31

**BASIC CHECK**

THIS TEST IS TO DETERMINE IF THE F-INJ RELAYS ARE ELECTRICALLY SOUND. IF THE RELAYS PASS THIS TEST IT IS WORKING NORMALLY. HOWEVER IT SHOULD BE KEPT IN MIND THAT ERRATIC PROBLEMS CAN CAUSE FOR A 'PASSED TEST'. THAT LATER A FAILURE OF A RELAY CAN HAPPEN DUE TO VIBRATION, HEAT AND/OR COLD CONDITIONS. •NOTE: RELAYS ARE NOT INTERCHANGEABLE•

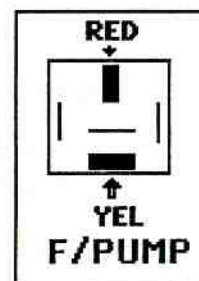
**• HOW TO TELL WHICH RELAY IS WHICH •**

- MAIN RELAY HAS THE 'GRAY' WIRE AT TOP TERM #30  
THE 'BL/YEL' WIRE AT THE BOTTOM TERM #87

- F/PUMP RELAY HAS THE 'RED' WIRE AT TOP TERM #30  
THE 'YEL' WIRE AT THE BOTTOM TERM #87

SEE DRAWINGS

\*\* RELAYS MUST BE CONNECTED \*\*

**••••• TESTING RELAYS •••••**

1 - FUEL PUMP RELAY ... TEST TERM #87.. YEL WIRE ... CRANK ENGINE KP III...

• T/LITE 'ON' .. MAIN AND FUEL PUMP RELAYS & RELAY CIRCUIT... OK

• T/LITE 'OFF'..... GO TO 2 ... CHECK POWER SUPPLY

**2- CHECK POWER SUPPLY**

IF TEST LITE OUT ... CHECK THE SOURCES LISTED.

- MAIN RELAY TERM #86[BL/R] 'HOT' WITH KEY 'ON' KP II ..... FED BY FUSE #5
- F/PUMP RELAY TERM #30[R] ALWAYS 'HOT' ..... FED BY FUSE #7 [from BAT junction block]
- KEY 'ON' KP II #86[GRAY] ... FED FROM MAIN RELAY TERM #30 [NO VOLT CHK MAIN RELAY]

THE MAIN RELAY OUTPUT IS TERM #30.

TERM #30 WILL BE FED CURRENT FROM FUSE #5 THRU RELAY TERM #87b

WHEN ENG IS RUNNING [KP II]. [HOWEVER THE RELAY WILL BE 'OFF']

AIR FLOW SENSOR SWITCH WILL 'OPEN' [NO GROUND AT TERM #85] WHEN ENG IS RUNNING.

TERM #30 WILL ALSO BE FED CURRENT FROM N/SAFETY SW THRU RELAY TERM #87

WHEN ENG IS CRANKING [KP III]. THE RELAY WILL BE 'ON'

THE GROUND[-] AT TERM #85 FOR RELAY TURNING 'ON' IS PROVIDED BY THE AIR FLOW SENSOR SWITCH. WHEN THE SWITCH IS 'CLOSED' IT IS GROUND[-]

**A) CHECKING RUN CIRCUIT - MAIN RELAY**

TURN KEY 'ON' KP II ...

REMOVE CONNECTOR FROM AIRFLOW SENSOR SWITCH [REMOVES GROUND[-] FROM M/RELAY]

CHECK TERM #30 ... TEST LITE SHOULD LITE ... GO TO B

IF NO LITE, RELAY BAD

**B) CHECKING CRANKING CIRCUIT - MAIN RELAY**

'CRANK' ENG KP III ...

CHECK TERM #30 ... TEST LITE SHOULD LITE ... GO TO C

IF NO LITE, RELAY BAD



FUEL PUMP RELAY OUTPUTS BOTH #87 TERMS. [YEL for F/PUMP] [BL for CPR, AIR SLIDE]

THE FUEL PUMP RELAY WILL BE 'ON' WHENEVER CURRENT IS FED TO TERM #86.

THIS CURRENT COMES FROM MAIN RELAY TERM #30.

THE CURRENT COMES INTO MAIN RELAY TERM #87 WHEN ENG IS CRANKED ... KP III

THE CURRENT COMES INTO MAIN RELAY TERM #87b WITH ENG RUNNING ... KP II [FUSE #5]

THE F/PUMP RELAY GROUND[-] AT TERM #85 FOR THE RELAY TURNING 'ON' IS ALWAYS THERE, PROVIDED BY THE SHORT WIRE TO GROUND.

WHENEVER CURRENT IS FED TO TERM #86 THE F/PUMP RELAY SHOULD TURN 'ON'. THIS WILL PROVIDE CURRENT TO TERM #30 FROM FUSE #7.

• NOTE: IF MAIN RELAY IS BAD, THE F/PUMP TERM #86 WILL BE 'HOT' WITH KEY 'ON' KP II, THE F/PUMP RELAY WILL TURN 'ON' [TERM #87 HOT], THE F/PUMP WILL RUN. •

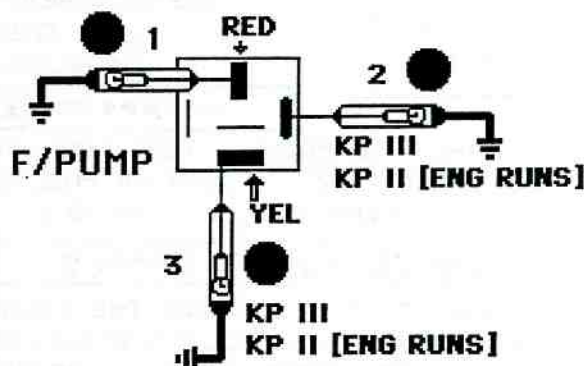
T/LITE

● ON

⊙ FILAMENT  
GLOWS

1] KEY 'OFF' KP O #30[RED]  
NO VOLT .... CHK FUSE #7

2] ENG CRANKED... KP III & ENG RUNNING... KP II  
NO VOLT...CHK Main Relay TERM #87 KP III  
& CHK Main Relay TERM #87b ENG RUNNING KP II

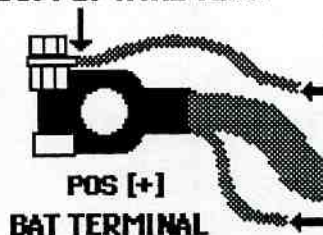


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025

\*NOTES\*

SUPPLY WIRE TERM



-- CURRENT FOR FUEL INJECTION SYSTEM  
COMES FROM SMALL SUPPLY WIRE AT  
POS[+] BAT TERM.

✓ CHECK FOR CORRODED TERMS AND  
WIRES pos[+] BAT term.

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027

**BASIC CHECK**

THIS TEST IS TO DETERMINE IF THE F-INJ RELAY IS ELECTRICALLY SOUND. IF THE RELAY PASSES THIS TEST, IT IS WORKING NORMALLY. HOWEVER IT SHOULD BE KEPT IN MIND THAT ERRATIC PROBLEMS CAN CAUSE FOR A 'PASSED TEST' THAT LATER FAILURE OF THE RELAY DUE TO VIBRATION, HEAT AND/OR COLD CONDITIONS.

THE RELAY IS SUPPLIED WITH 12.0v POWER, IT IS TURNED ON WHEN A GROUND[-] CIRCUIT IN INJ RELAY IS ACTIVATED BY IGNITION IMPULSES. WE CHECK THE POWER SUPPLY, THE GROUND[-] AND IGNITION IMPULSES IN ORDER TO TEST THE RELAY.

**..... TESTING RELAY .....**

- 1 - CONNECT TEST LITE TO A GOOD GROUND[-]. \*\* RELAY MUST BE CONNECTED \*\*
- 2 - TEST TERM #87 [Y/R] & TERM #87b [BL]  
 CRANK ENGINE KP III... T/LITE 'ON' AT BOTH TERMS ... RELAY & RELAY CIRCUIT OK  
 T/LITE 'OFF' AT EITHER TERM .... GO TO 3 CHECK POWER SUPPLY

**3 - CHECK POWER SUPPLY**

- A) TEST TERM#30... T/LITE 'ON'...OK  
 T/LITE 'OFF'..... CHECK [200 SERIES] FUSE #7      CHECK [700 SERIES] FUSE #1  
 ✓ SMALL Supply Wire at Pos[+] Bat Term
- B) TURN KEY 'ON' KP II .... TEST TERM#15.... T/LITE 'ON' ...OK      GO TO... 'C'  
 T/LITE 'OFF'..... '78 CHECK FUSE\_\_\_#5      '79 ON CHK FUSE\_\_\_#13
- C) CHECK RELAY GROUND[-] ... T/LITE FROM TERM#31 TO 'HOT' FUSE...  
 T/LITE 'ON' ... OK      T/LITE 'OFF'... CHECK GROUND[-] WIRE

**D) CHECK FOR IGNITION IMPULSES**

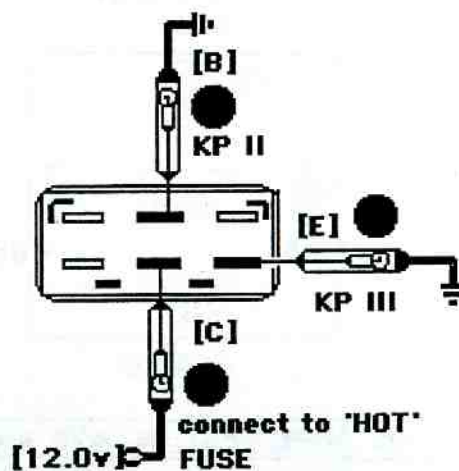
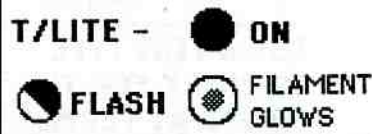
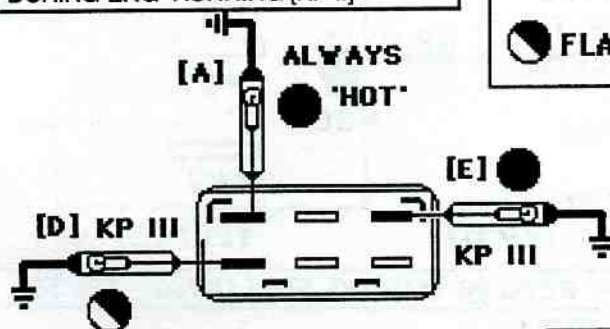
CRANK ENG KP III ... USE T/LITE TO CHECK TERM #31b  
 T/LITE 'FLASHES'... OK      T/LITE DOESN'T 'FLASH' CHK IGN & WIRE at COIL/TERM #1

**E) CHECK RELAY OUTPUTS #87 & #87b**

[TEST BOTH TERMS ONE AT A TIME, BOTH MUST TURN T/LITE 'ON' -  
 IF ONLY ONE OF THEM LITES, THE RELAY IS BAD]

CRANK ENG KP III ... T/LITE TO EITHER TERM#87 or 87b  
 T/LITE 'ON' AT BOTH TERMS ... RELAY IS OK ..... [FUEL PUMP RUNS]  
 T/LITE 'OFF' .. AT EITHER OR BOTH TERMS ... RELAY BAD  
 T/LITE 'ON' .. FUEL PUMP DOES NOT RUN ...CHECK F/PUMP, TERMS &  
 F/PUMP GROUND[-] WIRE CONNECTION.

WHEN RELAY OPERATES OK THE RELAY SHOULD 'CLICK' ON WHILE CRANKING [ KP III] AND REMAIN ON DURING ENG RUNNING [KP II]





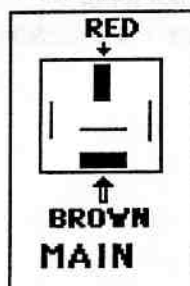
# FUEL INJECTION RELAY TEST.... 1983 and 84 LH II F-INJECTION MAIN & FUEL PUMP RELAYS

11

041

## BASIC CHECK

THIS TEST IS TO DETERMINE IF THE F-INJ RELAYS ARE ELECTRICALLY SOUND. IF THE RELAYS PASS THIS TEST IT IS WORKING NORMALLY. HOWEVER IT SHOULD BE KEPT IN MIND THAT ERRATIC PROBLEMS CAN CAUSE FOR A 'PASSED TEST'. THAT LATER A FAILURE OF A RELAY CAN HAPPEN DUE TO VIBRATION, HEAT AND/OR COLD CONDITIONS.



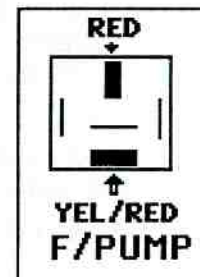
### • HOW TO TELL WHICH RELAY IS WHICH •

BOTH RELAYS HAVE THE 'RED' POWER 'WORKING CURRENT' AT THE TOP, IT LOOKS LIKE IT'S POINTED UP. SEE DRAWINGS.

• MAIN RELAY HAS THE 'BROWN' WIRE AT THE BOTTOM #87

• F/PUMP RELAY HAS THE 'YEL/RED' WIRE AT THE BOTTOM #87

\*\* RELAYS MUST BE CONNECTED \*\*



## ..... TESTING RELAYS .....

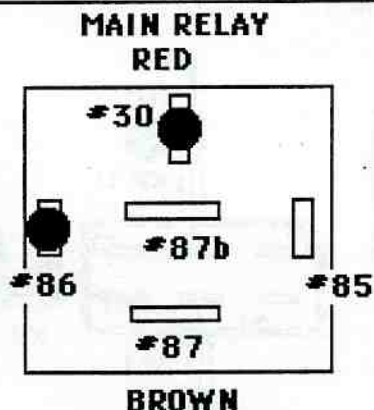
1 - FUEL PUMP RELAY ... TEST TERM#87.. YEL/RED WIRE ... CRANK ENGINE KP III...

- T/LITE 'ON' .. MAIN AND FUEL PUMP RELAYS & RELAY CIRCUIT... OK
- T/LITE 'OFF'..... GO TO 2 ... CHECK POWER SUPPLY

THE RELAYS ARE SUPPLIED WITH 12.0v POWER, THEY ARE TURNED ON WHEN GROUND[-] IS PROVIDED BY THE FUEL INJECTION CONTROL UNIT. WE WILL BYPASS THE C/U AND PROVIDE THE GROUNDS[-] OURSELVES IN ORDER TO TEST THE RELAYS.

### 2 - CHECK POWER SUPPLY ... TO ALL 'HOT' FED TERMINALS

- IF TERMS NOT 'HOT' ... CHECK THE SOURCE LISTED FOR WHERE POWER COMES FROM & ✓ SMALL Supply Wire at Pos[+] Bat Term
- MAIN RELAY TERMS #30[R],#86[R] BOTH ARE ALWAYS 'HOT'..... FED BY 25 AMP INJ FUSE
- F/PUMP RELAY TERMS #30[R] ALWAYS 'HOT' ..... FED BY 25 AMP INJ FUSE  
TURN KEY 'ON' KP II #86[BL/R] FED FROM FUSE '83 #12 '84 #13



### TEST LITE

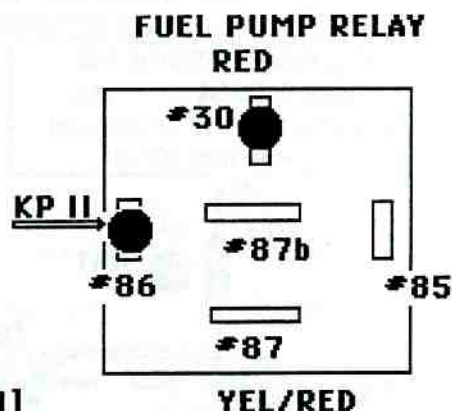
● - ON

USE A TEST LITE  
TO CHECK FOR THE  
POWER AT TERMS  
MAIN RELAY

#30 & #86

F/PUMP RELAY

#30 & #86 [KP II]



• BE SURE THAT RELAYS ARE SUPPLIED POWER BEFORE MAKING FOLLOWING TESTS

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043

USE EITHER TWO [2] TEST LITES. ONE WE WILL USE TO TEST FOR POWER DELIVERY.

THE OTHER WILL BE USED TO PROVIDE A GROUND[-] FOR THE RELAYS.

OR USE ONE [1] TEST LITE & ONE [1] JUMPER WIRE.

USE TEST LITE TO TEST FOR POWER DELIVERY & JUMPER WIRE TO PROVIDE A GROUND[-] FOR THE RELAYS.

TEST SHOWN USING TWO [2] TEST LITES.

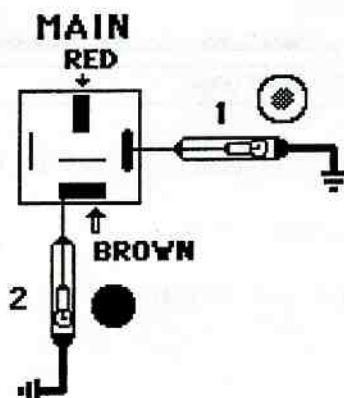
T/LITE - ● ON

○ OFF

◐ FLASH

● DIM

⊗ GLOWS



#### CHECK MAIN RELAY

• CHECK POWER SUPPLY FIRST •

[POWER comes from SMALL Supply Wire at POS[+] BAT TERM]

1. KEY 'OFF' KP O ACTIVATE RELAY ... GROUND[-] RELAY TERM #85 [Y/R] RELAY SHOULD 'CLICK ON'.

IF TEST LITE USED, BULB FILAMENT SHOULD 'GLOW' [KP O].

IF TEST LITE 'OFF' & NO RELAY 'CLICK' ... RELAY IS BAD.

THEN WITH THE RELAY STILL ACTIVATED.....

2. CHECK OUTPUT ... T/LITE AT TERM #87 [BN] SHOULD LITE UP.

IF RELAY 'CLICKS' ON, BUT T/LITE DOESN'T LITE ... RELAY IS BAD

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045

USE EITHER TWO [2] TEST LITES. ONE WE WILL USE TO TEST FOR POWER DELIVERY.

THE OTHER WILL BE USED TO PROVIDE A GROUND[-] FOR THE RELAYS.

OR USE ONE [1] TEST LITE & ONE [1] JUMPER WIRE.

USE TEST LITE TO TEST FOR POWER DELIVERY & JUMPER WIRE TO PROVIDE A GROUND[-] FOR THE RELAYS.

TEST SHOWN USING TWO [2] TEST LITES.

T/LITE - ● ON

○ OFF

◐ FLASH

● DIM

⊗ GLOWS

#### CHECK FUEL PUMP RELAY

• CHECK POWER SUPPLY FIRST •

1. KEY 'ON' KP II ... ACTIVATE RELAY ... GROUND[-] RELAY TERM #85 [BL/GN] RELAY SHOULD 'CLICK ON'. [FUEL PUMP SHOULD RUN]

IF TEST LITE USED, BULB FILAMENT SHOULD BE 'GLOW' [KP O]

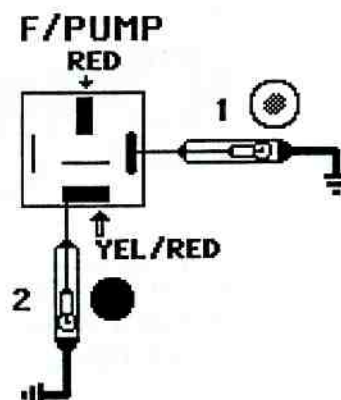
IF TEST LITE 'OFF' & NO RELAY 'CLICK' ... RELAY IS BAD.

THEN WITH THE RELAY STILL ACTIVATED.....

2. TEST LITE AT TERM#87 [Y/R] SHOULD LITE UP.

IF RELAY 'CLICKS' ON, BUT T/LITE DOESN'T LITE ... RELAY IS BAD

IF RELAY 'CLICKS' ON, T/LITE ON ... F/PUMP DOESN'T RUN ...  
CHECK WIRING, CONNECTIONS FOR F/PUMP & FUEL PUMP.



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047



## •• TESTING FUEL INJECTION CONTROL UNIT GROUND[-] CIRCUITS FOR RELAYS

### A] - TESTING THE GROUND[-] CIRCUIT FOR MAIN RELAY ACTIVATION

TESTING THE GROUND[-] CIRCUIT FOR MAIN RELAY ACTIVATION THAT F-INJ C/U DELIVERS WHEN IT RECEIVES CURRENT AT C/U TERM #18. ... TEST TERM #85 [Y/R]

KP 0 ... T/LITE 'VERY DIM' SHOULD GO 'OFF' WHEN KEY IS TURNED 'ON' KP II

IF T/LITE STAYS 'VERY DIM' WITH KEY 'ON', GROUND[-] FUNCTION OF C/U MISSING.

CHECK C/U TERM #18 FOR BAT VOLTAGE WITH KEY 'ON' KP II

CHECK C/U TERM #21 FOR GROUND[-] WITH KEY 'ON' KP II

CHECK C/U GROUND[-] TERM s #5, 11, 25 & GROUND[-] at INT MANIFOLD CONNECTIONS.

### B] - TESTING THE GROUND[-] CIRCUIT FOR F/PUMP RELAY ACTIVATION

TESTING THE GROUND[-] CIRCUIT FOR F/PUMP RELAY ACTIVATION THAT F-INJ C/U DELIVERS WHEN IT RECEIVES AN IGNITION SIGNAL. ... TEST TERM#85 [BL/GN]

KP II ... T/LITE 'VERY DIM' SHOULD GO 'OFF' WHEN ENGINE IS CRANKED KP III

IF T/LITE STAYS 'VERY DIM' WHILE CRANKING, GROUND[-] FUNCTION OF C/U MISSING,

CHECK IGNITION PRIMARY CIRCUIT FUNCTION.

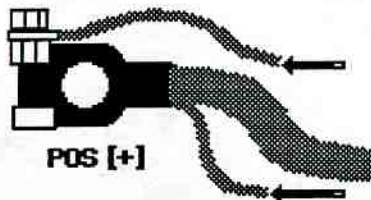
CHECK C/U TERM#17 FOR GROUND[-] WITH KEY 'ON' KP III

•• NOTE: THE MOST COMMON PROBLEM OF A BAD C/U IS THAT IT FAILS TO GIVE THE FUEL INJECTION RELAY A GROUND[-] TO TURN RELAY 'ON'.

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048

### \*NOTES\*



-- CURRENT FOR FUEL INJECTION SYSTEM COMES FROM SMALL SUPPLY WIRE AT POS[+] BAT TERM.

✓ CHECK FOR CORRODED TERMS AND WIRES pos[+] BAT term.

A SPECIAL CAUTION: NEVER DISCONNECT ANY CONTROL UNIT, AIR MASS METER, POWER STAGE etc. WITH THE KEY IN THE 'ON' POSITION [KP II]. DAMAGE TO UNITS WILL RESULT. TURN KEY OFF [KP 0] & REMOVE FUSES.

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049

**FUEL INJECTION RELAY TEST....1985 and ON 200 & 700 SERIES**  
**LH II F-INJECTION MAIN/FUEL PUMP RELAY**

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051

**BASIC CHECK**

THIS TEST IS TO DETERMINE IF THE F-INJ RELAY IS ELECTRICALLY SOUND. IF THE RELAY PASSES THIS TEST IT IS WORKING NORMALLY. HOWEVER IT SHOULD BE KEPT IN MIND THAT ERRATIC PROBLEMS CAN CAUSE FOR A 'PASSED TEST' THAT LATER FAILURE OF THE RELAY DUE TO VIBRATION, HEAT AND/OR COLD CONDITIONS.

USE EITHER TWO [2] TEST LITES. ONE WE WILL USE TO TEST FOR POWER DELIVERY.

THE OTHER WILL BE USED TO PROVIDE A GROUND[-] FOR THE RELAYS.

OR USE ONE [1] TEST LITE & ONE [1] JUMPER WIRE.

USE TEST LITE TO TEST FOR POWER DELIVERY & JUMPER WIRE TO PROVIDE A GROUND[-] FOR THE RELAYS.

TEST SHOWN USING TWO [2] TEST LITES.

**●●●●●● TESTING RELAY ●●●●●●**

1 - CONNECT TEST LITE TO A GOOD GROUND[-]. \*\* RELAY MUST BE CONNECTED \*\*

2 - TEST TERM #87/2..CRANK ENGINE KP III... T/LITE 'ON' .. RELAY & RELAY CIRCUIT OK  
T/LITE 'OFF'..... GO TO 3 CHECK POWER SUPPLY

**3 CHECK POWER SUPPLY**

25 AMP SYSTEM FUSE POWER comes from  
SMALL Supply Wire at POS[+] BAT TERM.

TEST TERM #30... T/LITE 'ON'...OK

T/LITE 'OFF'..... CHECK [200 SERIES] \_\_\_\_\_ 25 AMP FUSE

CHECK [700 SERIES] \_\_\_\_\_ FUSE #1

CHECK ['88 760] \_\_\_\_\_ FUSE #31

TURN KEY 'ON' KP II .... TEST TERM#85.... T/LITE 'ON' ...OK GO TO 3b

T/LITE 'OFF'..... CHECK IGN SWITCH

THE RELAYS ARE SUPPLIED WITH BAT POWER, THEY ARE TURNED ON WHEN GROUND[-] IS PROVIDED BY THE FUEL INJECTION CONTROL UNIT.

WE WILL BYPASS THE C/U AND PROVIDE THE GROUNDS[-] OURSELVES IN ORDER TO TEST THE RELAYS.

3b - KEY 'OFF' [KP O]... T/LITE TO TERM #86/1... T/LITE 'DIM'

**3c -TEST MAIN RELAY**

ACTIVATE RELAY ... USE T/LITE TO GROUND[-] TERM #86/1

T/LITE TO TERM #87/1 ... T/LITE 'ON' .. OK .... GO TO 4

T/LITE 'OFF' .. RELAY BAD

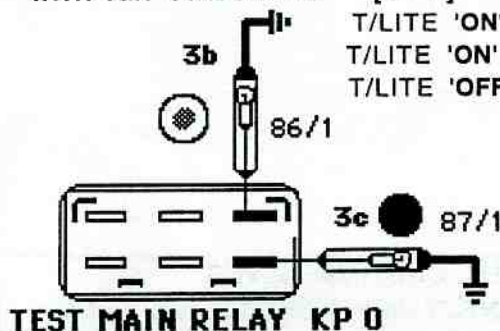
**4 - TEST FUEL PUMP RELAY**

WITH IGN SWITCH 'ON' [KP II] GROUND[-] TERM #86/2 ... TEST TERM #87/2 ...

T/LITE 'ON' ... RELAY IS OK ..... FUEL PUMP RUNS

T/LITE 'ON' .. FUEL PUMP DOES NOT RUN ...CHECK F/PUMP

T/LITE 'OFF' .. RELAY IS BAD

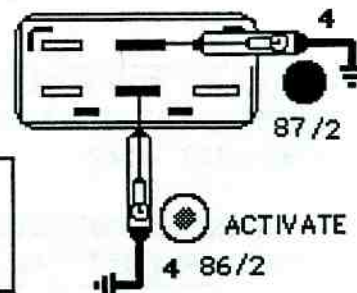


**TEST MAIN RELAY KP 0**

NOTE: KEY MUST BE 'ON' KP II FOR THE FUEL PUMP RELAY TO RECEIVE POWER TO TERM# 85 SO IT CAN TURN ON.

IF THE KEY IS 'ON' KP II, THE MAIN RELAY TERM# 86 WILL BE PROVIDED A GROUND[-] BY THE C/U. THIS WILL MEAN THE T/LITE WILL BE OFF.

**TEST F/PUMP RELAY KP II**



ACTIVATE

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053



# TEST FUEL INJECTION CONTROL UNIT GROUND[-] CIRCUITS FOR RELAYS

## A) TESTING THE GROUND[-] CIRCUIT FOR MAIN RELAY

THIS GROUND[-] CIRCUIT IS FOR MAIN RELAY ACTIVATION THAT F-INJ C/U DELIVERS WHEN IT RECEIVES CURRENT AT C/U TERM #18.

TEST RELAY TERM#86/1 KEY 'OFF' [KP 0]

T/LITE 'VERY DIM' T/LITE SHOULD GO 'OFF' WHEN KEY IS TURNED 'ON' [KP II]

IF T/LITE STAYS 'VERY DIM' WITH KEY 'ON', GROUND[-] FUNCTION OF C/U MISSING.

#1 - CHECK C/U TERM#18 FOR BAT VOLTAGE WITH KEY 'ON' KP II

#2 - CHECK C/U TERM#21 FOR GROUND[-] WITH KEY 'ON' KP II

#3 - CHECK C/U GROUND[-] TERM #5, 11, 25 & GROUND[-] at INT MANIFOLD CONNECTIONS.

IF ABOVE CHECKS [#1, 2 & 3] ARE 'OK' F/INJ CONTROL UNIT IS BAD

## B) TESTING GRND[-] CIRCUIT F/PUMP RELAY

THIS GROUND[-] CIRCUIT IS FOR F/PUMP RELAY ACTIVATION THAT F-INJ C/U DELIVERS WHEN IT RECEIVES AN IGNITION SIGNAL.

TEST RELAY TERM #86/2 KEY 'ON' [KP II]

T/LITE 'VERY DIM' SHOULD GO 'OFF' WHEN ENGINE IS CRANKED [KP III]

IF T/LITE STAYS 'VERY DIM' WHILE CRANKING, GROUND[-] FUNCTION OF C/U MISSING,

#4 - CHECK IGNITION PRIMARY CIRCUIT FUNCTION.

#5 - CHECK C/U TERM#17 FOR GROUND[-] WITH KEY 'ON' KP III

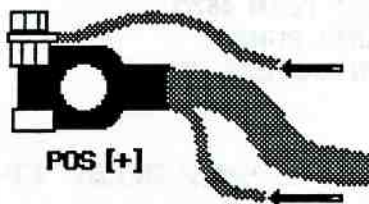
IF ABOVE CHECKS [#4 & 5] ARE 'OK' F/INJ CONTROL UNIT IS BAD

... NOTE: THE MOST COMMON PROBLEM OF A BAD C/U IS THAT IT FAILS TO GIVE THE FUEL INJECTION RELAY A GROUND[-] TO TURN RELAY 'ON'.

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### \*NOTES\*



-- CURRENT FOR FUEL INJECTION SYSTEM COMES FROM SMALL SUPPLY WIRE AT POS[+] BAT TERM.

✓ CHECK FOR CORRODED TERMS AND WIRES pos[+] BAT term.

A SPECIAL CAUTION: NEVER DISCONNECT ANY CONTROL UNIT, AIR MASS METER, POWER STAGE etc. WITH THE KEY IN THE 'ON' POSITION [KP II]. DAMAGE TO UNITS WILL RESULT. TURN KEY OFF [KP 0] & REMOVE FUSES.

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057

## BASIC CHECK

WE BEGIN BY CHECKING FOR THE 'PULSING GROUND' CIRCUIT FOR THE IGNITION COIL BUILD UP AND COLLAPSE. WE WILL CHECK FOR IT AT THE NEG [-] COIL TERM #1. PULSING GROUND COMES FROM THE IGN C/U.

• T/LITE DOESN'T FLASH, PULSING GROUND CIRCUIT IS MISSING, THEN WE WILL HAVE TO BACK TRACK THE PRIMARY IGNITION SYSTEM TO DETERMINE WHERE THAT PRIMARY CIRCUIT HAS FAILED.

• T/LITE FLASHES, PULSING GROUND CIRCUIT IS THERE, THE PRIMARY SECTION OF THE IGNITION SYSTEM IS AT LEAST FUNCTIONING AT A BASIC LEVEL. WE SHOULD THEN GO CHECK THE IGNITION SECONDARY CIRCUIT.

## \*\*\*\*\* TESTING BOSCH 'POINTLESS' IGNITION \*\*\*\*\*

## CHECKING CURRENT AT COIL TERM #1

- 1] USE TEST LITE TO TEST FOR CURRENT AT COIL TERM #1. CONNECT T/LITE TO TERM #1  
TURN KEY 'ON' [KP II] ... TEST LITE SHOULD BE DIM OR BULB FILAMENT BARELY GLOWS.

T/LITE DIM OR BULB BARELY GLOWS GO TO [2]  
T/LITE 'OFF' GO TO [A] T/LITE 'BRITE' GO TO [B]

## CHECKING GROUND IMPULSES

- 2] USE TEST LITE TO TEST FOR GROUND IMPULSES AT COIL TERM #1.  
CONNECT T/LITE TO TERM #1. CRANK ENG [KP III] ... TEST LITE FLASHES

T/LITE 'DOESN'T FLASH' GO TO [C]  
T/LITE 'FLASHES' GO TO [3]

## [A] CHECK FOR CURRENT AT C/T #15[+]

KEY 'ON' [KP II] .. CHECK FOR CURRENT AT C/T #15[+]

- IF T/LITE ... 'DIM' ... GO TO A/1
- IF T/LITE ... 'OFF'... CHECK RESISTOR & TERM CONNECTORS BY RESISTOR.

A/1 DISCONNECT WHITE WIRE AT COIL/TERM #1

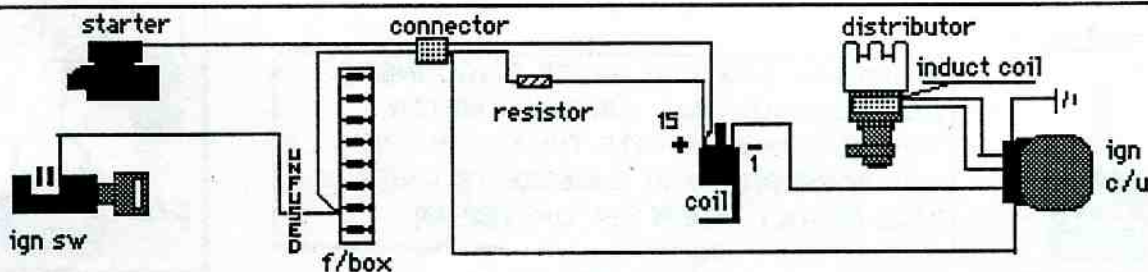
KP II CHECK C/T #1[not wire] ... • IF T/LITE NOW 'ON' GO TO A/2  
• IF T/LITE STILL 'OFF' IGN COIL IS BAD

A/2 CHECK WHITE WIRE GOING TO IGN C/U IS NOT SHORTED TO GROUND [-].

KP O ... DISCONNECT HARNESS FROM C/U

KP II ... [caution do not confuse a 'DIM' T/LITE with 'OFF']

- IF T/LITE AT C/TERM #1 NOW 'ON' C/U IS GROUNDED OUT, IGN C/U BAD.
- IF T/LITE AT C/TERM #1 STILL 'OFF' WHITE WIRE IS GROUNDED OUT, CHK AND REPAIR WIRE





## [B] KP II COIL TERM #1 .. TEST LITE BRITE CHECK THE FOLLOWING

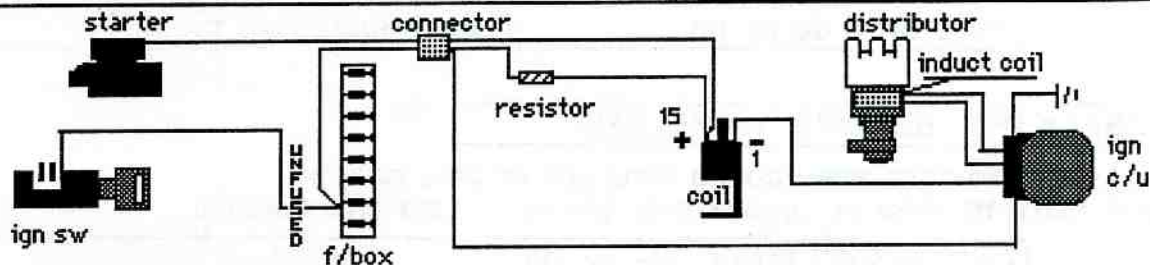
B/1 CHECK THAT WHITE WIRE AT C/TERM #1 IS MAKING GOOD CONTACT WITH IGN COIL.

B/2 CHECK THAT WHITE WIRE AT IGN C/U IS MAKING GOOD CONTACT WITH THE IGN C/U TERM #16. AND THAT THE HARNESS IS CONNECTED.

B/3 CHECK C/U GROUND[-] HARNESS TERM # 31 & EXTERNAL GROUND[-] CONNECTION, LOCATED NEAR C/U, FOLLOW BLACK WIRE FROM C/U HARNESS PLUG. CHECK IGN C/U IS BOLTED TIGHT TO BRACKET & BRACKET IS TIGHT TO BODY. CHECK FOR BAT VOLTAGE AT C/U TERM #15, IF NO VOLTAGE CHECK CONNECTOR NEAR IGN RESISTOR.

B/4 IF ALL CONNECTIONS ARE GOOD, THAN IGN C/U IS BAD.

NOTE: IGNITION C/U IS BOTH GROUNDED BY BLACK WIRE [TERM # ] & IT IS ALSO GROUNDED BY ITS' MOUNTING SCREWS. IF MOUNTING BRACKET IS LOOSE, A POOR GROUND[-] WILL RESULT & IGN PERFORMANCE WILL SUFFER.



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## [C] KP III .. COIL TERM #1 .. TEST LITE DOESN'T 'FLASH'

CHECK THAT DISTRIBUTOR INDUCTION COIL IS NOT 'OPEN' OR SHORTED TO GROUND[-].

DISCONNECT THE TWO[2] WIRE CONNECTOR BETWEEN THE IGN DISTRIBUTOR & THE IGN C/U.

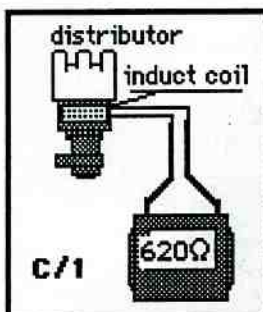
C/1 USE A DIGITAL OHM METER CONNECTED TO THE TWO TERMINALS OF THE CABLE THAT GOES TO THE DIST. CHECK RESISTANCE ...

4CYL 950 - 1250  $\Omega$  6CYL 530 - 680  $\Omega$

IF THE RESISTANCE IS HIGHER THAN THESE SPECS, THE DIST INDUCTION COIL IS BAD.

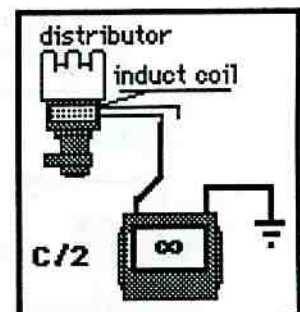
C/2 CHECK FOR A GROUNDED INDUCTION COIL. CONNECT AN OHM METER LEAD TO A GOOD ENG GROUND[-] AND THE OTHER LEAD TO A TERM OF THE DIST INDUCTION COIL CABLE. THE RESISTANCE SHOULD BE INFINITY [OPEN  $\infty$ ].

IF OHMS ARE LESS, CABLE OR DIST INDUCTION COIL IS GROUNDED[-] OUT & MUST BE REPLACED.



C/1

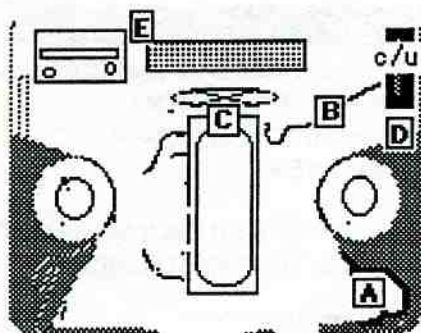
A SPECIAL CAUTION: NEVER DISCONNECT ANY CONTROL UNIT, AIR MASS METER, POWER STAGE etc. WITH THE KEY IN THE 'ON' POSITION [KP II]. DAMAGE TO UNITS WILL RESULT. TURN KEY OFF [KP O].



C/2

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## IMPORTANT IGNITION CONNECTIONS & AREAS

- A) HARNESS PLUG & RESISTOR 4 CYL ... POWER FOR C/U & COIL BY R. H/HINGE. [BL, BN WIRES]
- B) CONNECTOR FOR DIST INDUCTION COIL [2 WIRES] [BN & GN]
- C) CHECK FOR RUB THRU, DIST INDUCTION COIL HARNESS UNDER ENG BY CRANK & ALONG DIST AREA.
- D) GROUND[-] CONNECTION FOR IGN C/U [on w/wash brckt] THE IGN C/U ALSO GROUNDS[-] THRU ITS' MOUNTING BRACKET, SO MAKE SURE THAT BOTH THE C/U IS SCREWED DOWN TIGHT AS WELL AS THE BRACKET IT IS MOUNTED TO IS TIGHT.
- E) [2] RESISTORS 6 CYL

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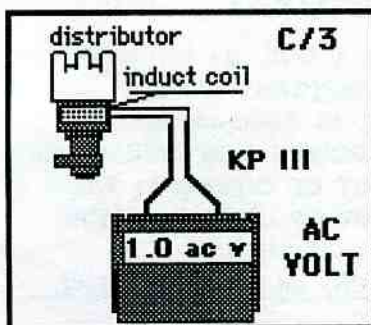
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## OPTIONAL DIST INDUCTION COIL OUTPUT TEST

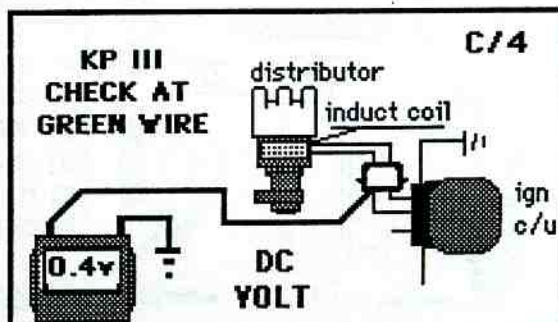
C/3 DISCONNECT THE TWO[2] WIRE CONNECTOR BETWEEN THE IGN DISTRIBUTOR & THE IGN C/U. USE A DIGITAL \_ AC\_ VOLT METER CONNECTED TO THE TWO TERMINALS OF THE CABLE THAT GOES TO THE DIST. CRANK ENG KP III ... CHECK AC VOLTAGE OUTPUT ... 4CYL 1.0v AC 6CYL 0.7v AC  
IF NO VOLTAGE OUTPUT, THE DIST INDUCTION COIL OR STAR WHEEL IS BAD.

C/4 CHECK INDUCTION COIL INPUT & OUTPUT VOLTAGE. CONNECT \_ DC\_ VOLT METER [-] LEAD TO A GOOD ENG GROUND[-] AND THE [+] LEAD TO GREEN WIRE OF THE DIST CABLE GOING TO IGN C/U. CHECK DC VOLTAGE  
• KEY 'ON' KP II ... DISCONNECTED, DC voltage from C/U should be approx 4cyl 0.5v 6cyl 2.0v  
IF NO VOLTAGE INPUT, CHK CONNECTIONS AT C/U, IF THEY ARE GOOD IGN C/U IS BAD.  
HARNESS CONNECTED 4 & 6 CYL SHOULD BE APPROX ... 0.3v DC

• CRANK ENG KP III ... HARNESS CONNECTED 4CYL 0.4v DC 6CYL 0.4v DC  
IF NO VOLTAGE OUTPUT, THE DIST INDUCTION COIL OR STAR WHEEL IS BAD.



FOR FURTHER DIST INDUCTION COIL TESTING SEE: UNIT TESTING SECTION OF 'BOSCH POINTLESS IGN'



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**BASIC CHECK**

WE BEGIN BY CHECKING FOR THE 'PULSING GROUND' CIRCUIT FOR THE IGNITION COIL BUILD UP AND COLLAPSE. WE WILL CHECK FOR IT AT THE NEG [-] COIL TERM #1. PULSING GROUND COMES FROM THE IGN C/U.

• T/LITE DOESN'T FLASH, PULSING GROUND CIRCUIT IS MISSING, THEN WE WILL HAVE TO BACK TRACK THE PRIMARY IGNITION SYSTEM TO DETERMINE WHERE THAT PRIMARY CIRCUIT HAS FAILED.

• T/LITE FLASHES, PULSING GROUND CIRCUIT IS THERE, THE PRIMARY SECTION OF THE IGNITION SYSTEM IS AT LEAST FUNCTIONING AT A BASIC LEVEL. WE SHOULD THEN GO CHECK THE IGNITION SECONDARY CIRCUIT.

\*\*\*\*\* **TESTING [CHRYSLER] MPG IGNITION** \*\*\*\*\*

**CHECKING CURRENT AT COIL TERM #1**

- 1) USE TEST LITE TO TEST FOR CURRENT AT COIL TERM #1.  
TURN KEY 'ON' [KP II] ..... TEST LITE SHOULD BE BRITE.

T/LITE DIM OR BULB BARELY GLOWS GO TO [2]  
T/LITE 'DIM or OFF' GO TO [A]

**CHECKING GROUND IMPULSES**

- 2) USE TEST LITE TO TEST FOR GROUND IMPULSES AT COIL TERM #1.  
CONNECT T/LITE TO TERM #1. CRANK ENG [KP III] ... TEST LITE FLASHES

T/LITE 'DOESN'T FLASH' GO TO [B]  
T/LITE 'FLASHES' GO TO [3]

**A) COIL/TERM #1 ... KP II ... T/LITE 'OFF OR DIM'**

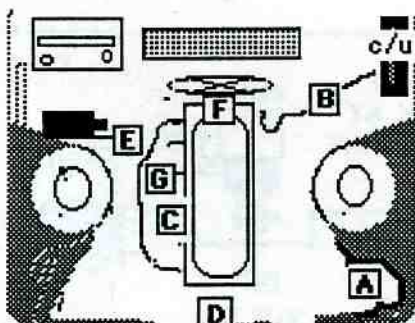
REMOVE THE WIRE FROM THE COIL/TERM #1[-] ... T/LITE TO C/TERM #1[not to the wire]

KP II ... T/LITE 'ON' ... GO TO A/1, CHK SHORT TO GROUND[-] OF WIRE FROM C/T#1 to C/U  
AND CHECK FOR IGN C/U GROUNDING OUT.

KP II ... T/LITE 'OFF' ... GO TO A/2, CHK C/T#15 FOR BAT VOLTAGE

A/1 KP O ... CONNECT WIRE BACK TO C/T #1... GENTLY REMOVE IGN C/U HARNESS PLUG.  
• IF T/LITE 'ON' ..... C/U IS BAD • IF T/LITE 'OFF OR DIM' ... WIRE SHORTED

A/2 KP II ... T/LITE TO C/T #15 .  
• IF T/LITE 'ON' ..... COIL IS BAD  
• IF T/LITE 'OFF OR DIM' ... CHECK CONNECTIONS AT C/T #15 & HARNESS PLUG  
NEAR RIGHT HOOD HINGE.



**IGNITION IMPORTANT CONNECTIONS & AREAS**

- A) HARNESS PLUG ... POWER FOR C/U & COIL BY H/HINGE  
B) CONNECTOR FOR COIL TERM #1 WIRE[GRAY WIRE]  
C) '85-on CONNECTOR for IGN SIGNAL to F/INJ[under/man]  
D) MAIN ENG HARNESS CONNECTOR, POWER FOR C/TERM #15  
E) CHECK FOR RUB THRU, GROUND OUT OF C/TERM #1 WIRE.  
F) CHECK FOR RUB THRU, GROUND OUT OF C/TERM #1 WIRE.  
UNDER ENG BY CRANK & ALONG DIST AREA.  
G) GROUND[-] CONNECTION FOR IGN C/U on intake manifold.

**B] COIL/TERM #1 ... KP III ... T/LITE WON'T 'FLASH'... CHECK HALL SW**

\*\*\* CHECK HALL SWITCH \*\*\*

• CHECKING HALL SWITCH •

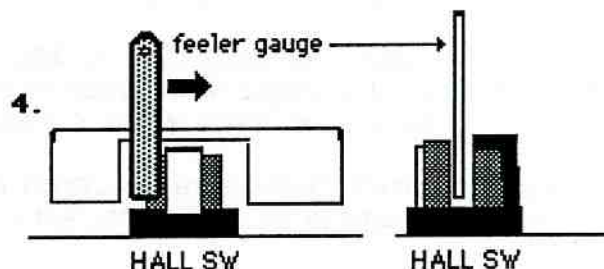
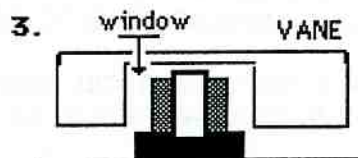
1. REMOVE DIST CAP 2. TURN IGN 'ON' KP II
- HARNESS CONNECTED •

3. LINE UP DIST VANE 'WINDOW' IN BETWEEN HALL SWITCH.

4. USE A FEELER GAUGE AS A 'VANE'. PASS IT THRU THE 'WINDOW' OPENING OF THE HALL SW.

• IF EVERYTHING IS WORKING OK, THE COIL WILL 'SPARK' & THE FUEL PUMP WILL RUN FOR A SECOND.

• IF THIS DOESN'T HAPPEN, GO TO [C] BYPASSING HALL SWITCH.



**SPECIAL CAUTION: NEVER DISCONNECT ANY CONTROL UNIT, HALL SWITCH, POWER STAGE etc. WITH THE KEY IN THE 'ON' POSITION [KP II]. DAMAGE WILL RESULT. TURN KEY OFF [KP**

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**C] C/TERM #1 ... KP III ... T/LITE WON'T 'FLASH' ... BYPASS HALL SW**

\*\*\* BYPASS HALL SWITCH \*\*\*

• BYPASS HALL SWITCH •

1. TURN 'OFF' KEY KP O 2. UNPLUG HALL SWITCH CONNECTOR[by DIST].

3. TURN KEY 'ON' KP II

BRIDGE CONTACTS B-to-C FOR 1 SECOND. DISCONNECT.

• IF EVERYTHING IS WORKING OK, THE COIL WILL 'SPARK' & THE FUEL PUMP WILL RUN FOR A SECOND.  
IF NOT CHECK A,B & C

**A. CHECK FOR MAIN VOLTAGE FROM C/U**

approx 12.5v [TERM 'A' GN]

[if no voltage, check wire & connection at C/U]

**B. CHECK FOR CONTROL VOLTAGE FROM**

C/U approx 5.0v [TERM 'B' YEL]

[if no voltage, check wire & connection at C/U]

[if voltage TO HIGH, check GROUND[-] wire & connection for C/U, grounded[-] at INTAKE MANIFOLD]

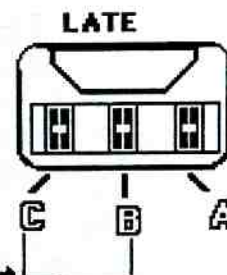
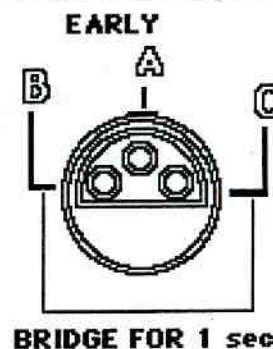
**C. USE OHM METER TO CHECK GROUND[-]**

[TERM 'C' SB] LESS THAN 1  $\Omega$

[check GROUND[-] wire & connection at C/U] & ground[-] at INTAKE MANIFOLD]

• IF VOLTAGES ARE CORRECT, BUT IGN WON'T 'SPARK' THE IGN C/U IS BAD.

**BRIDGE TERMS  
B - to - C OF  
THE HARNESS  
GOING TO THE  
IGN C/U.**



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## OPTIONAL CHECK - HALL SW & C/U FUNCTION

D] KEY 'ON' KP II

CHECK HALL SWITCH & IGN CONTROL UNIT BASIC FUNCTION ..... USE DIGITAL VOLT METER

\*\*\* CAUTION: DO NOT DISCONNECT C/U ..... USE A SHARP PIN & PROBE THRU WIRE INSULATION NEAR HARNESS PLUG TO GET THE VOLTAGE READINGS. \*\*\*

D/1 CHECK FOR SUPPLY VOLTAGE AT C/U TERM #2[BLUE WIRE] ..... 12.5v or HIGHER

• IF NO VOLTAGE CHECK THE HARNESS PLUG NEAR RIGHT HOOD HINGE.

D/2 CHECK FOR HALL SW SUPPLY VOLTAGE AT C/U TERM #3[GREEN WIRE] ... approx 12.0v

• IF NO VOLTAGE CHECK... TERM #3 OF C/U HARNESS PLUG

D/3 CHECK FOR HALL SW CONTROL VOLTAGE AT C/U TERM #5[YEL WIRE] ... approx 5.0v

ROTATE ENG BY HAND[SO VANE GOES PAST HALL SW], NOTE ANY VOLTAGE CHANGE.

• IF NO VOLTAGE CHECK...TERM #5 OF C/U HARNESS PLUG

• IF VOLTAGE WON'T CHANGE CHECK...TERM #5 OF C/U HARNESS PLUG, HALL SW TERM 'B'.  
IF THOSE CONNECTIONS ARE GOOD, HALL SWITCH MUST BE BAD.

• IF VOLTAGE IS OVER 6.0v AT C/U TERM #5[YEL WIRE] CHECK... THE GROUND[-] TERM #10

REMOVING THE IGNITION C/U CONNECTION. KEY MUST BE 'OFF' [KP O]  
USE CAUTION, PULL PLUG STRAIGHT OUT, SO NO DAMAGE IS DONE TO TERMINALS.

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### \*NOTES\*

A SPECIAL CAUTION: NEVER DISCONNECT ANY CONTROL UNIT, AIR MASS METER, HALL SW, POWER STAGE etc. WITH THE KEY IN THE 'ON' POSITION [KP II]. DAMAGE TO UNITS WILL RESULT. TURN KEY OFF [KP O] & REMOVE ANY SYSTEM FUSES.

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**BASIC CHECK**

WE BEGIN BY CHECKING FOR THE 'PULSING GROUND' CIRCUIT FOR THE IGNITION COIL BUILD UP AND COLLAPSE. WE WILL CHECK FOR IT AT THE NEG [-] COIL TERM #1. PULSING GROUND COMES FROM THE IGN C/U.

• T/LITE DOESN'T FLASH, PULSING GROUND CIRCUIT IS MISSING, THEN WE WILL HAVE TO BACK TRACK THE PRIMARY IGNITION SYSTEM TO DETERMINE WHERE THAT PRIMARY CIRCUIT HAS FAILED.

• T/LITE FLASHES, PULSING GROUND CIRCUIT IS THERE, THE PRIMARY SECTION OF THE IGNITION SYSTEM IS AT LEAST FUNCTIONING AT A BASIC LEVEL. WE SHOULD THEN GO CHECK THE IGNITION SECONDARY CIRCUIT.

**•••• TESTING BOSCH EZK IGNITION ••••**

- 1] USE TEST LITE TO TEST FOR CURRENT AT COIL TERM #1.  
TURN KEY 'ON' [KP II] ..... TEST LITE SHOULD BE BRITE.

T/LITE BRITE GO TO [2]  
T/LITE 'DIM or OFF' GO TO -[A]

- 2] USE TEST LITE TO TEST FOR GROUND IMPULSES AT COIL TERM #1.  
CONNECT T/LITE TO TERM #1. CRANK ENG [KP III] ... TEST LITE FLASHES

T/LITE 'DOESN'T FLASH' GO TO [B]  
T/LITE 'FLASHES' GO TO [3]

**A] COIL/TERM #1 ... KP II ... T/LITE 'OFF OR DIM'**

REMOVE THE WIRE FROM THE COIL/TERM #1[-] ... T/LITE TO C/TERM #1[not to the wire]

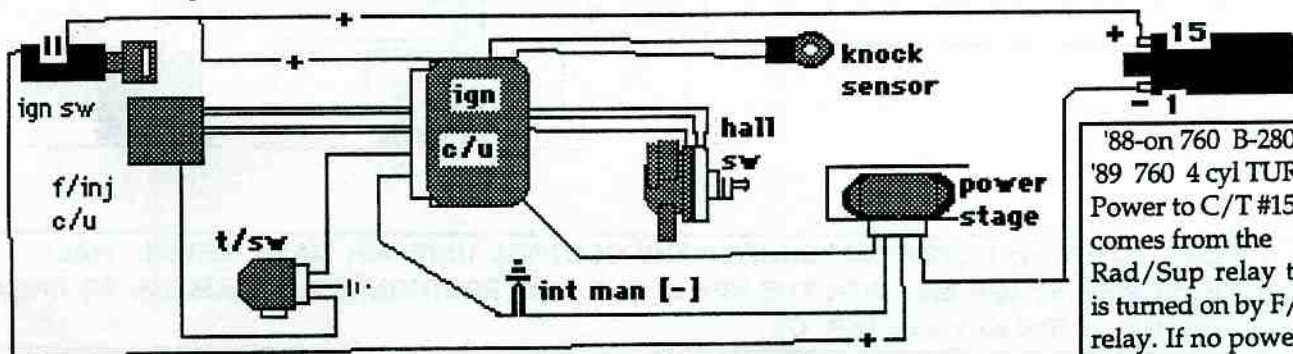
KP II ... T/LITE 'ON' ... GO TO A/1, CHK SHORT TO GROUND[-] OF WIRE FROM C/T#1 to  
POWER STAGE AND CHECK FOR POWER STAGE GROUNDING OUT.

KP II ... T/LITE 'OFF' ... GO TO A/2, CHK C/T#15 FOR BAT VOLTAGE

A/1 KP O ... CONNECT WIRE BACK TO C/T#1... REMOVE POWER STAGE HARNESS PLUG.  
T/LITE TO C/T#1 KP II • IF T/LITE 'ON' ..... P/STAGE IS BAD[THIS A COMMON FAULT]  
• IF T/LITE 'OFF OR DIM' ... WIRE SHORTED

A/2 KP II ... T/LITE TO C/T#15 .

- IF T/LITE 'ON' ..... COIL IS BAD
- IF T/LITE 'OFF OR DIM' ... CHECK CONNECTIONS AT C/T #15  
[B-230 TURBO] MAIN ENG HARNESS CONNECTOR[BL wire]



'88-on 760 B-280  
'89 760 4 cyl TURBO  
Power to C/T #15  
comes from the  
Rad/Sup relay that  
is turned on by F/inj  
relay. If no power to  
C/T #15, the F/inj  
relay is probaly  
BAD.



## B) COIL/TERM #1 ... KP III ... T/LITE DOESN'T 'FLASH'

.... BYPASS HALL SWITCH ....

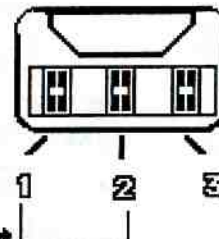
1. TURN 'OFF' KEY KP O      2. UNPLUG HALL SWITCH CONNECTOR[by DIST].
3. TURN KEY 'ON' KP II      BRIDGE CONTACTS 1 -to- 2 FOR 1 SECOND.
- IF EVERYTHING IS WORKING OK, THE COIL WILL 'SPARK' & THE FUEL PUMP WILL RUN FOR A SECOND AFTER CONTACT IS REMOVED. IF NOT CHECK 1,2 & 3 • IF VOLTAGES ARE CORRECT, BUT IGN WON'T 'SPARK' THE IGN C/U IS BAD.
3. CHECK FOR SUPPLY VOLTAGE FROM C/U      approx 11.0v [TERM '3' RED]  
[if no voltage, check wire & connection at C/U]

2. CHECK FOR CONTROL VOLTAGE FROM C/U      approx 5.0v [TERM '2' BLUE]  
[if no voltage, check wire & connection at C/U]  
[if voltage TO HIGH, check GROUND[-] wire & connection for C/U, grounded[-] at INTAKE MANIFOLD]

1. USE OHM METER TO CHECK GROUND[-]      LESS THAN 1  $\Omega$  [TERM '1' SB]  
[IF MORE check GROUND[-] wire & connection at C/U] & ground[-] at INTAKE MANIFOLD]

### • BYPASS HALL SWITCH •

BRIDGE THE TERMS 1-TO-2 OF THE CABLE THAT GOES FROM THE HALL SW TO THE IGN CONTROL UNIT. THE COIL SHOULD 'SPARK'. NOTE: THIS IS LIKE 'KICK STARTING' THE IGN C/U. A BAD C/U MAY 'SPARK' BUT BE ERRATIC CAUSING A STALLING PROBLEM AT OTHER TIMES.  
• FOR ERRATIC PROBLEMS USE 'OPTIONAL CHECK-HALL SW & C/U FUNCTION'. IT WILL SHOW IF THE C/U & HALL SW ARE OPERATING WITHOUT 'KICK STARTING' THE C/U INTO ACTION.



BRIDGE FOR 1 sec →

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705

## C) C/TERM #1 ... KP III ... T/LITE WON'T 'FLASH'... CHECK HALL SW

.... CHECK HALL SWITCH ....

• CHECKING HALL SWITCH •

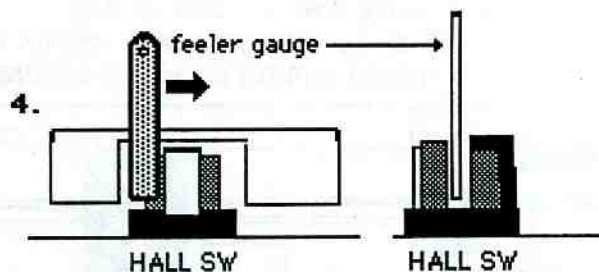
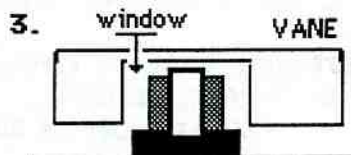
1. REMOVE DIST CAP      2. TURN IGN 'ON' KP II

3. LINE UP DIST VANE 'WINDOW' IN BETWEEN HALL SWITCH.

4. USE A FEELER GAUGE AS A 'VANE'. PASS IT THRU THE 'WINDOW' OPENING OF THE HALL SW.

• IF EVERYTHING IS WORKING OK, THE COIL WILL 'SPARK' & THE FUEL PUMP WILL RUN FOR A SECOND.

• IF THIS DOESN'T HAPPEN, GO TO [C] BYPASSING HALL SWITCH.



**A SPECIAL CAUTION: NEVER DISCONNECT ANY CONTROL UNIT, AIR MASS METER, HALL SWITCH, POWER STAGE etc. WITH THE KEY IN THE 'ON' POSITION [KP II]. DAMAGE TO UNITS WILL RESULT. TURN KEY OFF [KP O].**

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## D] C/TERM #1 KP III T/LITE WON'T 'FLASH' CHECK POWER STAGE

• WITH KEY 'OFF' ... KP O ... UNPLUG P/STAGE ... USE A VOLT METER, CHECK POWER STAGE FOR: A] IMPULSES FROM THE IGNITION CU B] GROUND[-] C] FOR OPERATING VOLTAGE .

A] CHECK IGNITION IMPULSES COMING FROM THE IGN C/U TO TERM # 5  
CRANK ENGINE ... KP III ... [CHECK TERM #5.... VOLTAGE OSCILLATES between approx 0.8 - 1.2 VOLTS]  
IF NO IMPULSES GO CHECK HALL SWITCH OPERATION. IF IMPULSES ARE PRESENT , YET THE IGNITION COIL DOESN'T 'FIRE' & TESTS B,C & D ARE OK, THE POWER STAGE IS LIKELY BAD.

B] TERM # 2 FOR GROUND[-] [0.4  $\Omega$  or less] [GROUNDED AT INTAKE MANIFOLD]

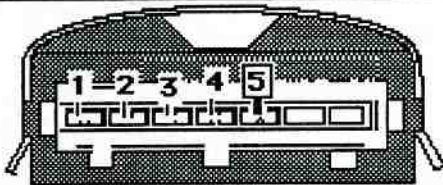
• WITH KEY 'ON' ... KP II ... USE A VOLT METER TO CHECK POWER STAGE HARNESS TERMS

C] TERM # 4 FOR SUPPLY POWER[+] [12.4 VOLTS or BAT VOLTAGE]

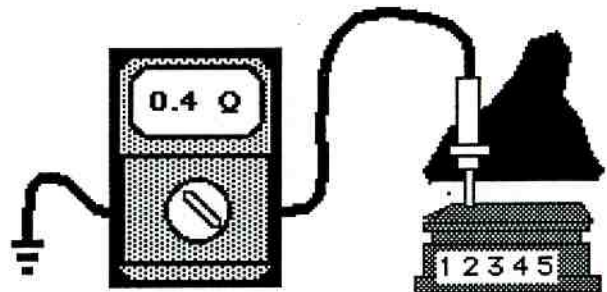
D] TERM # 1 [THIS WIRE GOES TO IGNITION COIL C/T#1, SHOULD HAVE SAME VOLT AS C/T#1, BAT VOLTAGE]

### • CHECKING POWER STAGE •

MAKE SURE ALL TERMS ARE IN PLUG



POWER STAGE HARNESS PLUG



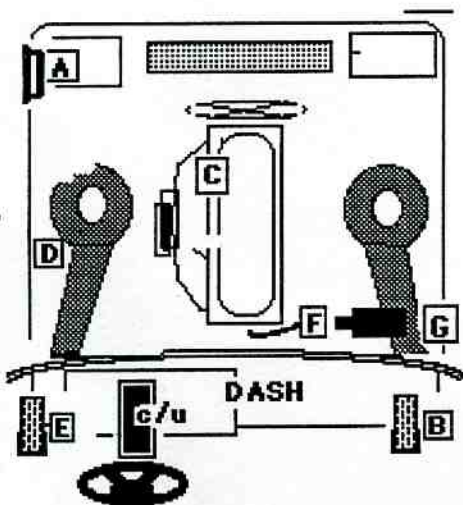
IMPORTANT; CHECK TERMS FROM REAR OF PLUG, NOT FROM FRONT.

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## • EZK IGNITION SYSTEM - - IMPORTANT CONNECTIONS & AREAS •

ALL CONNECTIONS SHOULD BE CHECKED FOR CLEAN & TIGHT CONTACT. THE CONNECTIONS MUSN'T BE OVERLOOKED AS THE SOURCE OF THE PROBLEMS IN THE SYSTEM.



A] POWER STAGE - GROUNDS IGN COIL - AMPLIFIES THE IMPULSE SIGNAL FROM C/U.

B] MAIN POWER TO C/U TERM #6  
MAIN POWER TO POWER STAGE TERM #4  
28 PIN HARNESS PLUG [BL wire term 28]

C] KNOCK SENSOR[on block between cyl 1 & 2]

D] CHECK 8 PIN HARNESS PLUG TERM #7 - 3 - 6  
[TURBO]WIRE TO IGN COIL TERM#1 term #7  
GROUND[-] FOR C/U & POWER STAGE term #3  
THROTTLE SWITCH term #6

E] [NON-TURBO]MAIN POWER TO IGN COIL TERM#15  
28 PIN HARNESS PLUG [BL wire term 6]

F] IGNITION COIL & PLUG CABLES  
G] HARNESS PLUG [8 WIRES]

'88-on 760 B-280 '89 760 4 cyl TURBO

Power to C/T #15 comes from the Rad/Sup relay that is turned on by F/inj relay. If no power, the F/inj relay is probably BAD.

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711



**GROUP 20 GENERAL INFORMATION**

- 20- 11 TEST POINT TERMINALS [C-O, STARTER BYPASS, IDLE DISABLE]
- 20- 31 SERVICE REMINDER LITES [EGR, LAMBDA]

**GROUP 21 ENGINE MECHANICAL**

- 21- 211 SIEZED CAMSHAFT
- 21- 311 CAMSHAFT REPLACEMENT
- 21- 400 ENGINE 'KNOCKING NOISE' [B-18, 20, 30], TIMING GEARS
- 21- 501 REAR CRANKSHAFT SEAL LEAKS [B-18, 20]
- 21- 511 ENGINE OIL LEAKS DIAGNOSIS
- 21- 531 ENGINE FLAME ARRESTOR, NOTES, LOCATION & REPLACEMENT
- 21- 711 ENGINE TIMING BELT \_\_ TIPS & REPLACEMENT

**GROUP 22 OXYGEN SENSOR, LAMBDA SOND, FUEL PUMP**

- 22- 001 O2 SENSORS \_\_ LAMBDA SOND COMPONENTS  
K-JETRONIC LH-INJECTION
- 22- 003 O2 SENSOR THEORY OF OPERATION
- 22- 111 C/O CHECKING AT O2 SENSOR [VOLTAGE TESTING]
- 22- 131 K-JET POOR RUNNING \_\_ PROBLEMS
- 22- 200 'WHAT IS NEEDED TO TURN THE FUEL PUMP ON'
- 22- 321 HARD HOT START \_\_ LONG CRANKING [F/P CHECK VALVE]
- 22- 331 FUEL PUMP & FILTER LOCATION \_\_ Ground[-] circuit NOTES
- 22- 711 SURGING \_\_ LOSS OF POWER [PRE PUMP & PRE PUMP HOSE]
- 22- 721 PRE PUMP \_\_ QUICK CHECK

**GROUP 23 CARB**

- 23- 121 SU CARB PROBLEMS \_\_ ADJUSTMENTS \_\_ CHECK POINTS
- 23- 211 ZENITH/STROM CARB PROBLEMS \_\_ DIAPHRAMS  
ADJUSTMENTS TEMP COMPENSATOR, BYPASS VALVE  
CHECK POINTS

## SERVICE REMINDER LAMP

1987  
ON  
SER-  
VICE

'SERVICE' LAMP LITES AT APPROX 5,000 MILES  
INTERVALS - RESET AT EVERY OIL CHANGE.

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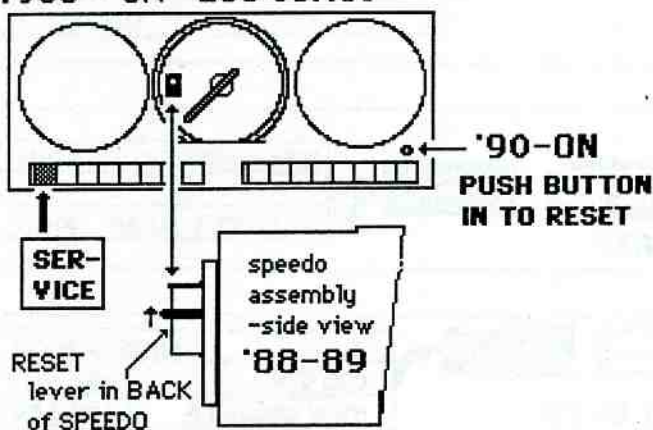
MOST 700 SERIES CARS FROM 1987-ON HAVE THE 'SERVICE' LAMP. 'RESET' LAMP BY REACHING BEHIND DASH FROM UNDERNEATH. YOU MAY HAVE TO REMOVE THE RADIO AMP FOR MORE ROOM FOR YOUR ARM. PUSH RESET BUTTON IN.

[BUTTON LOCATED ON REAR OF SPEEDO AT THE 85 MPH AREA]

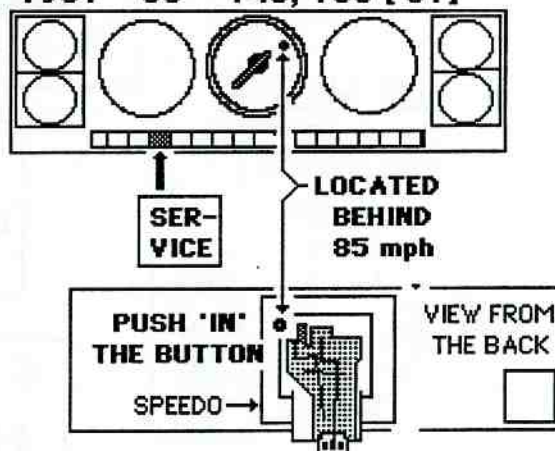
[87-88 740 SERIES CARS WITH 'SRS' DO NOT HAVE THE LAMP BECAUSE OF THE 'SRS' KNEE BOLSTER PAD]

ALL 200 SERIES FROM 1988-ON HAVE THE 'SERVICE' LAMP.

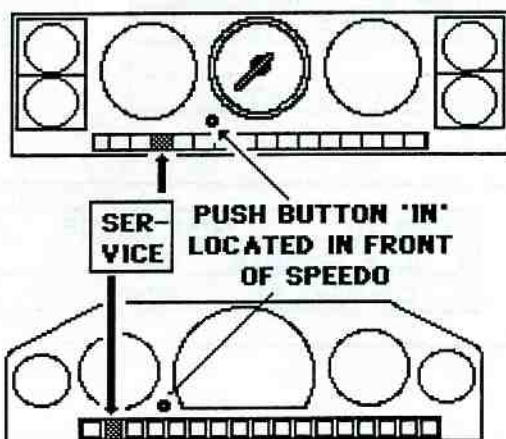
### 1988 - ON 200 Series



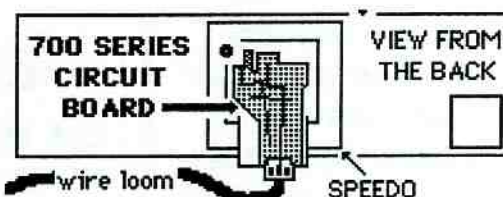
### 1987 - 88 740, 760 ['87]



### 1989 - ON 740 Series



### 1988-ON 760 Series



CAUTION

THIS LITTLE CIRCUIT BOARD ON THE 700 SERIES IS VERY FRAGILE. THE WIRE LOOM THAT ATTACHES TO IT IS TIED TO THE DUCT WORK BEHIND THE DASH ON SOME CARS. IF YOU PULL THE SPEEDO ASSEMBLY OUT IT WILL BREAK THE CIRCUIT BOARD OFF.

MAKE SURE LOOM IS NOT TIED UP BEFORE REMOVING SPEEDO/GAUGE ASSEMBLY.

SO IF YOU REMOVE SPEEDO ASSEMBLY TO 'RESET' SERVICE LAMP, BE VERY CAREFUL.

## DOES THIS CAR HAVE A SERVICE LAMP??

SINCE THE 'SERVICE' LAMP COMES ON AT APPROXIMATELY 5,000 MILE INTERVALS, IT MAY NOT BE 'ON' WHEN YOU ARE SERVICING THE ENG [CHANGING OIL]. YOU SHOULD STILL TURN IT OFF BY THE METHOD SHOWN IN THE DRAWING THAT APPLIES TO THE MODEL INVOLVED.

TO DETERMINE IF THE CAR HAS A 'SERVICE' LAMP, JUST TURN THE KEY TO KP II, SO ALL THE WARNING LAMPS COME ON [ENG NOT RUNNING]. SCAN ALL THE LAMPS, IF THERE IS A 'SERVICE' LAMP, YOU SHOULD RESET IT.

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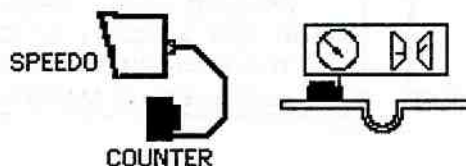




EGR REMINDER LIGHTS COME ON AT 15,000 Miles  
 LAMBDA SOND REMINDER LIGHTS AT 30,000 Miles  
 - THESE ARE TURNED ON BY THE SPEEDO -

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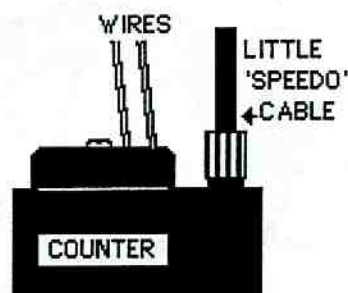
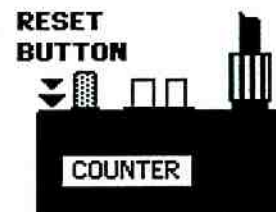


# .. RESET EGR/LAMBDA SOND REMINDER LAMPS ..

THERE IS AN EXTERNAL MILE COUNTER THAT IS CONNECTED TO THE SPEEDO BY A SMALL 'SPEEDO' CABLE. THIS LITTLE BLACK BOX ALSO HAS TWO[2] WIRES CONNECTED TO IT. THE WIRES GO TO THE INSTRUMENT CIRCUIT BOARD. [IF THESE WIRES ARE UNPLUGGED, THE REMINDER LITE WILL NOT COME ON.]

THE BLACK BOX IS LOCATED UNDER THE DASH, CLIPPED ON LOWER DASH BRACKET JUST ABOVE THE DRIVER'S LEFT LEG.

TO RESET LITE, REMOVE THE SINGLE SCREW THAT HOLDS THE LITTLE COVER ONTO THE COUNTER. PUSH THE BRASS PLUNGER BUTTON COMPLETELY IN ONCE OR TWICE TO SHUT OFF REMINDER LITE.



## \*NOTES\*

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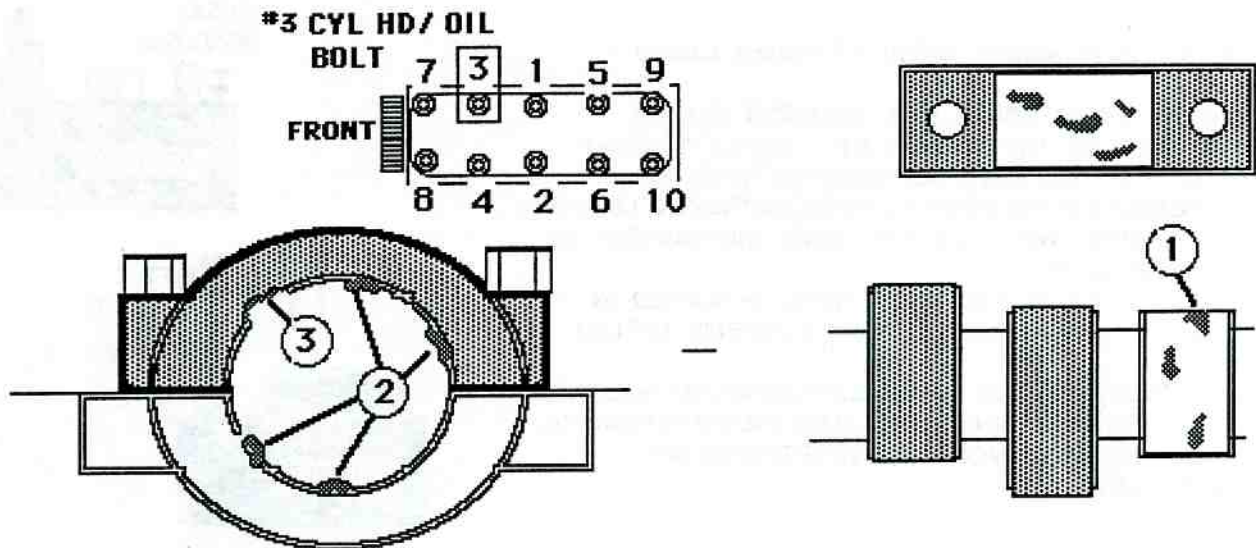
39

**SIEZED CAMSHAFT  
REPAIR  
B-21, 23, 230**

- 1--REMOVE ALL EXCESS BEARING MATERIAL FROM CAMSHAFT
- 2--REMOVE THE LUMPS THAT INTRUDE INTO THE BEARING CIRCLE AREA
- 3-- DO NOT ATTEMPT TO COMPLETELY SMOOTH OUT THE BEARING SURFACE, LEAVE THE AREAS THAT ARE 'MISSING' MATERIAL ALONE

21

211



===IMPORTANT===IMPORTANT=====IMPORTANT===

- \*REMOVE ALL FOREIGN MATERIAL FROM CAMSHAFT
- \*REMOVE ONLY 'EXCESS' MATERIAL FROM BEARINGS
- \*CHK FOR CAMS FREEDOM OF MOVEMENT (WHIP)
- \*CHK FOR DAMAGED ROLL PIN ON CAM FOR GEAR
- \*CLEAN 'OLD' BELT MATERIAL FROM GEARS
- \*CHK FOR OIL DELIVERY TO CAM AFTER REPAIR

21

214

A) CHANGE OIL AND FILTER TWICE > AFTER REPAIR & AFTER 30 MIN OF RUNNING.

- 1] CHK CAM BEARING CAPS FOR THE ONES THAT LOOK DISCOLORED & DRY (THESE WILL BE THE SEIZED ONES).
- 2] REMOVE THE BAD CAPS, ONE AT A TIME, AFTER EACH ATTEMPT TO TURN THE CAM, WHEN YOU CAN TURN CAM & THE CAM WANTS TO TURN BY ITSELF (WHIP) DUE TO PRESSURE FROM VALVE SPRING, THE CAPS REMOVED ARE THE BAD BRNGS.
- 3] NOW REMOVE ALL BRNG CAPS AND CAM > USE A SHARP EDGE TOOL, SCRAPE OFF ALL FOREIGN MATERIAL FROM CAM. THE ALUM BRNG CAP MATERIAL IS SOFT & WILL COME OFF WITHOUT REMOVING CAMSHAFT MATERIAL.



- 4] CHK ALL BEARING CAPS> USE SHARP TOOL TO SCRAPE THE 'EXCESS' MATERIAL.  
WITH OILED SAND PAPER #400 or higher, VERY, VERY LIGHTLY POLISH.  
(NOTE THAT THE BRNG CAP DOES NOT HAVE TO BE PERFECTLY SMOOTH, THERE CAN  
BE LINES & SHALLOW GROVES THAT ARE ALLOWED TO REMAIN.)  
\*\*\* REMEMBER IT IS BEST TO REMOVE ONLY THE 'EXCESS', DON'T REMOVE TOO MUCH \*\*\*
- 5] NOW WITH CAM & BRNG CAPS REMOVED > INSPECT ALL BRNG SURFACES OF THE CYL HD  
REMOVE ALL 'EXCESS' MATERIAL ON THESE BEARINGS THE SAME WAY DESCRIBED FOR  
THE BEARING CAPS.

- B] REMOVE # 3 CYL HD BOLT (FOR OIL DELIVERY PORT) & CLEAN IT AND ITS' BORE HOLE.  
THIS IS THE CHANNEL THE OIL COMES UP TO THE CYL HEAD THROUGH.  
\* TURN THE INTERMEDIATE SHAFT GEAR BY HAND TO OPERATE OIL PUMP.  
OIL SHOULD COME OUT BOLT HOLE AFTER THE PUMP HAS FILLED THE OIL FILTER.

RE-INSTALL BOLT & TORQUE IN THREE (3) STAGES 15ft/lbs ,43ft/lbs, 115°ANGLE TORQUE.

- C] OIL AND INSTALL CAMSHAFT & 'GOOD' BRNG CAPS, TORQUE 15-20ft/lbs, LEAVE THE  
SEIZED CAPS OFF, MATCH NUMBERS ON BRNG CAPS & CYL HEAD WHEN INSTALLING.  
ROTATE CAM TO CHECK FOR DRAG & 'WHIP'... NOW INSTALL 'SEIZED' BRNG CAPS ONE AT A TIME, TORQUE, CHK  
FOR DRAG & 'WHIP' IF NOT ENOUGH 'WHIP' GO TO XX

21

217

- \*\*\* IF CAM MOVEMENT OK >> CHANGE OIL & FILTER >>>  
INSTALL CAM GEAR AND TIMING BELT.  
REMOVE No. 1 term wire FROM IGNITION COIL TO PREVENT ANY IGN SPARKS.  
REMOVE THE FUEL INJ OR FUEL PUMP FUSE TO PREVENT FUEL DELIVERY.  
CRANK ENG ALL SPARK PLUGS REMOVED, OIL SHOULD BE COMING OUT OF EVERY CAM  
BEARING JOURNAL AFTER THE OIL PRESSURE IS BUILT UP.  
\* IT IS VERY IMPORTANT TO CHECK FOR OIL DELIVERY AT EVERY CAM JOURNAL.  
IF OIL IS NOT PRESENT AT ANY JOURNAL, YOU MUST FIND AND ELIMINATE THE BLOCKAGE.

IF OIL DELIVERY OK, INSTALL REMAINING PARTS, START ENG.  
IF OIL DELIVERY IS POOR, CLEAN BRNG OIL HOLES & REDO 'B'.

## XX REMOVE CAMSHAFT

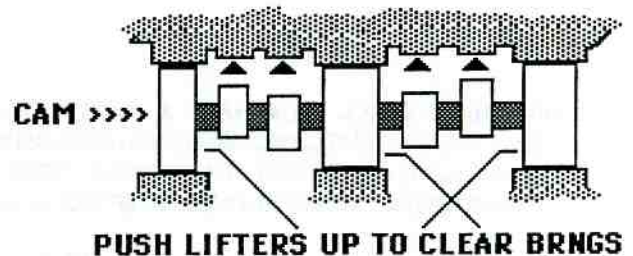
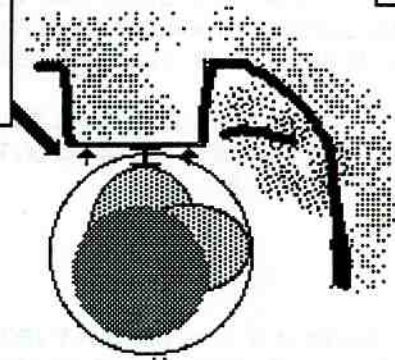
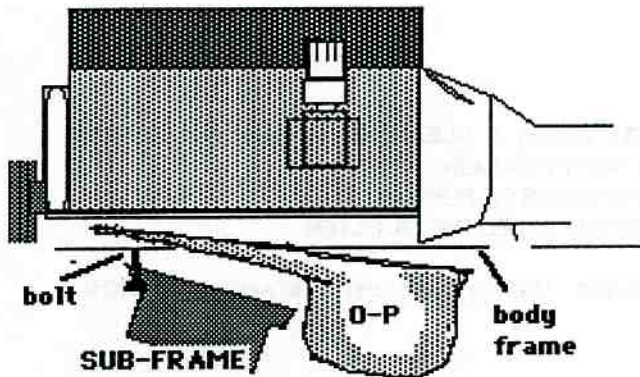
REINSTALL THE SEIZED BRNG CAPS ON THE CYLINDER HEAD & TIGHTEN TO A SNUG FIT> FIND A 3/8" DRIVE SOCKET  
THAT WHEN WRAPPED WITH 'VERY, VERY FINE SAND PAPER OR EMERY CLOTH' IS THE SIZE OF BEARING JOURNAL >  
A FIT THAT ALLOWS YOU TO ROTATE THE SOCKET AND SAND PAPER WITH A SLIGHT DRAG WHEN PUT INTO THE CAM  
BRNG JOURNALS. PUT A COATING OF ATF OR LIGHT ENG OIL ON BRNG JOURNAL & SAND PAPER. ROTATE BACK AND  
FORTH TO LIGHTLY REMOVE ANY REMAINING 'EXCESS' MATERIAL.  
CAUTION, DO NOT REMOVE TOO MUCH MATERIAL. CLEAN AREA. REINSTALL CAMSHAFT AS  
OUTLINED ABOVE, AND CHECK FOR DRAG & WHIP.

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**CAMSHAFT  
REPLACEMENT**

PUSH LIFTERS UP FLUSH IN THEIR BORES, BUT NO HIGHER, OR THEY CAN BE PUSHED OUT INTO THE AREA JUST BELOW CYL HEAD.



**\*\* THERE IS NO REASON TO REMOVE CYLINDER HEAD TO REPLACE A WORN CAMSHAFT. SAVE TIME AND EFFORT BY JUST REMOVING TIMING CASE COVER & OIL PAN (TO PUSH LIFTERS OUT). NO HEAD GASKET TO REPLACE & WORRY ABOUT HEAD GASK LEAK. MANIFOLDS & FUEL SYS LEFT UNDISTURBED.**

**1. REMOVE OIL PAN USING NORMAL METHODS & THOSE BELOW FOR ADDED ROOM FOR O/P**  
 \* REPLACE THE FRONT TWO (2) BOLTS HOLDING SUBFRAME WITH LONGER BOLTS (2 1/2" LONG) INSTALL THE LONGER BOLTS IN APPROX 1/2".

\* SUPPORT SUBFRAME & REMOVE THE TWO (2) BOLTS HOLDING REAR OF SUBFRAME UP. BE SURE SUBFRAME IS WELL SUPPORTED, YOU WILL BE WORKING UNDER IT.

\*\* ON 1975 240 MODELS WITH MACPHERSON STRUT SUSP > JUST LOOSEN ALL FOUR SUBFRAME BOLTS WITHOUT REMOVING THEM, LOWER SUBFRAME WHILE SUPPORTING ENGINE.

**2. REMOVE TIMING CASE COVER USING NORMAL METHODS.**

**3. REMOVE VALVE COVER, ROCKER ARM ASSEMBLY AND PUSHRODS. MARK & REMOVE IGN DISTRIBUTOR AND DIST DRIVE GEAR.**

**4. FROM UNDERNEATH THRU CRANKCASE AREA, PUSH VALVE LIFTERS UP FROM BELOW JUST ENOUGH SO THE LIFTERS WILL HAVE THE CLEARANCE FOR CAM LOBES & BRNGS TO CLEAR WHEN CAM IS PULLED OUT. (SEE PICTURE) DO NOT PUSH LIFTERS UP & OUT. JUST PUSH THEM FLUSH WITH THE LIFTER BORE OF THE ENGINE BLOCK.**



**CAMSHAFT  
REPLACEMENT  
[CONT.]**

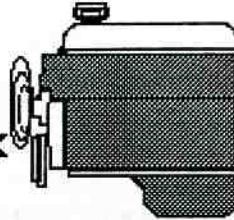
5. REMOVE CAMSHAFT & THEN FROM ABOVE THRU THE PUSHROD HOLES WITH A LONG ROD OR SCREWDRIVER PUSH ALL THE OLD LIFTERS OUT THE BOTTOM THRU O/P AREA.  
(CLEAN & INSPECT THEM-- I RECOMMEND YOU CHANGE THEM ALL)
6. LUBE THE NEW LIFTERS WITH OIL-- THEN TAKE SOME GREASE & PUT SOME ON THE LIFTER SO WHEN YOU PUSH IT FLUSH INTO THE LIFTER BORE HOLES OF THE CYL BLOCK THEY WILL STAY THERE.  
(SEE PICTURE) INSTALL LIFTERS FROM UNDERNEATH.
7. LUBE NEW CAMSHAFT LIBERALLY, LOBES & BRNGS AREAS LIBERALLY -- THEN INSTALL CAREFULLY -- TAKE CARE NOT TO DAMAGE BRNGS IN BLOCK.
8. REINSTALL ALL PARTS IN REVERSE ORDER.  
ADJUST VALVES [0.018 to 0.020"] WARM ENG
9. CHANGE OIL AND FILTER.

**\*NOTES\***

**B-20, 30  
TIMING GEAR  
'KNOCKING'  
NOISE**

21  
401

**KNOCK  
KNOCK  
KNOCK**



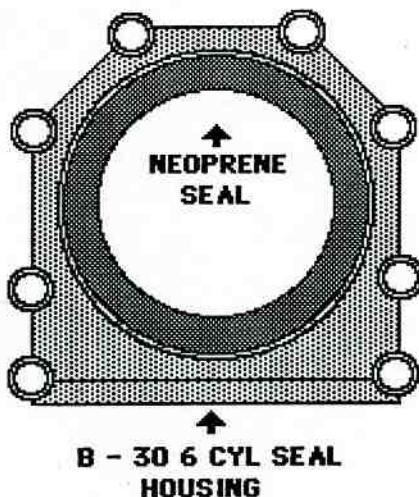
A ' KNOCKING NOISE ' LIKE A 'diesel knock' OR EVEN A 'rod knock' MAY ONLY BE THE TIMING GEARS. THE FIBER GEAR TEETH MAY BE WORN OUT OR THE FIBER GEAR MAY HAVE BROKEN LOOSE FROM THE FLANGE IT IS GLUED ONTO.

BY ROCKING THE CRANK PULLEY BACK < & > FORTH YOU MAY BE ABLE TO HEAR THE NOISE. NOW TAKE OFF THE DIST CAP & TAKE NOTE OF THE ROTOR AS YOU ROCK THE CRANK A LITTLE BACK < & > FORTH, IF YOU NOTICE THERE IS PLAY BEFORE THE ROTOR BEGINS TO MOVE THERE IS A VERY GOOD CHANCE THE TIMING GEARS ARE WORN.

REMOVE THE TIMING GEAR COVER AND REPLACE THE GEARS. BE SURE TO LUBE THE GEARS HEAVILY BEFORE ASSEMBLY. INSTALL THE CRANK GEAR FIRST, THEN THE CAM GEAR. A KIT WITH ALL THE PARTS (GASKETS, GEARS, BOLTS & CAM RETAINING PLATE) IS AVAILABLE FROM VOLVO.

**B-18,20 ENGINE  
REAR CRANK SEAL  
REPLACING FELT  
SEAL WITH  
NEOPRENE SEAL**

21  
501



REPLACEMENT OF THE REAR CRANKSHAFT FELT TYPE ON THE B-18,20 ENGINE WITH A NEW FELT SEAL MAY NOT STOP A STUBBORN OIL LEAK.

IT IS A LITTLE MORE COSTLY, YET IT IS A MUCH BETTER REPAIR IF THE FELT SEAL BE REPLACED WITH A **NEOPRENE TYPE**.

THE EXTRA COST COMES FROM THE NEED TO REPLACE THE **SEAL HOUSING** AS WELL AS THE SEAL.

REPLACE THE OLD SEAL HOUSING WITH A NEW ONE, **USE THE ONE FOR A B-30 6 CYL ENGINE**. THEN USE A NEOPRENE SEAL FOR A B-30. POSITION THE SEAL IN THE HOUSING SO IT WILL SEAT ITSELF ON A SMOOTH AREA OF THE CRANKSHAFT.

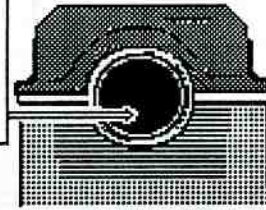
NOTE; YOU CANNOT USE THE OLD SEAL HOUSING. IPD, INC., IN PORTLAND, OREGON HAVE HOUSINGS THAT WILL WORK GREAT.



## **OIL LEAKS**

### **4 CYL ENGINE NON-TURBO**

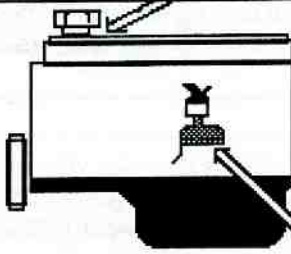
B-230 200 SERIES  
CAMSHAFT SEAL PLUG  
IF THIS PLUG IS BLOWN OUT,  
CHECK THE FLAME ARRESTOR.  
• THE BLACK SECTION IS TO THE  
OUTSIDE. CONE IS FACING TO THE  
INSIDE.



21

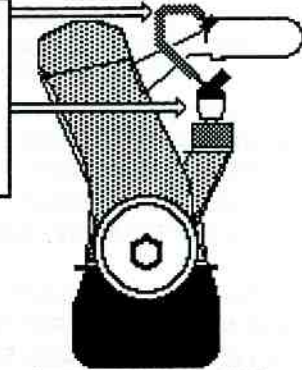
511

OIL FILL CAP SEAL RING SHOULD BE  
VERY FLEXIBLE & SOFT, NOT BRITTLE



\*\*\*\*\* FLAME ARRESTOR\*\*\*\*\*  
WHENEVER ENG OIL LEAKS OCCUR  
THE FLAME ARRESTOR & INTAKE  
MAN VACUUM PORT FITTING MUST  
BE CHECKED & CLEANED OR  
REPLACED.

\*\*\*\*\*OIL TRAP\*\*\*\*\*  
OIL TRAP MUST BE CLEAR OF ANY  
OBSTRUCTIONS. ANY "OLD" FLAME  
ARRESTOR PIECES, OR OIL SLUDGE  
MUST BE REMOVED.



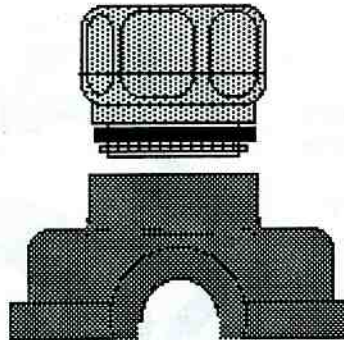
FRONT VIEW  
OF ENGINE

\* THESE ARE THE MOST COMMON POINTS FOR OIL LEAKS. THEY CAN EASILY BE REPAIRED. SOME  
IN ONLY A FEW MINUTES, SO DON'T ALWAYS ASSUME IT WILL TURN OUT TO BE A MAJOR REPAIR. LOOK AT THESE  
AREAS FIRST, BEFORE MOVING TO THE VARIOUS SHAFT SEALS.

THE VALVE COVER BOLT RETORQUE AND OIL FILL CAP SEAL RING CAN BE PART OF A YOUR PREVENTIVE  
MAINTENANCE SERVICE.



\* HALF MOON RUBBER SEAL  
REPLACE WHENEVER V/COVER  
GASKET IS REPLACED.  
B - 21, 23 ENGINES



\* OIL FILL CAP SEAL  
RING BECOMES HARD  
AND BRITTLE OVER  
TIME. OIL SEAPAGE WILL  
THE RESULT. REPL THE RING  
AND BE SURE CAP IS ON  
TIGHT.



\* OIL PRESSURE SW  
LEAKS BETWEEN NUT  
AND SWITCH TERM  
INSULATOR.



\* VALVE COVER BOLTS  
BECOME LOOSE.  
RETORQUE AT SERVICES, THE  
GASKET WILL NOT ALWAYS  
NEED TO BE REPLACED.

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**OIL LEAKS**  
**FLAME ARRESTOR**  
**1981-87**  
**4 CYL ENGINE**  
**NON-TURBO**

- ✓ OIL FILM IN ENG COMPARTMENT, DIPSTICK BLOWN OUT FROM OVER PRESSURE IN CRANKCASE.
- ✓ CLEAN FLAME ARRESTOR SYSTEM, REPLACE PARTS AS NECESSARY.
- ✓ CLEAN INTAKE MANIFOLD VAC FITTING[SMALL HOSE]

21

531

THE ENGINE CRANKCASE MUST BE ABLE BREATHE. SO WHEN THE FLAME ARRESTOR BECOMES PLUGGED IT WILL CAUSE EXCESSIVE PRESSURE TO BUILD UP IN THE CRANKCASE. THIS PRESSURE WILL FORCE OIL OUT OF EVERY SEAL & GASKET AREA IT CAN. THE OIL DIPSTICK MAY BLOW OUT PARTIALLY FROM IT'S PIPE.

THE CRANKSHAFT (FRONT & REAR), CAMSHAFT & INTERMEDIATE SHAFT SEALS MAY ALSO BLOW OUT OR WEAR OUT. THE FIRST METHOD OF REPAIR IS TO CLEAN OR REPLACE THE FLAME ARRESTOR. THIS MAY BE ENOUGH IF THE SEALS ARE IN GOOD SHAPE(NEWER AUTO). **MAKE SURE FLAME ARRESTOR IS THE LARGE ONE (SEE DRAWING).** IF THE OIL LEAK CONTINUES, REPLACE LEAKING SEALS.

**SUCK DOWN TEST**

**1976 - 87:** TO CHECK FOR A FLAME ARRESTOR THAT IS PLUGGING UP BUT NOT TOTALLY CLOSED YOU CAN PERFORM A **QUICK CHECK**. RUN THE ENGINE, THEN LOOSEN OIL FILL CAP TO WHERE IT JUST SITS FLAT ON VALVE COVER, NOT BEING HELD ON BY THE LOCKING LUGS. WITH THE ENG RUNNING AT IDLE, THE CAP SHOULD BE SUCKED BACK ON, NOT BOUNCING AROUND.

IF IT BOUNCES AROUND & IT ISN'T DUE TO EXCESSIVE ENGINE WEAR (BLOWBY) , CHECK FLAME ARRESTOR, HOSES AND INTAKE MANIFOLD FITTING. IF IT HAS THE F/A THAT IS IN THE BREATHER HOUSING IT MUST BE THOROUGHLY REMOVED FROM HOUSING, SO THERE WILL BE NO RESTRICTIONS.

**1988 -ON:** THE NEW F/A VERSION USED ON THESE ENGINES ARE MOUNTED ABOVE THE INTAKE MANIFOLD. IT IS UPSIDE DOWN, 'SUCK DOWN TEST' DOESN'T APPLY [NO SUCK DOWN].

**FLAME**  
**ARRESTOR**  
**1981-87**  
**4 CYL ENGINE**

- \* PLUGGED FLAME ARRESTOR IS CAUSED BY>  
 LOW GRADE, DIRTY OIL, OIL LEVEL KEPT TOO LOW, NOT PROPERLY SERVICED.
- \* THE INTAKE MANIFOLD VAC FITTING FOR SMALL HOSE SHOULD BE REAMED OUT [CLEANED].
- \* IDLE SCREW ADJ PORT MAY NEED CLEANING OUT OF OIL SLUDGE,OR IDLE RPM MAY NOT BE ABLE TO SET.

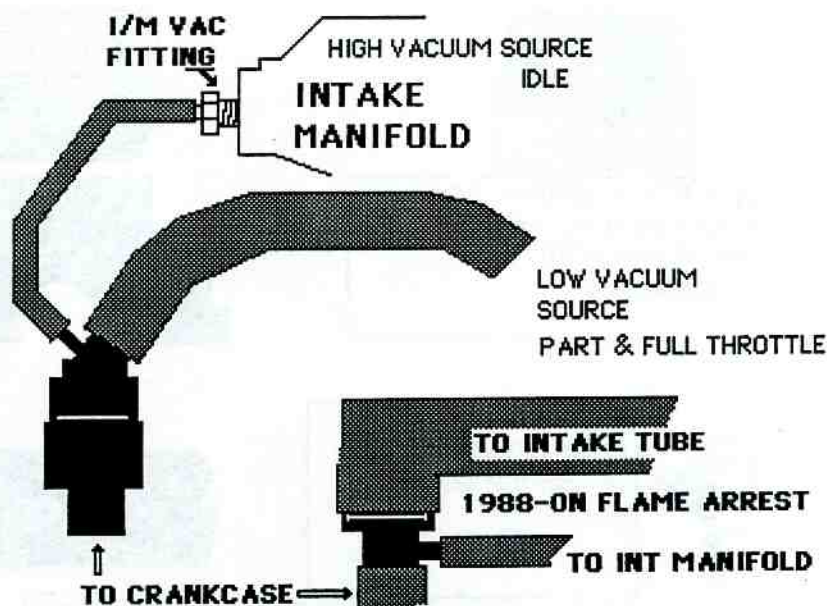
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534

THERE ARE TWO VACUUM SOURCES FOR THE FLAME ARRESTOR SYSTEM. THEY MUST BOTH BE CLEAN AND UNRESTRICTED. MAKE SURE THEY ARE CONNECTED PROPERLY.

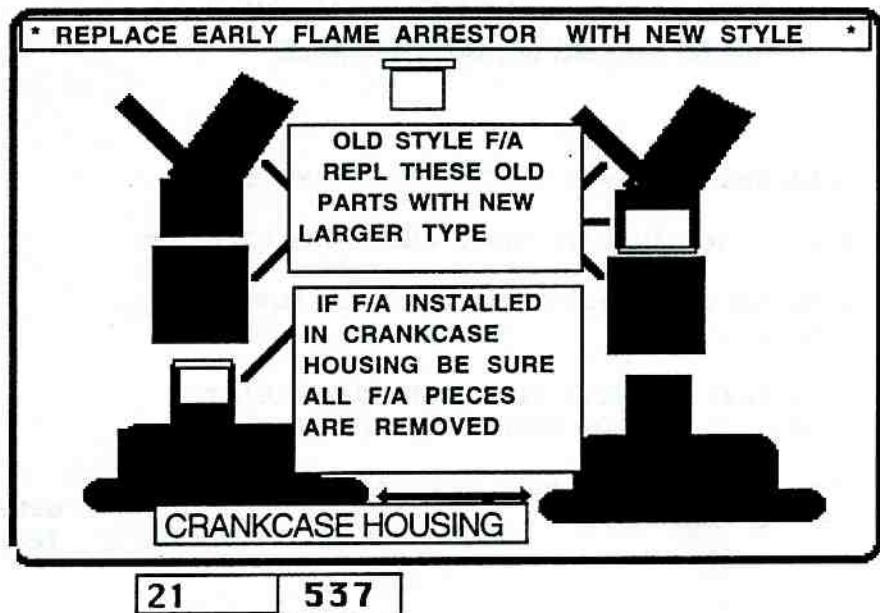
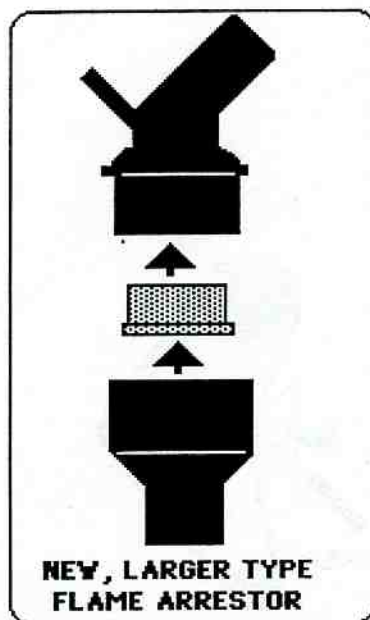
THE VACUUM AT IDLE IS PROVIDED BY THE INT MAN VAC FITTING, SO IF IT IS PLUGGED THERE CAN STILL BE PRESSURE IN THE CRANKCASE AT IDLE.

THE LARGE HOSE GOES TO INDUCTION SYSTEM, PROVIDING VACUUM AT HIGHER RPMs.





A PLUGGED FLAME ARRESTOR IS THE MAJOR CAUSE OF ENGINE OIL LEAKS. PRESSURE BUILDS UP IN CRANKCASE AND BLOWS OIL OUT OF THE SEALS & GASKETS (also seals can be blown out). IF NEW SEALS ARE INSTALLED WITHOUT THE F/A & INT MAN VAC PORT FITTING BEING CLEANED, THE NEW SEALS WILL LIKELY BE BLOWN OUT AS WELL. SOMETIMES JUST CLEANING THE F/A SYSTEM WILL STOP THE LEAKS ,BUT BE SURE TO CHECK THAT THE LEAKS ARE THOROUGHLY STOPPED.



**\*NOTES\***

**BROKEN  
TIMING BELT**

**CHECK ITEMS**

REPLACEMENT OF THE TIMING BELT IS ONE OF THE MOST COMMON ENGINE REPAIR AND/OR MAINTENANCE OPERATION NEEDED ON THE B-21, 23, B-230.

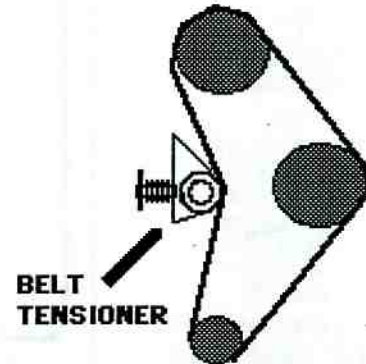
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711

THE BELT MAY BREAK FROM 'OLD' AGE OR BECAUSE THE CAM HAS SEIZED, IF SO CHECK FOR ANY DAMAGE TO THE RELATED PARTS.

**REPLACE TIMING BELT EVERY  
45 to 50,000 mi INTERVALS**

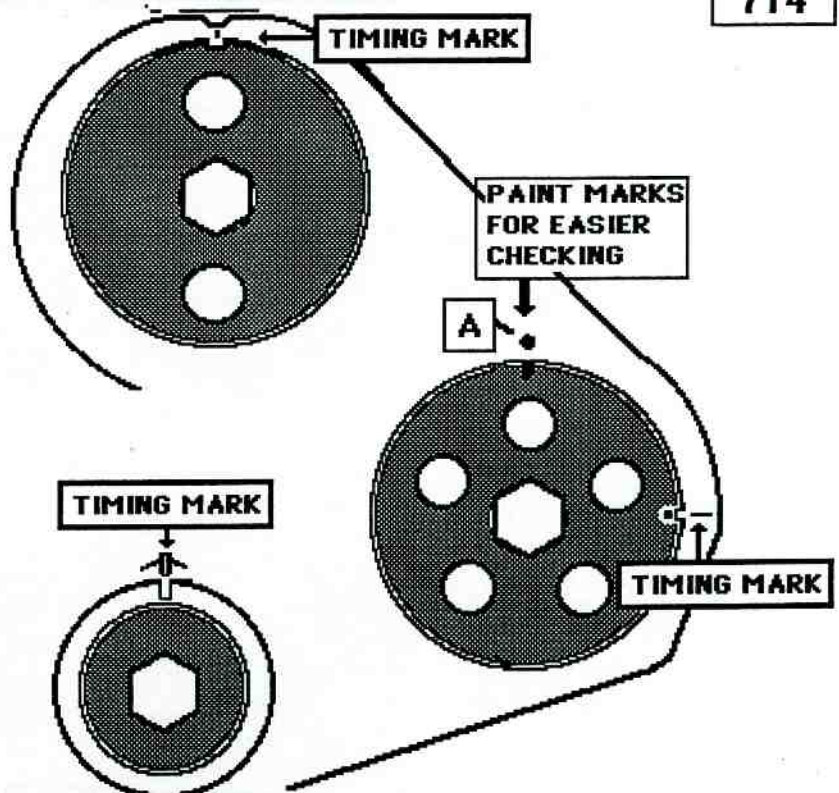
- ✓ CHECK THE CAMSHAFT, MAKE SURE IT ISN'T SEIZED.
- ✓ REMOVE THE CAMSHAFT GEAR, CHECK THE DRIVE PIN.
- ✓ CHECK THE CRANKSHAFT BELT GEAR FOR ANY CRACKS.
- ✓ CHECK THAT THE BELT TENSIONER IDLER PULLEY BEARING IS IN GOOD CONDITION, NOT NOISY.
- ✓ CLEAN EXCESSIVE OLD BELT MATERIAL FROM THE TEETH OF THE GEARS.



**TIMING BELT  
REPLACEMENT**

- \* LINE THE TIMING MARKS UP WITH THE GEARS.
- \* PUT A PAINT MARK ON THE INT SHAFT & ON THE BACKING PLATE FOR AN EASIER QUICK CHECK (SEE 'A')
- \* LOOSEN THE TENSIONER NUT 1-2 TURNS.  
PULL BELT AWAY BETWEEN CAM & INTERMEDIATE SHAFT GEARS TO FORCE TENSIONER BACK, THEN TIGHTEN NUT. [SEE DRAWING]

OR IF BELT BROKEN:  
USE A LARGE PAIR CHANNEL LOCK PLIERS TO PULL BACK TENSIONER. WHILE HOLDING IT BACK AS FAR AS IT WILL GO, TIGHTEN THE NUT.



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714



\* REMOVE THE OLD BELT.

\* CHECK TIMING MARK ALIGNMENT.  
INSTALL THE NEW BELT IN THE ORDER  
THAT SHOWN IN THE PICTURE TO THE  
RIGHT.

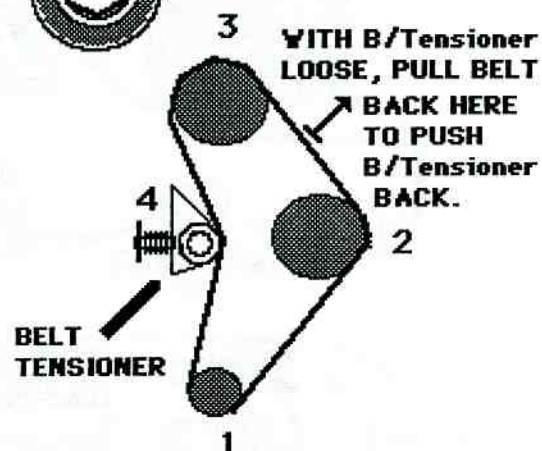
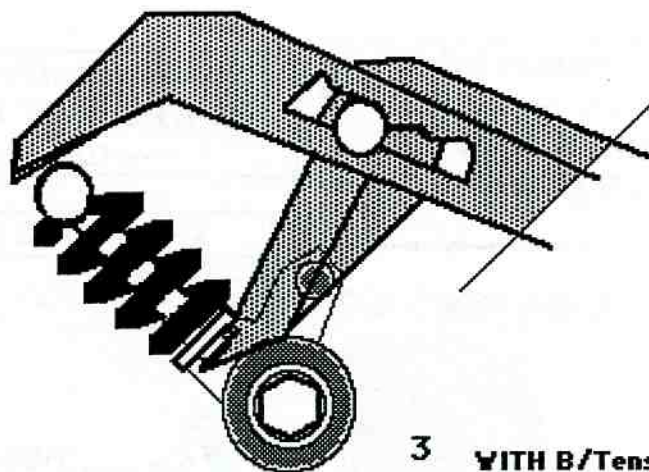
OVER .. 1- CRANK GEAR  
2- INT SHAFT GEAR  
3- CAM GEAR  
4- TENSIONER PULLEY

\* LOOSEN THE TENSIONER NUT,  
ALLOWING THE PULLEY TO PUT  
PRESSURE ON THE BELT. TIGHTEN  
THE NUT.

\* DOUBLE CHECK THAT THE TIMING  
MARKS STILL ARE LINED UP.

\* AFTER THE ENG HAS RUN FOR AWHILE  
THE BELT SHOULD BE ADJUSTED AGAIN.  
TURN THE ENGINE 'OFF'.  
LOOSEN THE NUT 1 TURN AND THEN  
RETIGHTEN IT AGAIN.

--- CAUTION - DO NOT TURN ENG OVER  
WITH THE TENSIONER BOLT LOOSE.



21 717

\*NOTES\*

21 719

**LAMBDA SOND  
O2- SENSOR  
K-JETRONIC INJ  
LH INJECTION**

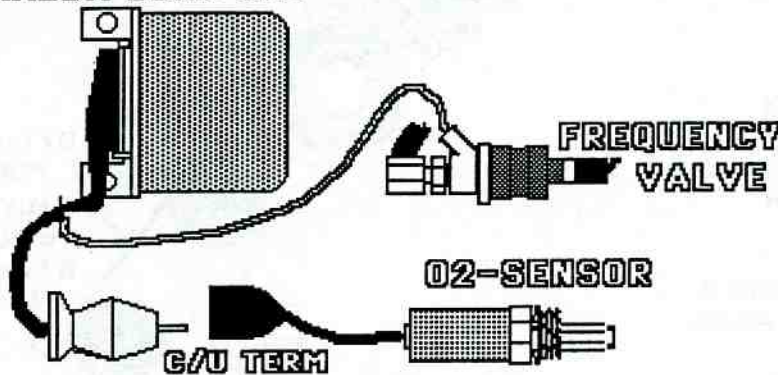
**CAUTION: NEVER DISCONNECT ANY  
CONTROL UNIT WITH THE KEY ON [KP II]  
... DAMAGE WILL RESULT ...**

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001

**K-JETRONIC INJ LAMBDA SOND COMPONENTS**

**LAMBDA SOND C/U**



K-JETRONIC FUEL INJECTION SYSTEM utilizes a SEPARATE CONTROL UNIT that will monitor the O2 SENSOR. The CONTROL UNIT will then change the FREQUENCY VALVE DUTY CYCLE to vary the amount fuel injected. The system has its own relay.

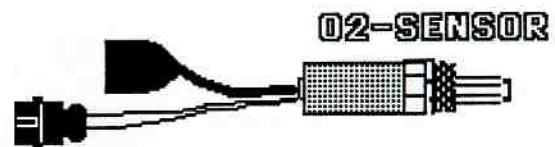


	CON COLOR	WIRE COL
K-JET	BLACK	C/O TP RED
	BLUE	IDLE DIS W/BL

**LH FUEL INJECTION LAMBDA SOND COMPONENTS**

THE LH FUEL INJECTION SYSTEM incorporates the LAMBDA SOND function within the INJECTION CONTROL UNIT that will monitor the O2 SENSOR.

The amount of fuel is varied by changing injector firing time length [DURATION].



B	TERM NO	
LH II INJECTION	1	IDLE DISABLE
	2	C/O TEST POINT

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002



**LAMBDA SOND  
OXYGEN SENSOR  
THEORY OF  
OPERATION**

OXYGEN SENSOR IS A LOW VOLTAGE GENERATOR, FROM 0.1 to 0.9 volts DC. IT REACTS TO OXYGEN IN THE EXHAUST AFTER THE OXY-SENSOR HAS BEEN HEATED UP BY EXH HEAT. THE HIGHER THE LEVEL OF OXYGEN (LEAN air/fuel mixture) THE LOWER THE VOLTAGE OUTPUT. THE LOWER THE LEVEL OF OXYGEN (RICH air/fuel mixture) THE HIGHER THE VOLTAGE OUTPUT. MEANING = LEAN 0.120v or lower  
= RICH 0.850v or higher.

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003

----- OXYGEN SENSOR, O2 SENSOR, LAMBDA SOND, OXY SENSOR -----

ALL THOSE NAMES MEAN THE SAME THING, THE KEY TO FUEL EFFICIENCY AND OPTIMUM PERFORMANCE FROM A FUEL INJECTED ENGINE. THE FIRST EMISSION COMPONENT THAT ACTUALLY WOULD PROVIDE BETTER FUEL ECONOMY, LESS POLLUTION AND EVEN ENHANCE ENGINE OUTPUT!  
THE BENEFITS DIDN'T STOP THERE, BECAUSE THE O2 SENSOR CAN ALSO BE USED BY THE TECHNICIAN TO MONITOR AND SET FUEL SYSTEM PERFORMANCE.

THERE ARE TWO DIFFERENT FUEL INJECTION SYSTEMS THAT USE O2 SENSORS ON VOLVOs. THESE ARE THE K-JETRONIC [constant inj system] AND THE LH-INJECTION SYSTEMS. THEY BOTH RECEIVE THE SAME INFO FROM THE O2 SENSOR, IT'S HOW THEY USE THIS INFO IN CHANGING FUEL MIXTURE THAT IS DIFFERENT. WE WILL NOT DEAL WITH THAT HERE, LET'S JUST EXPLORE WHAT THE OXY SENSOR IS AND HOW IT WORKS. WHEN YOU UNDERSTAND THIS, YOU WILL BE BETTER ABLE TO USE THE OXY SENSOR INFO FOR YOUR OWN BENEFIT JUST AS THE FUEL INJECTION SYSTEMS DO.

AS STATED ABOVE THE O2 SENSOR IS A LOW VOLTAGE GENERATOR. THE TRICK OF IT IS THAT IT USES OXYGEN TO GENERATE THE VOLTAGE. THE SENSOR SAMPLES BOTH THE AMOUNT OF OXYGEN IN THE OUTSIDE AIR AND THE AMOUNT IN THE EXHAUST.

• RICH MIXTURE •

WHEN THERE IS A LOW OXYGEN CONTENT IN THE EXHAUST AIR, THE OXYGEN IN THE OUTSIDE AIR REACTS WITH THE PLATINUM COATED CERAMIC ELEMENT INSIDE AND PRODUCES A VOLTAGE OF UP TO APPROX 0.98v. NATURALLY, THIS WOULD BE A RICH FUEL MIXTURE, WITH TOO MUCH UNBURNED, WASTED FUEL AND OF COURSE POOR ENGINE PERFORMANCE.

• LEAN MIXTURE •

WHEN THERE IS A HIGH OXYGEN CONTENT IN THE EXHAUST AIR, THE SENSOR WILL NOT PRODUCE AS HIGH OF A VOLTAGE. THE VOLTAGE OUTPUT WILL BE CLOSER TO 0.10v. NATURALLY, THIS WOULD BE A LEAN FUEL MIXTURE AND OF COURSE POOR ENGINE PERFORMANCE.

THERE IS A HAPPY MEDIUM, HOWEVER, THE AREA RIGHT IN THE MIDDLE. WHERE THE FUEL EFFICIENCY AND OPTIMUM ENGPERFORMANCE OCCUR. THIS WILL BE JUST THE RIGHT AMOUNT OF FUEL AND AIR BEING BURNED IN THE ENGINE.

THE OXYGEN SAMPLINGS OF BOTH THE OUTSIDE AIR AND THE OXYGEN IN THE EXHAUST WILL THEN PRODUCE A VOLTAGE OUTPUT OF APPROX 0.50v.

NOW FOR ANY OF THESE OXY SENSOR VOLTAGE OUTPUTS TO OCCUR WE NEED ANOTHER VERY IMPORTANT INGREDIENT, WE NEED HEAT. THE TEMPERATURE WILL NEED TO BE AROUND 600°F FOR ANY OF THIS TO START TO HAPPEN.

A LOWER TEMP THAN THIS WILL MEAN NO VOLTAGE OUTPUT. THE EXHAUST WILL PROVIDE THIS HEAT, BUT IT WILL TAKE TIME TO HEAT UP. ALSO, PROLONGED IDLING WILL TEND TO COOL THE OXY SENSOR DOWN BELOW THIS NEEDED TEMPERATURE.

22

004



TO ASSIST IN HEATING THE OXY SENSOR, LATER MODELS USE A PREHEATED SENSOR. THESE OXY SENSORS WILL HAVE THREE (3) WIRES ON THEM INSTEAD OF JUST ONE (1) LIKE THE UNHEATED (EARLY) SENSORS.

ONE WIRE WILL BE THE O2 SENSOR OUTPUT. THE OTHER TWO WIRES WILL BE FOR THE HEATING ELEMENT IN THE O2 SENSOR.

WHEN THE ENGINE IS RUNNING, THE HEATING ELEMENT WILL BE SUPPLIED WITH 12v FROM THE FUEL INJ RELAY ON ONE WIRE. THE OTHER WIRE IS ALWAYS GROUNDED.

\*\*\* O2 SENSOR LOOP \*\*\*  
EXHAUST CONDITIONS  
HIGH OXYGEN > LEAN MIXTURE > LOW O2  
SENSOR VOLTAGE

LOW OXYGEN > RICH MIXTURE > HIGH O2  
SENSOR VOLTAGE

#### LH-INJECTION SYSTEMS

LH-INJECTION SYSTEMS HAVE THE OXY SENSOR SYSTEM WITHIN THE LH C/U. THE AIR/FUEL MIXTURE IS THEN CONTROLLED BY VARYING THE LENGTH OF TIME THE FUEL INJECTORS ARE OPEN (INJECTION DURATION).

#### K-JETRONIC INJECTION

K-JETRONIC LAMBDA SOND SYSTEMS USE THEIR OWN C/U, RELAY AND FREQUENCY VALVE. VARYING THE LOWER CHAMBER FUEL PRESSURE IN THE FUEL DISTRIBUTOR IS HOW AIR/FUEL MIXTURE IS CONTROLLED IN THESE FUEL INJ SYSTEMS.

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005

WHEN THE ENGINE IS AT OPERATING TEMP THE O2 SENSOR WILL BE ABLE TO GIVE YOU A VOLTAGE OUTPUT YOU CAN USE TO SET THE AIR/FUEL MIXTURE WITH. THE ONE THING TO KEEP IN MIND IS THAT THE ENGINE AND O2 SENSOR TEMPERATURE IS IMPORTANT FOR PROPER OPERATION. BEFORE TAKING A VOLTAGE READING IT IS ADVISABLE TO HEAT THE OXY SENSOR UP. A LOW SENSOR TEMP CAN EITHER CAUSE IT TO PRODUCE NO VOLTAGE OR A LOW INCORRECT VOLTAGE.

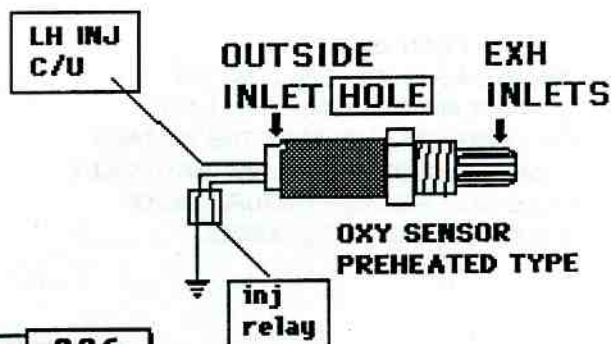
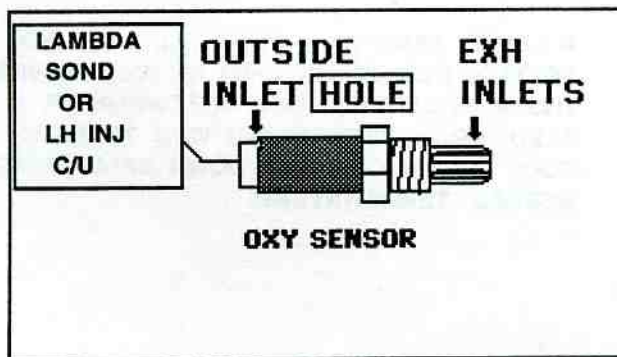
THE ENG RPMs SHOULD FIRST BE RAISED TO 2,500 FOR ABOUT 20 sec TO INSURE O2 SENSOR IS HEATED UP, ESPECIALLY IF O2 SENSOR IS NOT THE PREHEATED TYPE.

#### \*\*\*\*\* IMPORTANT CONDITIONS FOR PROPER O2 SENSOR OPERATION \*\*\*\*\*

OUTSIDE AIR INLETS OPEN  
NO DIRT OR OIL ETC

EXHAUST INLETS OPEN  
NO CARBON,OIL FOULING

O2 SENSOR TEMP  
MINIMUM 600°F



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006



**---LAMBDA SOND---O2 SENSOR---CHECK OPERATION---**  
**VOLTAGE CHECK AT O2 SENSOR**

22  
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THE OUTPUT VOLTAGE FROM THE O2-SENSOR CAN BE A EXCELLENT "TOOL" FOR BOTH SETTING C/O, AS WELL AS CHECKING FUEL SYSTEM PERFORMANCE. TESTING IS VERY EASY. USE A DIGITAL VOLT METER IN VERY LOW VOLTAGE SCALE.

REMEMBER THE OUTPUT IS LESS THAN ONE (1.0) VOLT D.C..IF THE O2-SENSOR IS OPERATING PROPERLY YOU WILL FIND THIS VOLTAGE CHK IS THE BEST WAY TO SET THE C/O (air/fuel mixture). IT IS QUICK, EASY AND REQUIRES NO EXH GAS ANALYZER.

\*\*\*\*\*

**#1 CHECK C/U VOLTAGE [green wire]**

UNPLUG THE OXY-SENSOR AT FIREWALL [black wire O2 SENSOR]-from-[green wire CONTROL/ UNIT]

- \* **HOOK VOLT METER GROUND(-) LEAD TO A GOOD GROUND.**
- \* **HOOK VOLT METER POS (+) LEAD TO C/U WIRE (green wire) CHK FOR CONTROL VOLTAGE**  
VOLTAGE AT GREEN WIRE SHOULD BE APPROXIMATELY;

( 4CYL K-JET 2.2v '78-80) ( V6 K-JET 0.5v '77 -86)

( 4CYL K-JET 0.5v '81-85)

(LH INJ 0.5v)

CORRECT VOLTAGE SHOWS C/U IS OK... if voltage OK go to #2 ,

**IF NO VOLT CHECK >**

√ **K-JET CHECK LAMBDA SOND RELAY**(left fender 200 series), WIRING, LAMBDA SOND C/U term #2

√ **LH INJ CHECK C/U term # 20 FOR 0.5v** [THE TERM FOR THE WIRE THAT GOES TO THE O2 SENSOR].

**#2 CHECK O2 SENSOR VOLTAGE OUTPUT[black wire]**

**HOOK VOLT METER POS (+) LEAD TO O2 SENSOR (black wire)**

VOLTAGE WHICH WILL PROBABLY BE OSCILLATING

(0.120-0.320v LEAN)

(0.350-0.680v C/O CORRECT)

(0.760-0.980v RICH)

- \* IF VOLTAGE IS NOT OSCILLATING BUT STAYING ALMOST CONSTANT IT SHOWS C/O IS  
**TOO LOW (LEAN approx 0.120v)** or **TOO HIGH (RICH approx 0.890v)**  
ADJUST C/O ACCORDINGLY

**\*\* IF THE OUTPUT VOLTAGE IS LOW (approx 0.120 v or lower) AND REMAINING CONSTANT THE O2-SENSOR MAY NOT BE FUNCTIONING.**

**#3 THE ENGINE SHOULD BE AT OPERATING TEMP BEFORE A TRUE DETERMINATION CAN BE MADE. THIS WILL ALSO BE A TEST FOR THE LAMBDA SOND C/U (K-JET), OR THE FUEL INJ C/U (LH INJ SYS).WITH O2 Sensor DISCONNECTED FROM GREEN C/U WIRE, GROUND THE CONTROL UNIT(green wire) TERM. YOU SHOULD NOTICE THE RPMs INCREASE, THIS HAPPENS BECAUSE THE GROUNDED WIRE IS SENDING THE C/U A FALSE SIGNAL, remember a low voltage output (approx 0.120v) means a LEAN MIXTURE (HIGH OXYGEN). THE C/U WILL THEN RICHEN THE MIXTURE, CAUSING THE RPMs TO INCREASE.**

**IF THE RPMs INCREASE BUT THE VOLTAGE OUTPUT FROM THE O2-SENSOR (black wire) DOESN'T INCREASE THE O2-SENSOR IS PROBABLY DEFECTIVE NEEDING REPLACEMENT.**

**#3A YOU CAN FURTHER TEST THE C/U BY HOLDING THE POS(+) BATTERY CABLE WITH ONE HAND WHILE HOLDING THE C/U (green wire) TERM IN THE OTHER. YOUR BODY WILL ALLOW ENOUGH CURRENT TO PASS THRU TO THE C/U, THIS WILL FALSELY TELL THE C/U THE ENG IS RUNNING TOO 'RICH' AND IT WILL THEREFORE LEAN THE ENG OUT.**

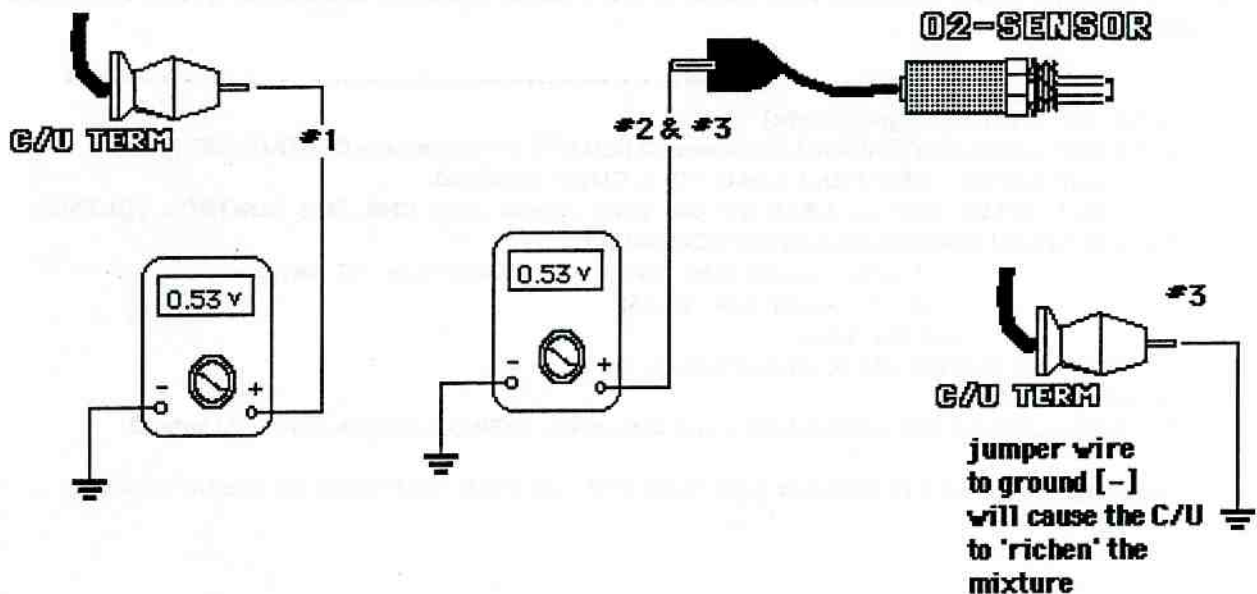
**THE IDLE WILL GO DOWN AND BE VERY POOR. A VERY LOW VOLTAGE OUTPUT FROM THE O2 SENSOR WILL RESULT.**

## O2 SENSOR TESTING

### DIGITAL VOLT METER HOOK UPS

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## O2 SENSOR --- COMMON FAULTS

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IF OXY SENSOR IS OLD, WITH SLUGGISH VOLTAGE REACTION TO AIR/FUEL MIXTURE, THE CONDITION MAY EVEN BE WORSE WHEN THE ENG IS IN THE WARM UP STAGE. THE ENG MAY STALL, DIE OR RUN ROUGH. REPLACEMENT OF THE O2 SENSOR SHOULD CORRECT THIS.

### \*\*\*\* K-JETRONIC FUEL INJECTION \*\*\*\*

IF OXY SENSOR VOLTAGE GOES FROM LEAN (0.10v) STEADILY MOVING UP TO RICH (0.80v) and you hardly MOVE C/O ADJUSTING TOOL BUT THE VOLTAGE JUST STEADILY, SLOWLY MOVES UP OR DOWN DEPENDING ON DIRECTION TOOL IS MOVED. THE OXY SENSOR IS MOST LIKELY BAD.

IF O2 SENSOR VOLTAGE GOES 'UP' OR 'DOWN' QUICKLY WHILE YOU ARE TRYING TO SET THE C/O, TAKE C/O TOOL OUT. PLUG THE HOLE. ALLOW THE ENG TO IDLE FOR A MINUTE OR TWO. NOW CHECK THE O2 SENSOR VOLTAGE, IF VOLTAGE IS MOVING QUICKLY 'UP' OR 'DOWN', WHILE YOU AREN'T MAKING ANY ADJUSTMENTS, CHECK THE FOLLOWING:

OIL CONTAMINATED[GAS], GAS EVAP SYSTEM, LEAKING COLD START INJ, VAC LEAKS, FUEL QUALITY [HI ALCOHOL CONTENT], O2 SENSOR.

**BUZZ --- BUZZ --- BUZZ --- BUZZ --- BUZZ --- BUZZ**

THE FREQUENCY VALVE SHOULD ALWAYS BE BUZZING.

WHEN IT DOESN'T BUZZ, IT IS EITHER STAYING 'CLOSED' WHICH WILL LEAN OUT THE ENGINE, OR 'OPEN' RICHENING THE ENGINE.

CHECK [& ADJUST] THE C/O MIXTURE TO SEE IF IT IS EITHER TOO RICH OR TOO LEAN CAUSING THIS TO HAPPEN. IF THE FREQ/VALVE IS UNPLUGGED OR A BAD LAMBDA RELAY ARE ALSO CAUSES.

**IF AT ALL POSSIBLE TRY TO KEEP A OXY SENSOR (EITHER NEW OR A GOOD OLD ONE) AROUND TO USE FOR CHECKING PURPOSES. IF YOU SUSPECT THE O2 SENSOR IS BAD, YOU CAN JUST PUT YOUR OWN IN & CHECK FOR A DIFFERENT READING.**



**LAMBDA SOND TEST POINT - DUTY CYCLES**  
**✓ USE A GOOD DWELL METER ON 4 CYLINDER SCALE**

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THE TEST POINT FOR THE LAMBDA SOND  
 SYS CAN BE FOUND ON THE- TEST POINT  
 PAGE -- GROUP #20

----- DUTY CYCLES -----

A GOOD QUALITY DWELL METER CAN BE USED FOR  
 CHECKING THE AIR/FUEL MIXTURE.

\* **ALWAYS SET THE DWELL METER TO THE  
 4 CYL SCALE**(or read the 4 cyl scale when set on 8 cyl  
 mode)

**\*\*\*\* K- JETRONIC INJECTION**

THERE WILL BE DIFFERENT DUTY CYCLES DEPENDING  
 ON A FEW VARIABLES;

- 1-THE TYPE OF ENG(4 CYL,4 CYL TURBO, 6 CYL)
- 2- ADDITIONAL ENRICHMENT SYSTEMS

**\*\*\*\* LH INJECTION SYSTEM**

THERE ARE NOT ANY PRESET DUTY CYCLES.  
 ALL ENGINES WILL HAVE THE SAME DUTY CYCLE.

**OSCILLATES [20-70° DWELL 4cyl scale]**

\* K-JETRONIC INJ \*

IF YOU DON'T HEAR THOSE 'BEES' BUZZING,  
 SOMETHING IS WRONG.

THE FREQUENCY VALVE SHOULD ALWAYS BE BUZZING.  
 IF NOT, CHECK OUT THE REASON WHY IT ISN'T CYCLING.

THERE ARE PRESET TEST VALUES THAT THE  
 C/U WILL PUT THE FREQUENCY VALVE AT  
 DURING VARIOUS STAGES OF RUNNING.

THE VALUE THAT WILL BE USED WHENEVER THE O2  
 SENSOR DOES NOT HAVE AN OUTPUT VOLTAGE. THIS IS  
 ALSO THE VALUE THAT IS BEST FOR SETTING THE C/O  
 (AIR-FUEL MIXTURE) TO. TO DETERMINE THIS VALUE  
 YOU CAN SIMPLY UNPLUG THE O2 SENSOR & WAIT A  
 MINUTE, THE C/U WILL THEN GO TO ITS' PROPER  
 PRESET VALUE.

----- USING THE 4 CYL DWELL SCALE -----

THESE VALUES ARE:

- 4 CYL - ['78- 80] - 45° dwell
- 4 CYL ----- 54° dwell
- 4 CYL TURBO ---- 45° dwell
- 6 CYL ----- 45° dwell

**COLD ENGINE ENRICHMENT**

SOME ENGINES USE AN ADDITIONAL  
 ENRICHMENT SYSTEM.

THESE ENGINES WILL HAVE ANOTHER FIXED DUTY  
 CYCLE. WHEN CERTAIN CONDITIONS ARE MET, THE C/U  
 WILL THEN PROVIDE A DUTY CYCLE THAT INCREASES  
 THE AMOUNT OF FUEL DELIVERED.

THESE SYSTEMS ARE ONLY ENGAGED WHEN ENG  
 TEMP IS BELOW 60° F, OR IF OVER 60° F AND  
 TERM #7 OF THE LAMBDA C/U IS GROUNDED(-)  
 BY A MICRO SW [B-28], OR A PRESSURE  
 DIFFERENTIAL SWITCH [4 cyl TURBO].

NOTE: IF YOU WERE TO CONNECT A JUMPER WIRE  
 FROM THE #7 TERM WIRE TO GROUND(-) IT WILL ALSO  
 GO TO THIS DUTY CYCLE. THIS WAY YOU WILL BE ABLE  
 TO CHECK THE C/U ENRICHMENT SYSTEM YOURSELF.

✓ IF DUTY CYCLE STAYS AT THIS PRESET YOU  
 SHOULD CHECK FOR A GROUNDED WIRE.  
 A SHORT TO GROUND OF THE WIRE TO C/U TERM #7  
 WILL KEEP DUTY CYCLE AT RICHSETTING.

\* K- JETRONIC INJ \*

----- ENRICHMENT SYSTEMS -----

**COLD ENG WARMUP; ENG TEMP BELOW 60°F**

**B21 F 4 CYL**

PRESET 1982 ----- 54° dwell

**B21 FT 4 CYL TURBO**

PRESET 1982 & ON ----- 68° dwell

**FULL LOAD ENRICHMENT, PRESS SWITCH**  
 (on firewall, charge press above 2.9 psi)

PRESET ----- 68° dwell

**B27 F & B28 F V6 cyl**

PRESET 1979 ----- 75° dwell

1980 & on --- 54° dwell

**FULL THROTTLE, MICRO SW OPERATED**

PRESET 1980 ----- 54° dwell

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## ACCELERATION & COLD ENRICHMENT

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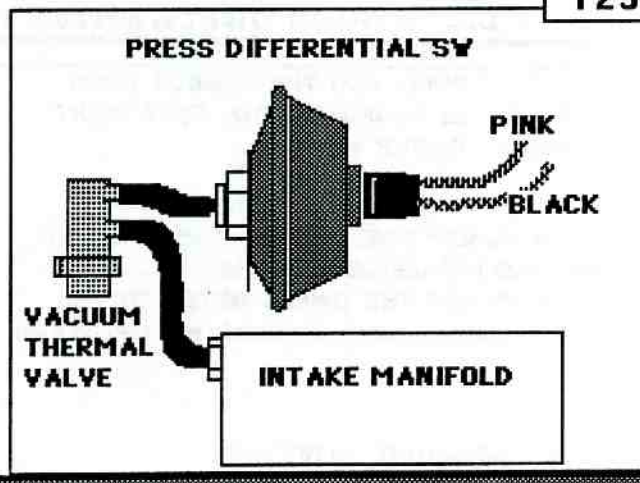
V6 B-28 '82 - ON  
4cyl TURBO '84-85 [K-JET]

GROUNDS THE PINK WIRE\* WHEN THE VACUUM DROPS ON ACCEL, WHEN THE VAC THERMAL VALVE IS OPEN [BELOW 60° F].

VACUUM - AT IDLE OR CRUISE - SWITCH OPEN - OXY SENSOR WILL DICTATE MIXTURE.

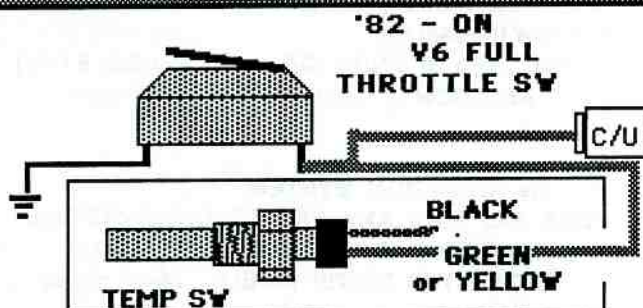
NO VACUUM - ON ACCELERATION - THE SWITCH CLOSES[for 1 sec] - GROUNDING[-] OUT PINK WIRE - PRESET DUTY CYCLE. 68° dwell FOR 1 SEC

\* PINK WIRE GOES TO TERM #11 LAMBDA C/U



TEMP SENSOR SWITCH - GROUND GREEN OR YELLOW WIRE WHEN ENG TEMP IS BELOW 60° F. THE LAMBDA C/U WILL THEN SET FREQUENCY VALVE DUTY CYCLE TO PRESET VALUE [54° dwell] THAT WILL PROVIDE A RICHER MIXTURE UNTIL THE ENG TEMP REACHES 60° F.

'82 - ON V6 B -28 FULL THROTTLE SWITCH IS HOOKED UP TO SAME GREEN WIRE.



## •• TURBO ACCELERATION ENRICHMENT ••

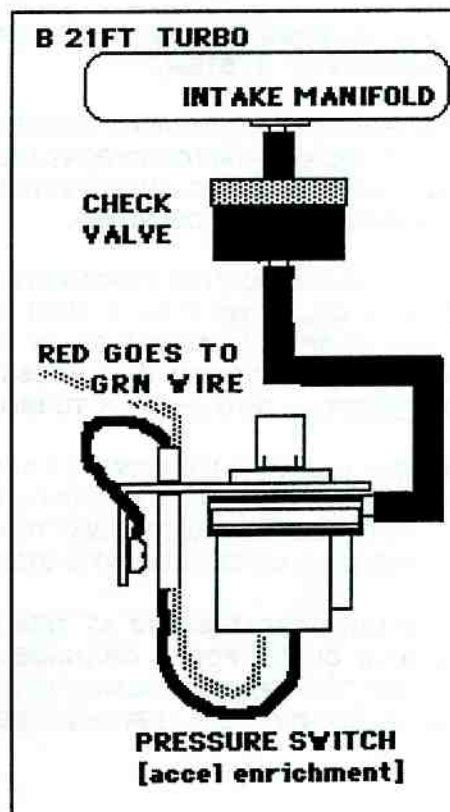
'81 - 85 4 CYLINDER TURBO [K-JET]

THIS PRESSURE SWITCH IS USED TO PROVIDE A RICHER MIXTURE DURING THE CHARGE PRESSURE STAGE. WHEN THE CAR IS ACCELERATED AND THE TURBO STARTS TO DEVELOP BOOST PRESSURE, ADDED FUEL IS NEEDED.

THIS PRESSURE SWITCH WILL GROUND[-] OUT TERMINAL #7 OF LAMBDA SOND C/U. THIS WILL CAUSE THE FREQUENCY VALVE DUTY CYCLE TO GO TO THE PRESET OF 68° dwell. THE SWITCH GROUND OUT AT APPROX 3 psi.

✓ THE DELAY [CHECK] VALVE IS USED ON AUTO TRANS ONLY. THE YELLOW SIDE OF VALVE FACES THE INTAKE MANIFOLD.

SWITCH IS LOCATED ON FIREWALL, UNDER THE HOOD.



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## SEVERE IDLE HUNT

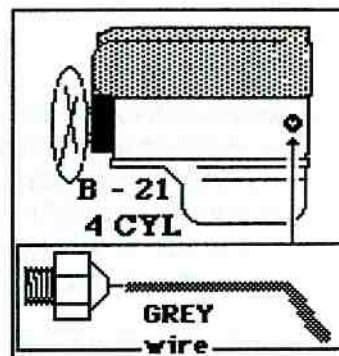
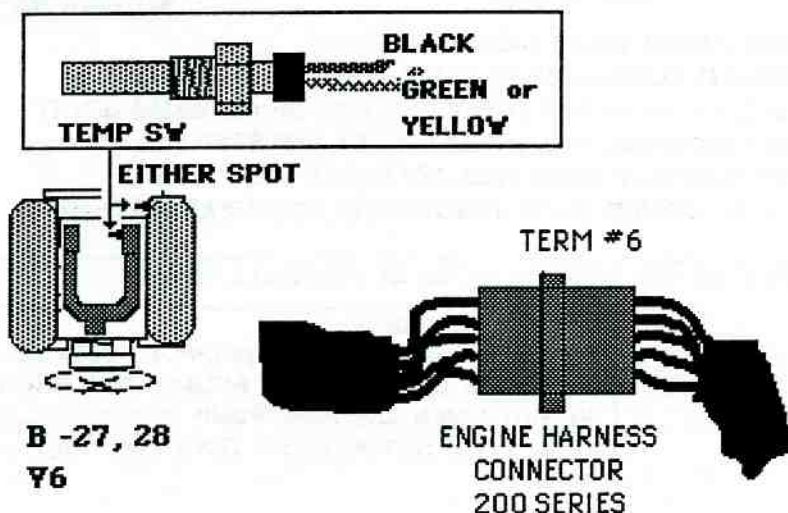
**COLD ENG  
K-JET O2 SENSOR  
B-27,28**

THE TEMP SENSOR GROUNDS OUT WHEN ENGINE IS BELOW 60°F.  
IF THE WIRE IS GROUNDED OUT—DUTY CYCLE GOES TO PRESET VALUE.

• NOTE THE LATER V6 ENG TEMP GAUGE SENSOR UNIT IS LOCATED ON LEFT CYL HD, IT HAS A YELLOW WIRE.

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THE TEMP SENSOR CANCELS THE SIGNAL WHEN THE ENGINE IS COLD, SO THE OXY-SENSOR WON'T BE SIGNALING THAT THE ENG IS TOO RICH & MUST BE LEANED OUT. THAT WOULD CAUSE THE ENG TO LEAN OUT- THEN RICHEN OUT- THEN LEAN OUT- THEN RICHEN OUT.  
THIS BOUNCING BACK AND FORTH MIXTURE CYCLE WILL CAUSE SEVERE IDLE HUNTING.

T/S GROUNDS OUT UP TO 60° F

GOES TO PRESET

B-21 ..... 55 °

B-27, 28 ..... 45 °

B-21 TURBO ..... 68 °

TEMP SENSOR SWITCH - GROUNDS WIRE WHEN ENG TEMP IS BELOW 60° F.

THE LAMBDA C/U WILL THEN SET FREQUENCY VALVE DUTY CYCLE TO PRE SET VALUE THAT WILL PROVIDE A RICHER MIXTURE UNTIL THE ENG TEMP REACHES 60° F.

THERMAL SENSOR IS LOCATED:

• B -21... LEFT REAR SIDE OF BLOCK UNDER INT MANIFOLD NEAR OIL D/STICK TUBE.[GREY wire] ON THE SENSOR  
WIRE GOES UP TO ENG HARNESS CONNECTOR REAR OF ENGINE.

• B-27,28 V6... LEFT REAR SIDE OF HEAD UNDER INT MANIFOLD OR ON 'Y' PIPE, LEFT SIDE UNDER INTAKE MANIFOLD. [GREEN or YELLOW wire] ON THE SENSOR

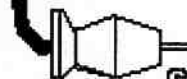
22

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**LAMBDA SOND  
O2- SENSOR  
K-JETRONIC INJ**

**CHECK ITEMS**

**C/U**



**C/U TERM**



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LAMBDA SOND C/U IS LOCATED FRONT RIGHT SIDE KICK PANEL.

- ✓ CHK FREQUENCY VALVE, SHOULD ALWAYS BE BUZZING WHEN ENG RUNNING.
- ✓ CHK GROUND WIRES(2) AT INTAKE MANIFOLD [THEY MUSTN'T BE ON SAME BOLT]
- ✓ CHK RELAY ON LEFT FENDER (240 series) BAR BY BAT & HDLAMP STEP RELAY  
(RELAY IS TURNED ON BY CURRENT FROM FUEL INJ RELAY BLUE WIRE).
- ✓ VOLTAGE AT RELAY TERM # 30, COMES FROM JUNCTION BLOCK NEAR BATTERY.

- ✓ CHK VOLTAGE OF GREEN WIRE BY OXY SENSOR TERM AT FIREWALL WHEN UNPLUGGED.

ENGINE	VOLTAGE
B-27, 28	0.5 v
B-21	2.2 v [1978- 80]
B-21	0.5 v [1981- on]
B-23 TURBO	0.5 v

IF NO VOLTAGE >

CHK TERM #8 LAMDA C/U [SUPPLY VOLTAGE FROM THE LAMBDA SOND RELAY]. THIS SHOULD BE HOT WHEN THE FUEL PUMP IS RUNNING. IF TERM # 8 IS NOT HOT CHK TERM #87 F/Inj RELAY.

**\*NOTES\***

22

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## **WHAT MAKES THE FUEL PUMP RUN?**

### **D-JETRONIC**

WHEN THE KEY IS FIRST PUT IN THE 'ON' POSITION[ KP II ] THE INJ CONTROL UNIT PROVIDES A GROUND[-] TO THE FUEL PUMP RELAY. THIS GROUND WILL LAST APPROX 1-3 secs. THE FUEL PUMP RELAY WILL THEN TURN ON PROVIDING THE FUEL PUMP WITH WORKING CURRENT.

THE FUEL PUMP RELAY WILL ALSO BE GIVEN A GROUND[-] WHEN THE ENGINE IS CRANKED OVER WITH THE STARTER OR IS RUNNING. THIS IS BECAUSE THE TRIGGERING POINTS IN THE DISTRIBUTOR ARE BEING OPENED AND CLOSED.

THE OPERATING AND WORKING CURRENT FOR THIS SYSTEM COMES FROM THE 16 AMP FUSE UNDER THE HOOD, IT IS IN A PLASTIC HOLDER NEAR THE BATTERY.

### **K-JETRONIC '74-77**

DURING ENGINE CRANKING CURRENT FROM THE STARTER SOLENOID CIRCUIT WILL GO THRU F/INJ SYSTEM RELAY AND TURN ON F/PUMP RELAY. THIS WILL INTURN SUPPLY CURRENT COMING FROM FUSE #7 TO F/PUMP.

THERE IS A SWITCH THAT IS CONNECTED TO THE AIR FLOW SENSOR PLATE THAT PROVIDES A GROUND[-] TO THE SYSTEM RELAY WHENEVER THE PLATE IS CLOSED.

DURING ENGINE RUNNING THE SWITCH ON THE AIR FLOW SENSOR HOUSING WILL OPEN BECAUSE THE AIR FLOW SENSOR PLATE WILL BE FORCED TO MOVE BY THE AIR BEING SUCKED PAST IT. THE GROUND[-] WILL THEN BE REMOVED FROM THE SYSTEM RELAY. THIS WILL ALLOW CURRENT FROM FUSE #5 TO GO THRU THE SYSTEM RELAY AND TURN ON THE F/PUMP RELAY, THIS WILL IN TURN SUPPLY CURRENT COMING FROM FUSE #7 TO F/PUMP.

**NOTE: IF THIS SWITCH IS DISCONNECTED & THE KEY IS IN THE 'ON' POSITION[ KP II ] THE F/PUMP RELAY WILL BE TURNED ON & THE F/PUMP WILL THEN RUN. USE THIS METHOD TO RUN PUMP FOR ANY FUEL DELIVERY CHECKS[FUEL PRESS & FUEL VOLUME].**

## **WHAT MAKES THE FUEL PUMP RUN?**

### **K-JETRONIC '78 - ON**

THE IGNITION MUST BE WORKING ON THESE SYSTEMS. THE IGNITION SIGNAL IS SENT TO THE FUEL INJECTION RELAY. THIS RELAY CONTAINS BOTH THE SYSTEM RELAY AND THE FUEL PUMP RELAY. THE RELAY ALSO HAS AN ELECTRICAL CIRCUIT IN IT THAT WILL PROVIDE A GROUND[-] TO THE F/PUMP RELAY SECTION WHEN AN IGNITION SIGNAL IS DELIVERED. THIS GROUND[-] WILL THEN TURN ON THE F/PUMP RELAY, WHICH WILL THEN SUPPLY CURRENT FROM:

200 series FUSE #7 TO THE F/PUMP.

700 series FUSE #1 TO THE F/PUMP

### **LH INJECTION 240 SERIES**

THE IGNITION MUST BE WORKING ON THESE SYSTEMS. THE IGNITION SIGNAL IS SENT TO THE FUEL INJECTION CONTROL UNIT[TERM #1]. THE INJECTION C/U WILL THEN PROVIDE A GROUND[-] TO THE FUEL PUMP RELAY. THIS GROUND[-] WILL THEN TURN ON THE F/PUMP RELAY, WHICH WILL THEN SUPPLY CURRENT FROM THE 25 FUSE UNDER THE HOOD TO THE F/PUMP.

### **LH INJECTION 700 SERIES**

THE IGNITION MUST BE WORKING ON THESE SYSTEMS. THE IGNITION SIGNAL IS SENT TO THE FUEL INJECTION CONTROL UNIT[TERM #1]. THE INJECTION C/U WILL THEN PROVIDE A GROUND[-] TO THE FUEL PUMP RELAY. THIS GROUND[-] WILL THEN TURN ON THE F/PUMP RELAY, WHICH WILL THEN SUPPLY CURRENT FROM FUSE #11 TO THE F/PUMP.

**NOTE: ON MODELS FROM 1978 - ON THE IGNITION PRIMARY CIRCUIT MUST BE WORKING IN ORDER FOR THE FUEL PUMP TO RUN. SO DON'T AUTOMATICALLY ASSUME THE FUEL INJECTION SYSTEM IS AT FAULT IF THE F/PUMP DOESN'T RUN. THE IGNITION SYSTEM HAS GOT TO START THE BALL ROLLING.**

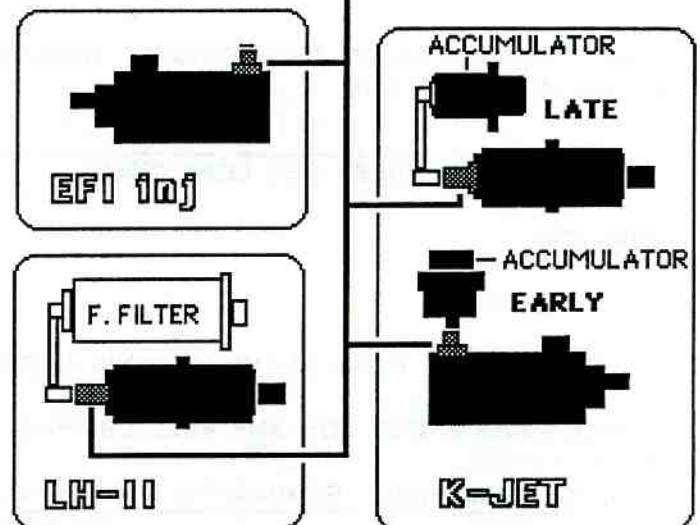
**SEE BYPASSING THE FUEL PUMP RELAY IN THE FUEL INJ SECTION GROUPS #24 & #25 IN THIS MANUAL FOR MAKING THE F/PUMP RUN FOR FUEL DELIVERY CHECKS.**



**HARD START  
"HOT "  
LONG CRANKING  
FUEL PUMP CHECK  
VALVE**

WHEN THE ENGINE IS TURNED OFF. CHECK VALVE PREVENTS FUEL FROM FLOWING BACK TO TANK. THIS ENSURES THAT THERE IS PRESSURE IN FUEL SYSTEM LINES, ELIMINATES VAPOR LOCK.

- \* THE CHECK VALVE IS REPLACEABLE
- \* ON THE K- JETRONIC, REPLACE THE PLASTIC PIPE TO ACCUMULATOR.
- \* ON THE LH INJ, CHECK THE FUEL PRESS REGULATOR, MAY BE LEAKING BACK TO TANK [SEE F/PRESS REG LEAK CHECK].
- \* ON ANY OF THE SYSTEMS WITH PLASTIC PIPE BE CAREFUL NOT TO TWIST OR KINK THE PIPE. THOSE PLASTIC PIPES THAT ARE TWISTED OR KINKED MUST BE REPLACED.
- \* AFTER REPLACING THE CHECK VALVE BE SURE TO CHECK FOR LEAKS.

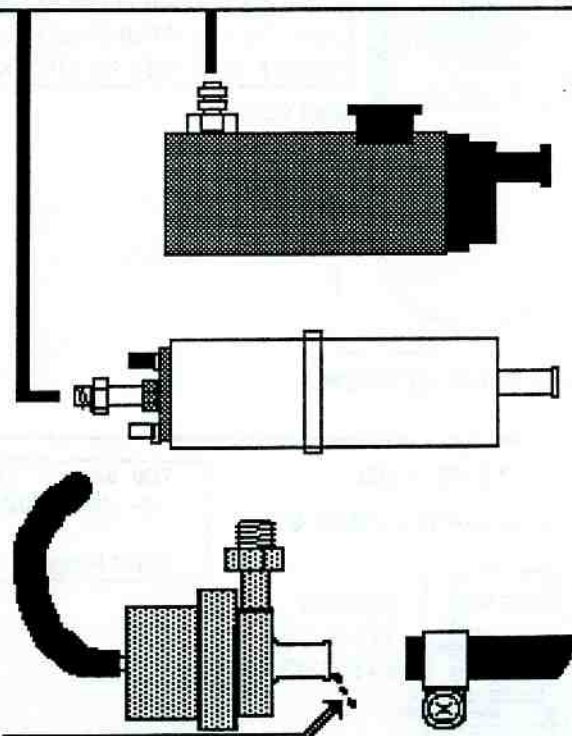


\* THE PRESSURE THAT REMAINS IN THE FUEL SYSTEM IS NECESSARY TO HELP PREVENT LINES FROM RUNNING DRY. SO WHEN THE CHECK VALVE STAYS OPEN, THE FUEL FLOWS BACK TO THE FUEL TANK. WHEN THAT HAPPENS, THE LINE WILL HAVE TO BE FILLED UP ONCE AGAIN WITH FUEL. THIS IS WHERE THE DELAY IN STARTING COMES FROM.

\* THE STARTING PROBLEM MAY BE ONCE IN AWHILE OR HAPPEN ALL THE TIME. THIS IS BECAUSE THE CHECK VALVE MAY SEAT PROPERLY AT TIMES, SO THE FUEL CAN'T FLOW BACK TO THE TANK.

.... THE MOST COMMON PROBLEM FOR THE LH INJECTION FUEL PRESSURE REGULATOR IS THAT IT WILL LEAK BACK FUEL TO THE F/TANK. THE FUEL LEAKS PAST REGULATOR VALVE THRU THE RETURN FITTING. THIS WILL CAUSE THE SAME PROBLEM AS A LEAKING F/PUMP CHECK VALVE. REPLACEMENT OF THE FUEL PRESS REG IS THE ONLY SOLUTION.

SOMETIMES THE CHK VALVE BECOMES AJAR WITH FOREIGN MATERIAL OR EVEN WILL COME APART.



## •• REST PRESSURE CHECKING ••

\* IF THE ENG HAS TO BE CRANKED FOR A LONG TIME BEFORE IT WILL START AGAIN AFTER IT JUST BEEN RUNNING, CHK REST PRESSURE.

AFTER THE PUMP HAS RUN & FUEL PRESS HAS BUILT UP IF THE ENG IS TURNED OFF, THE PRESS IS ALLOWED TO DROP BUT STILL STAY APPROX 2.0 kp/cm<sup>2</sup> (30 psi) FOR ABOUT 25 MINUTES. IT WILL SLOWLY GO DOWN FROM THERE.

IF THE PRESSURE DROPS VERY QUICKLY THEN THE CHK VALVE MAY BE BAD.

### • LH INJECTION F/PRESS REG LEAK CHECK •

1. RUN ENG
2. TURN ENG 'OFF'
3. LOOSEN RETURN HOSE CLAMP, REMOVE HOSE
4. CHECK F/PRESS REG FOR ANY FUEL DRIPPING OUT OF FITTING.

[REPLACE FUEL PRESS REGULATOR IF LEAKING]

## \*\*\*\*\* QUICK CHECK \*\*\*\*\*

- ✓ YOU CAN QUICK CHECK REST PRESS LEAKAGE WITHOUT A GAUGE.
- \* RUN ENG TO OPER TEMP.
- \* THEN TURN ENG OFF FOR A FEW MINUTES.
- \* RUN THE FUEL PUMP

### K-JET .....

'74 -'77 disconnect switch on Air Flow Sensor  
'78 JUMP F/P RELAY TERMS #30 to #87  
'79 - on JUMP CURRENT TO PRE-PUMP FUSE

### LH-INJ .....

JUMP CURRENT TO PRE-PUMP FUSE  
For further info see GROUP #25 - 021  
'MAKING FUEL PUMP RUN'

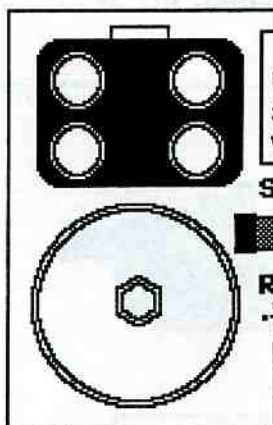
AFTER THE PUMP HAS RUN FOR ABOUT 30 sec , WITH THE PUMP STILL RUNNING, TRY STARTING THE ENGINE.

NOW IF ENGINE STARTS EASIER, CHK VALVE IS BAD.

22

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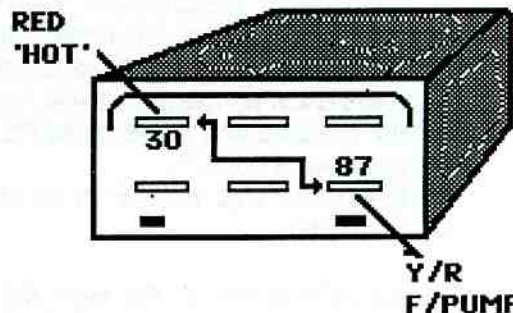
## MAKING THE FUEL PUMP RUN



AIR FLOW SENSOR

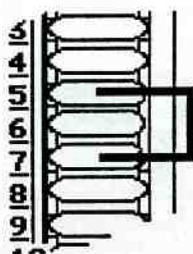
----- 1974 - 77 -----  
UNPLUG THE AIR FLOW SENSOR SWITCH, THE F/PUMP WILL RUN WHEN THE KEY IS 'ON' [KP II].

SWITCH  
FOR  
F-INJ  
RELAY  
'74-77



----- 1978 -----  
JUMP TERMS #30 [RED] to #87 [YEL/RED] F/PUMP RELAY IS LOCATED UNDER DASH ON DRIVER'S SIDE [L SIDE]. IT IS NEAR THE HOOD RELEASE HANDLE.

1979 - ON  
200 Series FUSE BOX



BRIDGE  
TO MAKE  
F/PUMP RUN

700 series V6 B-28  
K- JET INJECTION  
JUMP FUSE #1 to #15

### — LH INJECTION SYSTEMS —

#### 200 series

'83 - 84 JUMP FUSE #5 to #7  
'85 - on JUMP FUSE #4 to #6

#### 700 series

JUMP FUSE #1 to #11

760 ['88 - on] & 900 series  
JUMP FUSE #31 to #30

22

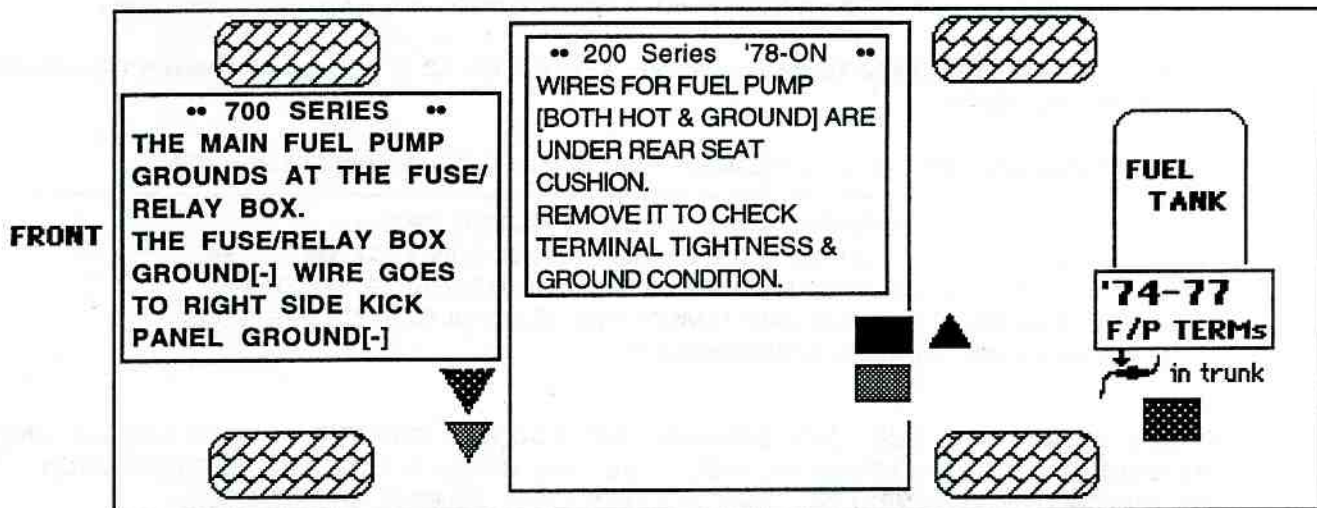
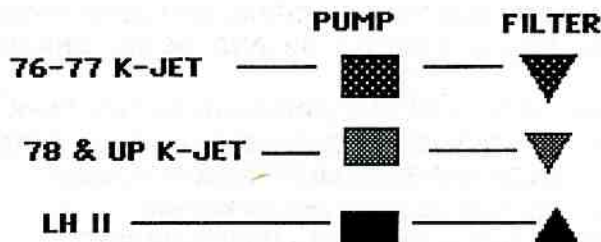
329



## FUEL PUMP & FILTER LOCATION

22

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## PRE-PUMP & HOSE FAILURE SURGING, LOSS OF POWER & STALLING

THE PRE-PUMP IN THE TANK IS THERE TO HELP PREVENT VAPOR LOCK.

22

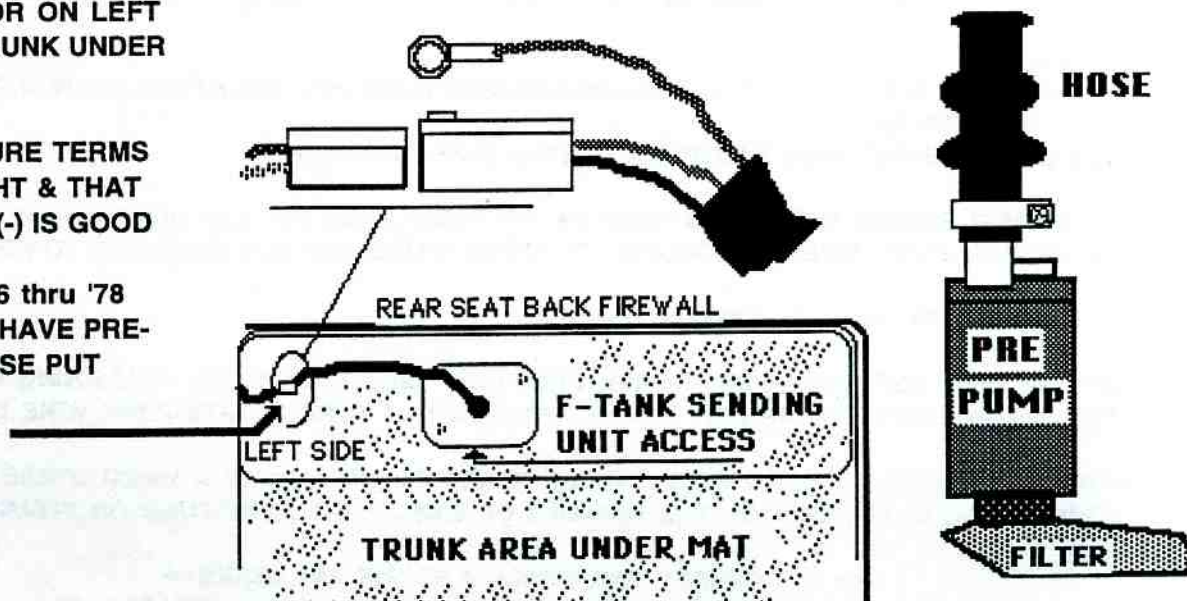
711

THE ENGINE WILL STILL BE ABLE TO RUN WITH A FAULTY PRE-PUMP, BUT THE FUEL SYSTEM WILL BE SUBJECT TO VAPOR LOCK AND THE MAIN FUEL PUMP WILL BE NOISY. A CUT HOSE WILL CAUSE LOSS OF POWER & STALLING.

CONNECTOR ON LEFT SIDE OF TRUNK UNDER MAT

\* MAKE SURE TERMS ARE TIGHT & THAT GROUND (-) IS GOOD

\* EARLY '76 thru '78 MODELS HAVE PRE-PUMP FUSE PUT HERE



**NOISE FROM THE MAIN FUEL PUMP CAN BE NORMAL.** A 'CONSTANT PITCH' HUMMING, IT WOULD NORMALLY OCCUR IN HOT WEATHER AFTER SUSTAINED DRIVING PERIODS. ALSO DIFFERENT MIXTURES OF FUEL (dry) CAN CAUSE A NOISE DUE TO LACK OF F/PUMP LUBRICATION. **THESE NORMAL NOISES ARE OF STEADY HUMMING SOUND, NOT A VARYING UP AND DOWN, GRAVELLY, SCREECHING TYPE OF NOISE.**

**\*HOWEVER IT MAY BE A SIGN THE PRE-PUMP IN THE TANK IS NOT RUNNING OR THE HOSE CONNECTING P/PUMP TO FUEL GAUGE SENDER IS RUPTURED OR A BAD MAIN FUEL PUMP.** PRE-PUMP IS FED 12 VOLTS WHENEVER MAIN F/PUMP IS RUNNING.

**PULL FUSE#5 or#4** (chk fuse box cover for fuse location)

**IF> noise is LOUDER pre-pump is WORKING > MAIN PUMP bad??**

**IF> noise goes AWAY the pre-pump HOSE is RUPTURED** ( a half tank or less of gas makes problem worse )

**CHECK AMP DRAW AT FUSE** (#4 or #5 chk fuse cover) **SHOULD BE 1.2 to 2.0 amp** (IF HIGHER OR LOWER PRE PUMP OR WIRING IS BAD)

**NOTE: PRE-PUMP WILL DELIVER A GOOD STREAM OF FUEL. YOU CAN CHECK THIS AT THE ENGINE.**

**•• ENGINE LOOSES POWER AND/OR DIES ••**

THE PRE PUMP HOSE CAN BE THE CAUSE. THE FUEL GOING TO MAIN F/PUMP WILL BECOME AERATED BECAUSE OF THE HOLE IN THE HOSE. PROBLEM IS WORSE WITH LESS THAN HALF TANK OF FUEL. ALCOHOL OR ADDITIVES IN GAS CAN CAUSE THE HOSE TO DETERIORATE.

**•• WHEN YOU R&R THE FUEL TANK SENDING UNIT, YOU CAN CUT THE PLASTIC RETURN LINE AND REPLACE IT WITH HIGH PRESSURE FUEL HOSE. THIS MAKES IT EASIER TO R&R UNIT. EVEN THOUGH THIS IS A LOW PRESSURE LINE, IT NEEDS CLAMPS, CHK FOR LEAKS AFTERWARDS.**

**22**

**714**

**FUEL PUMP  
NOISE  
• QUICK CHECK •  
PRE-PUMP &  
HOSE FAILURE**

**NOTE; PRE-PUMP WILL DELIVER A GOOD STEADY STREAM OF FUEL. YOU CAN CHECK THIS AT THE ENGINE COMPARTMENT. USE CAUTION WITH GAS, CHECK FOR LEAKS AFTER TEST.**

**22**

**721**

**1- TO PREVENT MAIN F-PUMP FROM OPERATING REMOVE PRE-PUMP FUSE**

[200 ser '79 -84 fuse #5, '85 -ON fuse #4] [700 ser K-JET fuse #15, LH INJ fuse #11] ['88-ON 760 ser fuse #30]

**2- DISCONNECT**

**[K-JET]** FUEL LINE AFTER THE FUEL FILTER. ADD A PIECE OF HOSE ONTO THE FITTING AND RUN IT INTO A SAFE CONTAINER.

**[LH INJ]** LINE FROM FUEL RING. THEN PLACE LINE IN A SAFE CONTAINER.

**3- [200 SERIES] BRIDGE THE 'FUSED' SIDE OF PRE-PUMP FUSE [for fuse number see#1]**

**TO A HOT FUSE. FUSED SIDE IS THE DOUBLE LOOP FUSE HOLDER END THAT IS NEAREST TO WIRE TERMINALS.**

**HOT FUSE -** ['79 - 84 FUSE #7] ['85 - ON FUSE #6]

**[700 SERIES] SEE '700 SERIES - RUN PRE-PUMP' SECTION ON THE FOLLOWING PAGES FOR INSTRUCTIONS TO BRIDGE POWER ANTENNA HOT WIRE TO PRE-PUMP WIRE IN TRUNK.**

**4- AFTER APPROX 10 SECONDS FUEL SHOULD START FILLING JAR IN A GOOD STEADY STREAM ABOUT THE SIZE OF THE OPENING OF LINE. IF NOT, PRE-PUMP OR INTANK HOSE IS BAD.**

**••• RECONNECT LINE, CHECK & REPAIR ANY LEAKS •••**

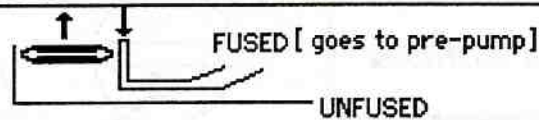
**RUN PRE-PUMP, CHECK FOR PRE-PUMP NOISE BY LISTENING AT TANK WITH CAP OFF.**

**CHECK PRE-PUMP AMP DRAW ACROSS ITS' FUSE WHEN ENG IS RUNNING [1.2- 2.0AMP]**

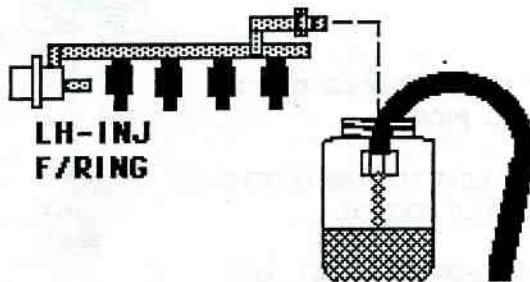
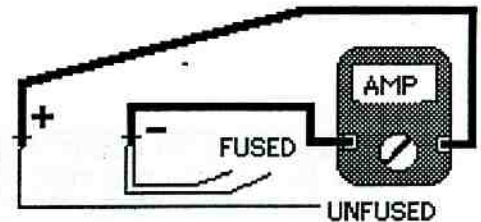


**DANGER  
USE EXTREME  
CAUTION  
WITH GASOLINE**

WITH THE FUSE REMOVED, BRIDGE TO THIS SIDE OF FUSE HOLDER [double loop nearest wire terminals]. THIS IS THE FUSED SIDE.

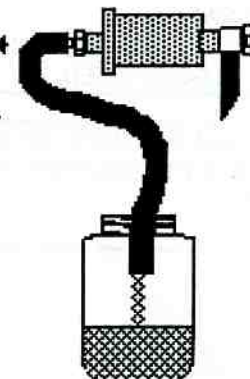


USE DIGITAL AMP METER TO MEASURE THE AMP DRAW. REMOVE FUSE, HOOK UP THE AMP METER [FOLLOW YOUR METER'S INSTRUCTION]. RUN ENG, CHECK THE AMP DRAW, SHOULD BE BETWEEN 1.2 - 2.0 AMPS.



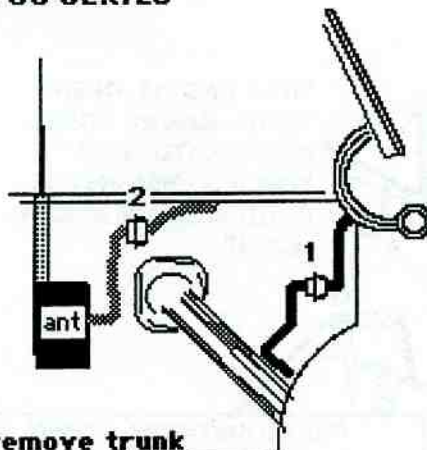
**K-JET FILTER**

ADD A PIECE OF HOSE, RUN TO JAR



22 724

## 700 SERIES



remove trunk liner to reach connectors

## 700 SERIES - RUN PRE PUMP

REMOVE PRE-PUMP FUSE:

[K-JET #15] [LH INJ #11] ['88-on 760 #30]

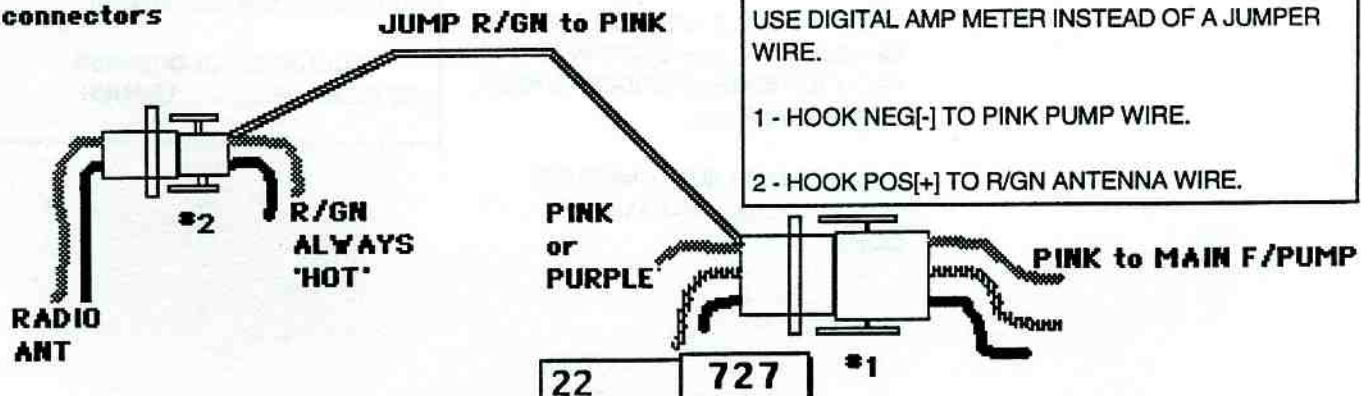
[IF PRE-PUMP FUSE IS LEFT IN MAIN PUMP WILL ALSO RUN]

REMOVE TRUNK LINER OF LEFT TRUNK AREA, NEAR FUEL TANK INLET & RADIO ANTENNA.

THE CONNECTORS FOR BOTH THE PRE PUMP[1] & RADIO ANTENNA[2] ARE LOCATED THERE.

USE 'HOT' LEAD [GN/R] TO ANTENNA TO JUMP TO THE PRE PUMP WIRE[PINK]. [ FUSED JUMPER ]

NOTE; LATER 700 SERIES CONNECTORS ARE SLIGHTLY DIFFERENT SHAPE. LOCATION & WIRE COLOR ARE THE SAME, HOWEVER.



### • CHECKING AMP DRAW •

USE DIGITAL AMP METER INSTEAD OF A JUMPER WIRE.

1 - HOOK NEG[-] TO PINK PUMP WIRE.

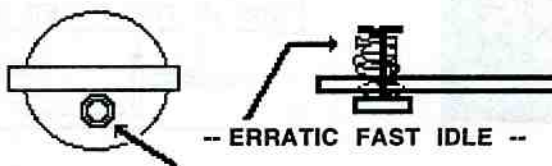
2 - HOOK POS[+] TO R/GN ANTENNA WIRE.

## S-U CARB

### PROBLEM POINTS

23

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POPPET VALVE SPRING  
BECOMES DISTORTED  
FROM HEAT DUE TO ENG  
BACKFIRING/ WILL THEN  
BE WEAK/ WON'T CLOSE.

USE ATF - FILL TO ABOUT  
A 1/4 INCH FROM THE TOP.

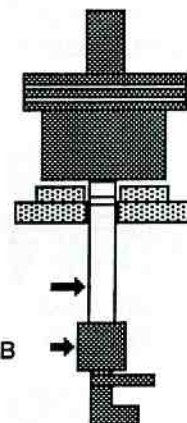
SLIDING AREA SHOULD BE  
KEPT CLEAN.  
MOVEMENT IN CARB VAC CHAMBER  
MUSTN'T BE RESTRICTED.

JET NEEDLE MUSTN'T BE BENT.  
IT SHOULD TILT TOWARD THE A-FILTER  
OPENING.

METAL JET SLEEVE PULLS OUT OF  
PLASTIC FUEL PICKUP.

THIS CAUSES SLEEVE TO MOVE UP TO CARB  
BRIDGE & LEAN OUT MIXTURE.

✓ YOU CAN REMOVE THE JET, AND  
PUT IT IN A VISE TO GENTLY PUSH  
SLEEVE BACK INTO PLASTIC PICKUP.



## S-U CARB

### ADJUSTING

23

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- BRIDGE - ADJUST THE JET SO IT  
IS FLUSH WITH THE BRIDGE. THEN  
TURN THE ADJ SCREW CLOCKWISE  
2 1/2 TURNS FOR THE BASE  
ADJUSTMENT, BRINGING THE JET  
DOWN.

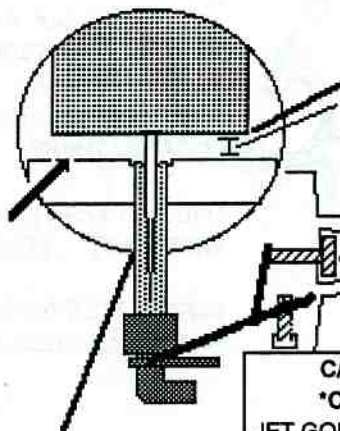
- JET - BOTH CARB JETS SHOULD  
BE 'ABOUT' THE SAME DISTANCE  
FROM TOP EDGE OF BRIDGE TO HELP  
ENSURE BALANCE.

THE RETAINING NUT SOMETIMES  
COMES LOOSE & WILL PULL JET  
DOWN.

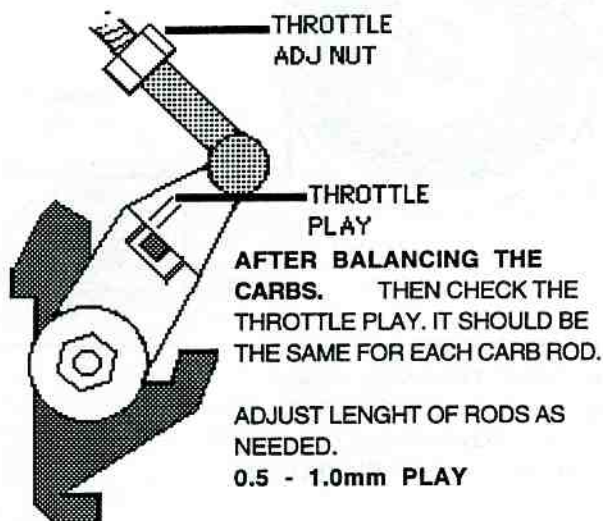
WITH ENG AT OPER  
TEMP...CHOKE OFF...  
ADJ THROTTLE STOP  
SCREW SO PISTONS FOR  
BOTH CARBS ARE AT SAME  
HEIGHT.

C/O ADJUSTMENT SCREW  
\*CLOCKWISE  
JET GOES DOWN ..... RICHER

\*COUNTER CLOCKWISE  
JET GOES UP..... LEANER



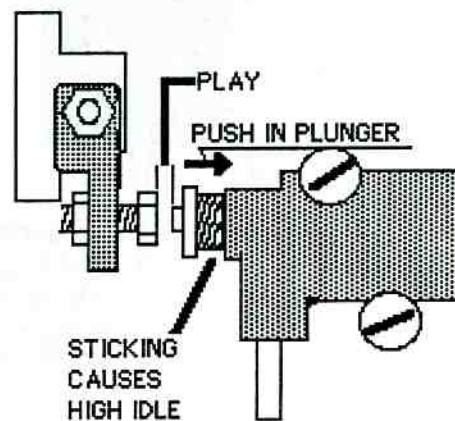


**CHECK POINTS**

-- FAST IDLE, WON'T COME DOWN --

TO PREVENT **PLUNGER** FROM STICKING, WHICH WILL HOLD THE THROTTLE OPEN. **PLUNGER MUST BE CLEAN & LUBED.**

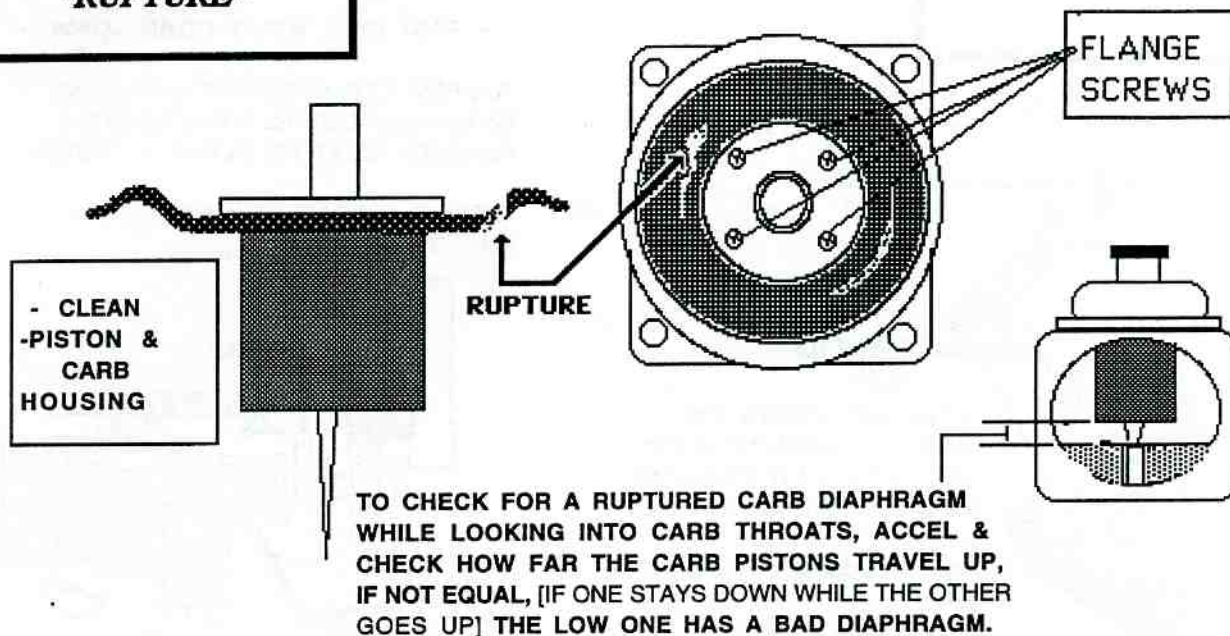
THERE SHOULD BE **0.5 MM** PLAY WITH PLUNGER PUSHED IN.

**\*NOTES\***

**ZENITH/STROM  
CARB  
PISTON DIAPHRAM  
\*RUPTURE\***

23

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**-- MOST COMMON PROBLEM --**

**SYMPTOMS: POOR PERFORMANCE, LOW TOP SPEED, POOR ACCELERATION, POOR IDLE, ENGINE RUNNING LEAN.**

THE DIAPHRAGMS ARE USED TO LIFT THE CARB PISTONS UP TO ALLOW MORE FUEL IN ALONG WITH THE NEEDED AIR FOR PROPER COMBUSTION. WHEN THE DIAPHRAGMS ARE RUPTURED, THE PISTONS WILL ONLY BE MOVED UP BY THE AIR BEING SUCKED IN PAST THEM.

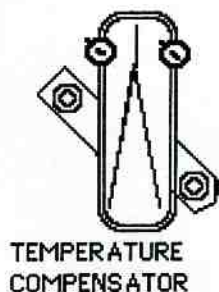
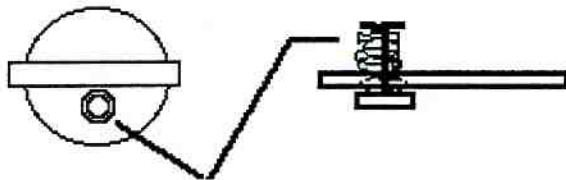
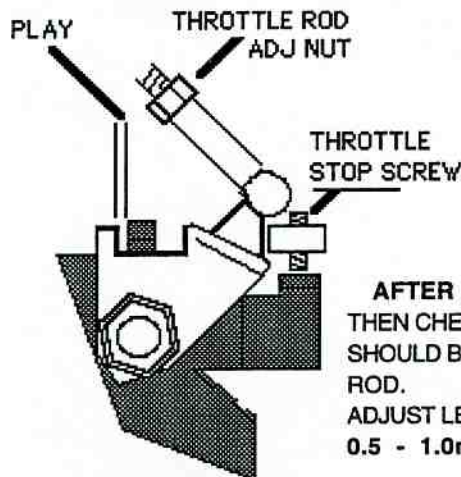
✓ **WHEN ONE OF THE TWO CARBS' DIAPHRAGMS IS RUPTURED, ITS' PISTON WILL NOT TRAVEL AS FAR UP AS THE OTHER.**

**NOTE: THE THROTTLE PLAY ON BOTH CARBS SHOULD BE THE SAME.**

**NOTE: LINE UP THE LUGS ON THE DIAPHRAGMS TO THE CARB INDENTS & PISTON INDENTS, OTHERWISE THE PISTON AND JET NEEDLE WILL NOT BE IN PROPER POSITION.**





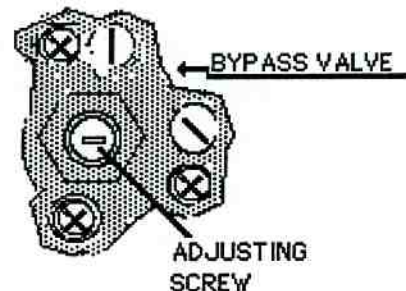


**TEMPERATURE COMPENSATOR  
[FOR HOT IDLE]**

**THE VALVE IS FULLY OPEN AT 85°F.**

A LITE PUSH ON THE NEEDLE VALVE  
WHEN WARM, THE VALVE SHOULD SEAT THEN  
FLEX BACK OPEN.

IF NEEDLE VALVE IS AGAINST THE SEAT  
[CLOSED] WHEN ENGINE IS WARM, THE  
COMPENSATOR VALVE IS BAD.



**-- BYPASS VALVE --  
[FOR CONTROLLED DE-ACCELERATION]**

Located on forward side of front carb.

THIS VALVE WILL PREVENT THE ENG SPEED FROM  
COMING DOWN TOO FAST.  
IT MAY NEED SOME ADJUSTING.

**CLOCKWISE - ENG RUNS FAST LONGER**

**COUNTER/CLOCKWISE - ENG SLOWS  
SOONER.**

**GROUP 23 D-JETRONIC EFI**

- 23- 411 E.F.I. COLD START INJECTION FUNCTION  
TESTING THERMAL TIME SWITCH & VALVE
- 23- 431 E.F.I. COLD START INJECTION PROBLEMS  
COLD START VALVE &  
THERMAL TIME SWITCH WIRING
- 23- 511 D-JETRONIC INJECTION SYSTEM CHECKS
- 23- 521 D-JET SYSTEM FAULT LIST
- 23- 531 D-JET RELAY TESTING
- 23- 541 D-JET DISTRIBUTOR TRIGGER CONTACTS \_\_ PROBLEMS
- 23- 551 D-JET THROTTLE SWITCH \_\_ IDLE & ACCEL PROBLEMS
- 23- 561 D-JET PRESSURE SENSOR
- 23- 581 D-JET TEMP SENSORS [AIR & COOLANT] \_\_ PROBLEMS
- 23- 591 AUX AIR SLIDE[FAST IDLE] \_\_ EGR PIPE\_\_ PROBLEMS

**GROUP 24 K-JETRONIC INJECTION**

- 24- 001 K-JET FUEL INJECTION COMPONENTS  
POOR & NO RUN CHECK ITEMS
- 24- 011 K-JET FUEL DISTRIBUTOR
- 24- 021 K-JET FUEL PRESSURE REGULATOR
- 24- 031 AIR FLOW SENSOR PLATE ASSEMBLY
- 24- 041 AIR SLIDE [FAST IDLE] \_\_ OPERATION \_\_ PROBLEMS \_\_ TIPS
- 24- 131 K-JET FUSES - CHECKING - BYPASSING RELAY
- 24- 151 K-JET RELAY LOCATION & FUNCTION
- 24- 171 K-JET WIRES & CONNECTORS
- 24- 211 K-JET C/O SETTING
- 24- 301 K-JET FUEL PRESSURE TESTING
- 24- 351 K-JET INJECTOR TESTING \_\_ SPRAY PATTERNS
- 24- 411 K-JET POOR IDLE \_\_ INJECTOR SEAL \_\_ VACUUM LEAK  
CHECK & SEAL REPLACEMENT
- 24- 521 V6 IDLE ADJUSTMENT



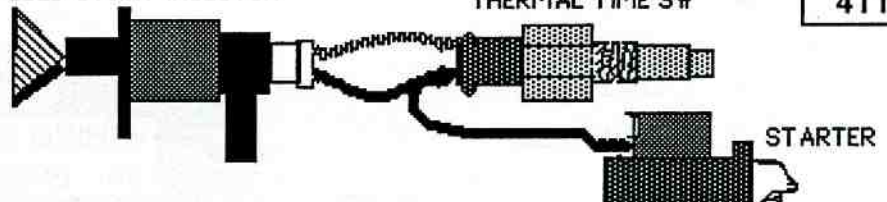
# **COLD START INJECTOR FUNCTION & TESTING**

COLD START INJECTOR

THERMAL TIME SW

23

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THE COLD START INJECTION SYSTEM CONSISTS OF THE- COLD START INJECTOR, THERMAL TIME SWITCH, WIRING CONNECTING THESE WITH THE STARTER.

THE COLD START INJ -IS LOCATED IN THE INTAKE MANIFOLD. IT IS A VALVE THAT OPENS AND INJECTS FUEL DURING STARTER ENGAGEMENT. IT WILL ONLY INJECT WHEN KEY IS TURNED TO "START" AS LONG AS ENG TEMP IS BELOW 60° F.

THE THERMAL TIME SWITCH- IS LOCATED IN A WATER JACKET IN THE CYL HEAD (B-21) , IN THE CYL BLOCK (B-20, 30) OR THE WATER PUMP HOUSING (B-27). ITS' FUNCTION IS TO PROVIDE "GROUND" (-) TO THE COLD START INJ. IT IS HEATED BY THE COOLANT AS WELL AS BY THE CURRENT FROM THE STARTER THAT PASSES THRU IT WHEN THE STARTER IS ENGAGED. THE "TIMER" FUNCTION IS DUE TO THE FACT THAT AS THE STARTER CURRENT IS BEING PASSED THRU IT, A BI-METALIC SPRING INSIDE HEATS UP AND AFTER CRANKING A MAXIMUM OF ABOUT 15 SECONDS IT BREAKS THE "GROUND" CONTACT. THE HOTTER THE ENG, THE LESS TIME THE "GROUND"(-) WILL BE PROVIDED. WHEN THE ENG TEMP IS ABOVE 60° F AND THE STARTER IS ENGAGED, POS (+) CURRENT WILL STILL BE SUPPLIED TO THE COLD START INJ BUT, NO GROUND (-) WILL BE PROVIDED, THE THERMAL TIME SWITCH "CUTS IT OFF", NO INJECTION.

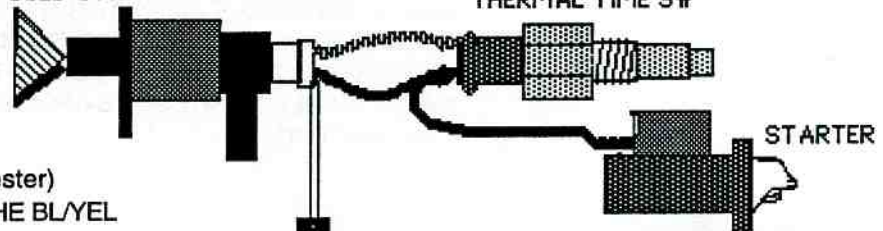
• AFTER THE ENG IS STARTED THE COLD START INJECTOR IS INOPERATIVE. THIS MEANS IF THE ENGINE RUNS POORLY COLD IT IS NOT THE C/S INJ FAULT [UNLESS IT IS LEAKING]. SO CHECK ELSEWHERE.

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COLD START INJECTOR

THERMAL TIME SW



1. **HOOK A TEST LITE** (circuit tester) TO GROUND(-) AND PROBE THE BL/YEL WIRE AT C.S. INJECTOR.
2. **CRANK ENG [KP III]**, TEST LITE SHOULD LITE (if not chk wiring at starter, thermal time sw)  
IF T/LITE IS LITES UP \_ go to 3.
3. **PROBE WHITE WIRE AND CRANK ENG [KP III]**, TEST LITE SHOULD NOT LITE IF ENG IS COLD.  
( if T/LITE lites and eng COLD, 'T/Tsw' is FAULTY , OR WIRING FROM THERMAL TIME SW IS 'OPEN')

T/LITE SHOULD LITE IF ENG TEMP IS OVER

60°F (because no ground[-] from T/T SW)

• YOU CAN PULL THE INJECTOR OUT OF MANIFOLD & WITH THE FUEL LINE AND THE WIRING HOOKED UP CRANK THE ENG... THE INJ SHOULD PRODUCE A FINE FUEL CONE SPRAY.

**\*\* (CAUTION-CATCH FUEL IN JAR)\*\***

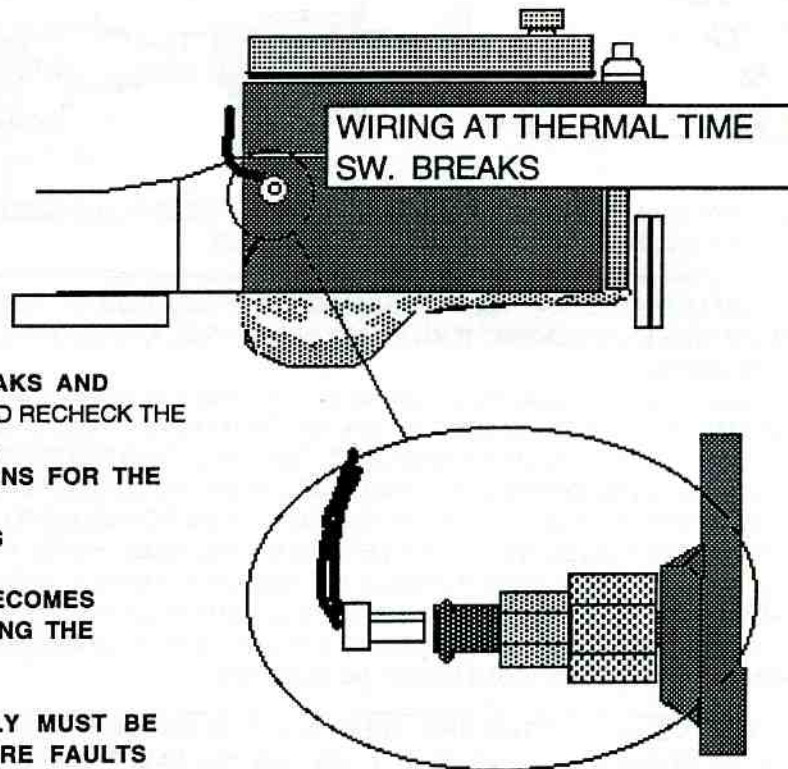
• YOU CAN BYPASS THE 'T/T SW' IF ENG TEMP IS HOT. MAKE SURE ALL THE CONNECTORS ARE HOOKED UP TO THEIR TERMINALS.

1. **JUMP THE WHITE WIRE TO GROUND(-)**
2. **THEN CRANK THE ENG.**
3. **THE COLD START INJECTOR SHOULD NOW INJECT WHEN THE ENGINE IS CRANKED [KP III]**

**HARD COLD START**  
**B-20 EFI D-JET**  
**B-20 F K-JET**  
**B-30 EFI D-JET**  
**WIRING BREAKS**

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CHECK THE WIRING FOR BREAKS AND FRAYING. REPAIR ANY FOUND AND RECHECK THE COLD START INJECTOR FUNCTION. THERE ARE TWO MAIN REASONS FOR THE WIRING PROBLEMS;

1) BROKEN MOTOR MOUNTS

2) THE WIRE SHIELDING BECOMES DRY AND BRITTLE, BREAKING THE INSULATION & WIRES.

•THESE PROBLEMS OBVIOUSLY MUST BE REPAIRED TO PREVENT FUTURE FAULTS IN THE COLD START SYSTEM.

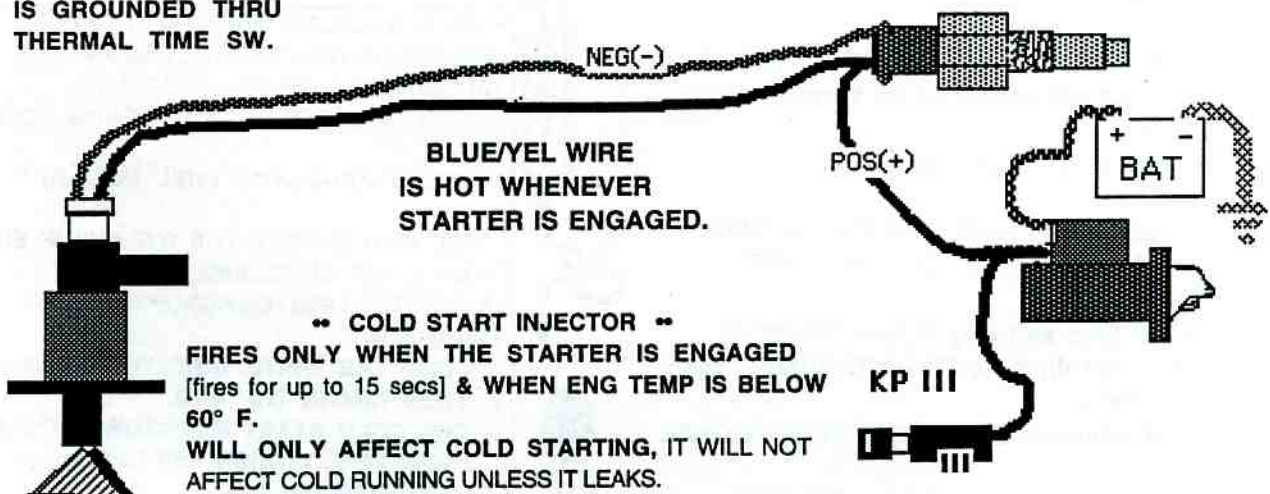
**- THERMAL TIME SWITCH (T T SW) -**

\*PROVIDES GROUND FOR C-S INJ WHEN ENG TEMP BELOW 60° DEGREES ....IT IS ALSO HEATED BY CURRENT FROM STARTER SOLENOID THAT IS APPLIED TO THE BI-METALIC SPRING WHEN STARTER ENGAGED. THE SPRING THEN HEATS UP & BREAKS GROUND[-] CONTACT INSIDE THERMAL TIME SW. THE C-S INJ WILL THEN LOSE ITS GROUND[-], SO IT WILL THEN STOP INJECTING.

23

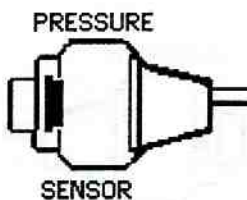
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WHITE WIRE IS GROUNDED THRU THERMAL TIME SW.

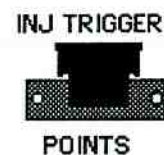




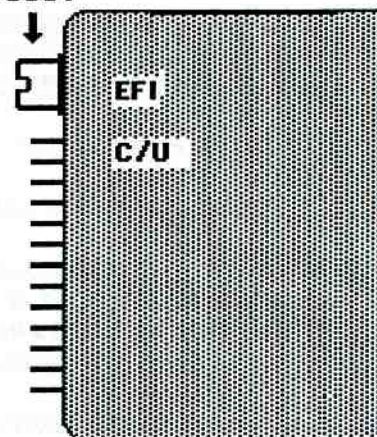
**D-JETRONIC  
FUEL INJECTION  
SYSTEM**



**EFI FUSE BOX  
LOCATED BY  
BATTERY**



**C/O ADJUST  
SCREW**



**D-JETRONIC INJECTION**

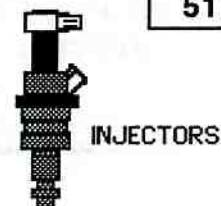
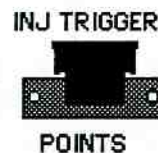
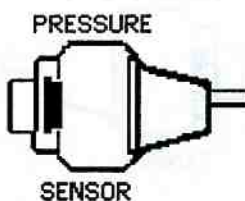
1970 - 73 B-20 4 CYL

1972 - 75 B-30 6 CYL

**\*NOTES\***

**CAUTION**  
**DO NOT DISCONNECT CONTROL UNIT WITH**  
**KEY 'ON'. DAMAGE WILL RESULT.**

**D-JETRONIC  
FUEL INJECTION  
SYSTEM  
CHECK ITEMS**



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GROUND (-) CONNECTIONS (AT BAT BOX,  
INTAKE MANIFOLD).

BROKEN WIRES & BAD CONNECTORS FOR  
(WATER TEMP SENSOR, THER TIME SW,  
THROTTLE SW, DIST TRIGGER POINTS).

ADJUST THROTTLE SW & C/O.

CLEAN TRIGGER POINTS IN IGN DIST.

VACUUM LEAKS (INT MANIFOLD BOLTS,  
PRESSURE SENSOR HOSE & OTHER HOSES  
ALSO THE DIST VAC ADVANCE DIAPHRAGM)  
NOTE; VAC LEAKS WILL CAUSE HIGH IDLE.

FUEL PUMP FUSE UNDER HOOD (CORRODED  
AT HOLDER OR AT THE WIRE TERMINALS).

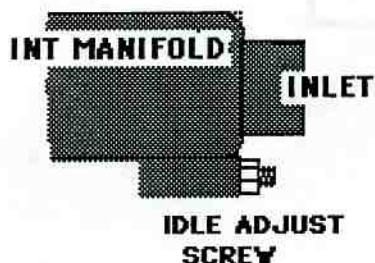
FUEL PUMP & MAIN RELAYS (CHK OPER &  
WIRING, GROUND AT RELAY MOUNT).

WIRE AT COIL TERM #15 FOR MAIN RELAY  
'ON/OFF' FUNCTION.

CLOGGED AIR SCREW - UNABLE TO ADJUST  
IDLE SPEED PROPERLY. (IDLE ADJUST  
SCREW SHOULD BE TAKEN OUT, CLEAN PORT  
& SCREW).

FUEL HOSES LEAKING (ESPECIALLY COLD).

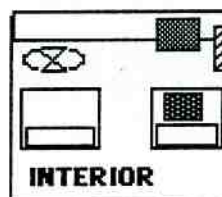
• NOTE; MOST WIRES ARE WHITE WITH A  
NUMBER PRINTED ON THEM EVERY INCH OR  
TWO FOR IDENTIFICATION.



✓ CHK FUSE, POS (+) LEAD AT BAT POS  
TERM, BAT J/BOX, GROUND WIRES ON  
INTAKE MANIFOLD, BAT BOX PLATE AND AT  
RELAY MOUNTING.

✓ RELAYS ARE LOCATED ON REAR OF  
RIGHT SIDE FENDER AREA.

✓ GROUND WIRES AT INTAKE MANIFOLD  
AND AT BATTERY BOX.



\*\*\* C/U LOCATION \*\*\*  
140, 160 - UNDER FRONT  
PASS SEAT

LATE 160 - RIGHT FRONT  
PASS KICK PANEL

1800 - UNDER DASH  
ON PASS SIDE



C/O ADJUST  
SCREW



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**FACT SHEET****•• ENG WON'T START ••**

- ✓ FUEL PUMP & PRESSURE [28 -34 psi]
- ✓ WIRE at COIL TERM #15 [MAIN RELAY]
- ✓ SYSTEM FUSE & WIRES UNDER HOOD
- ✓ RELAYS & WIRES [SEE RELAY TESTING]
- ✓ GROUND TERMINALS [BATTERY BOX & INTAKE MANIFOLD]
- ✓ INJECTION TRIGGER POINTS & WIRES
- ✓ COOLANT TEMP SENSOR & WIRES
- ✓ PRESSURE SENSOR & WIRES

**•• HARD START - COLD ••**

- ✓ COLD START INJECTOR
- ✓ THERMAL TIME SWITCH & WIRES
- ✓ INJECTION TRIGGER POINTS & WIRES
- ✓ AIR SLIDE & HOSES

**•• HARD START - HOT ••**

- ✓ FUEL PUMP CHECK VALVE OPEN
- ✓ LEAKING INJECTORS
- ✓ INJECTION TRIGGER POINTS
- ✓ LEAKING INJECTOR HOSES

**•• POOR PERFORMANCE, ACCEL ••**

- ✓ THROTTLE SWITCH & WIRES
- ✓ INJECTION TRIGGER POINTS
- ✓ PRESSURE SENSOR

**•• MISSING, POOR IDLE ••**

- ✓ INJECTION TRIGGER POINTS
- ✓ GROUND TERMINALS [especially for fuel injectors]
- ✓ VACUUM LEAKS
- ✓ LEAKY INJECTOR

**•• HIGH IDLE RPM ••**

- ✓ VACUUM LEAKS AT MANIFOLD, DIST VAC ADVANCE
- ✓ STICKING THROTTLE & CABLE

**RELAY TESTING  
MAIN & F/PUMP  
RELAYS  
D-JET FUEL  
INJECTION**

IT IS USEFUL TO HAVE TWO[2] TEST LITES SO YOU CAN USE ONE TO PROVIDE A GROUND[-] WHICH WILL TURN RELAY 'ON/OFF' SECTION 'ON' , AND THE OTHER TO CHECK THAT THE 'WORKING CURRENT' IS THEN DELIVERED TO OUTPUT TERMINAL.

23

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**.. MAIN RELAY ..**

1 - CHECK HEAVY 'RED' WIRES AT RELAY TERM #30 OF BOTH RELAYS. THEY SHOULD ALWAYS BE 'HOT'. IF THEY ARE NOT CHECK THE POS[+] BAT TERM & THE FOLLOWING:

- F/PUMP RELAY CURRENT COMES FROM FUSE BLOCK BY BATTERY ON 140 & early 164 LATE 164 COMES FROM FUSE BOX FUSE #7

• MAIN RELAY CURRENT COMES FROM JUNCTION BLOCK BY BATTERY.  
IF THESE TERMINALS ARE HOT GO TO #2

2 - MAIN RELAY CHECK 'ON/OFF' FUNCTION TERM #86 'HOT' KP II  
TURN KEY 'ON' KP II TERM #86 SHOULD BE 'HOT' T/LITE IS 'ON'  
[RELAY SHOULD 'CLICK' ON]

- IF NOT 'HOT' CHECK COIL TERM #15, THE F/INJ WIRE #38 CONNECTS TO IT.

IF RELAY DOESN'T 'CLICK', TOUCH T/LITE TO TERM #85, IF RELAY 'CLICKS' ON NOW, THE GROUND[-] AT RELAY MOUNT IS BAD, REPAIR IT.

IF RELAY 'CLICKS' ON GO TO #3

3 - MAIN RELAY 'WORKING CURRENT' TERM #87 'HOT' AFTER RELAY 'CLICK' KP II  
KP II TERM #87 IS 'HOT' T/LITE 'ON' MAIN RELAY IS OK.

- IF TERM #87 IS 'COLD' T/LITE 'OFF' MAIN RELAY IS BAD, REPLACE IT.

IF TERM #87 'HOT' [MAIN RELAY OK] GO TO #4

**.. FUEL PUMP RELAY ..**

**MAIN RELAY MUST BE OPERATING CORRECTLY TO CHECK F/PUMP RELAY**

4 - F/PUMP RELAY CHECK 'ON/OFF' FUNCTION TERM #86 'HOT' KP II  
TURN KEY 'ON' KP II TERM #86 SHOULD BE 'HOT' T/LITE IS 'ON'  
[RELAY SHOULD 'CLICK' ON THEN OFF AFTER 2 SECONDS]

- IF NOT 'HOT' CHECK MAIN RELAY TERM #87.

IF RELAY DOESN'T 'CLICK' ON FOR 2 SECS TOUCH T/LITE TO TERM #85, IF RELAY 'CLICKS' ON NOW, THE GROUND[-] from C/U IS MISSING. [BAD WIRE, CONNECTION OR C/U]

- IF RELAY STILL WON'T 'CLICK' ON WITH T/LITE TOUCHING TERM#85, RELAY IS BAD.

IF RELAY 'CLICKS' ON GO TO #5

5- F/PUMP RELAY 'WORKING CURRENT' TERM #87 'HOT' AFTER RELAY 'CLICK' KP II  
KP II TERM #87 IS 'HOT' for 2 SECS T/LITE 'ON' F/PUMP RELAY IS OK.

- IF TERM #87 IS 'COLD' T/LITE 'OFF' F/PUMP RELAY IS BAD, REPLACE IT.

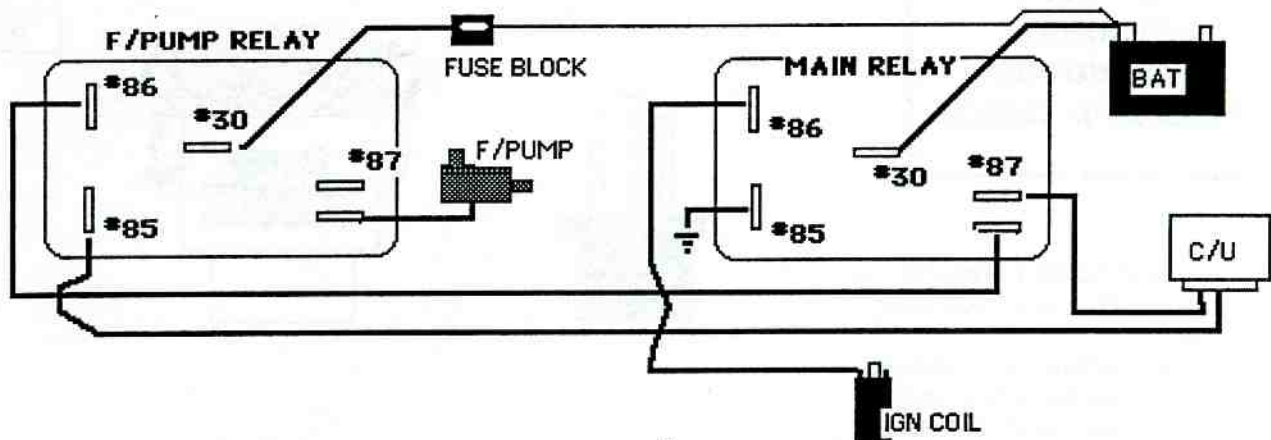
IF TERM#87 'HOT' [F/PUMP RELAY OK]

FUEL PUMP SHOULD RUN FOR THE 2-3 SECS THAT THE F/PUMP RELAY TERM IS 'HOT'.

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**• FUEL/PUMP RELAY •**  
**• ON - OFF SECTION OF RELAY •**

#86 FROM MAIN RELAY #87 [HOT KP II]  
 #85 GROUND[-] THRU C/UNIT

**• WORKING SECTION OF RELAY •**

#30 FROM FUSE BLOCK BY BAT[ALWAYS HOT]  
 #87 POWER TO- F/PUMP

**• MAIN RELAY •**  
**• ON - OFF SECTION OF RELAY •**

#86 FROM C/TERM #15 [HOT KP II]  
 #85 GROUND[-] AT RELAY BRACKET

**• WORKING SECTION OF RELAY •**

#30 FROM BAT JUNCT/BOX [ALWAYS HOT]  
 #87 POWER TO- F/PUMP RELAY  
 [ON/OFF] CONTROL UNIT

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**\*NOTES\***

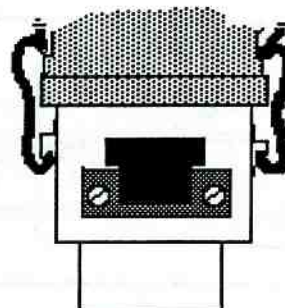
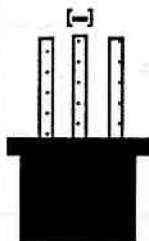
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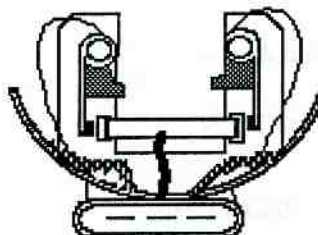
**TRIGGER CONTACT  
D-JETRONIC  
DISTRIBUTOR  
CLEAN AND CHECK**

23

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- \*\* SYMPTOMS & FAULTS \*\***
- \* ENG WON'T RUN, F/PUMP WON'T RUN
  - \* LOSS OF POWER, ENG MISSES
  - \* HARD STARTING, POOR IDLE
  - \* NOT ALL THE INJECTORS FIRE
  - ✓ DIRTY POINTS
  - ✓ LOOSE WIRES OR TERMINALS
  - ✓ SHORTING WIRE LOOM [BEHIND ENG IS A COMMON SPOT]
  - \*\* THE INJ POINTS SIGNAL THE C/U TO RUN THE FUEL PUMP. IF NO SIGNAL, F/P WON'T RUN.



TERM #	FIRES INJ
1 - 2 & 4	[&6]
2-GROUND[-]	
3 - 1 & 3	[&5]
	6
	CYL

THE TRIGGERING CONTACTS CONSIST OF TWO (2) SETS OF POINTS OPERATED BY A ONE LOBE CAM.

EACH CRANK ROTATION WILL CAUSE ONE SET OF POINTS TO OPEN (FIRE). THIS SIGNALS THE C/U TO FIRE ONE SET OF INJECTORS ALONG WITH SIGNALING FOR THE FUEL PUMP TO RUN. NEXT CRANK ROTATION THE OTHER SET OPENS SIGNALING THE C/U TO FIRE OTHER SET OF INJECTORS.

SO OIL & DIRT ON POINTS OR A WIRING PROBLEM CAN PREVENT ONE SET OF INJ FROM OPERATING, ENG WILL ONLY RUN ON HALF OF THE CYLINDERS.

**\*\*\*\*\* CHECKS \*\*\*\*\***

WITH POINTS OUT OF DISTRIBUTOR & WITH THE WIRES STILL CONNECTED.

TURN KEY TO 'ON' KP II

OPEN EACH SET OF POINTS ONE BY ONE, THE FUEL PUMP SHOULD RUN FOR 1 - 3 sec [and the injectors on that point set that is being opened should also fire.]

THIS IS A GOOD WAY TO CHECK C/U for FUEL PUMP FUNCTION, INJECTOR FIRING

\* CLEAN POINTS WITH ELECTRICAL OR CARB CLEANER. RUN A CLEAN PIECE OF PAPER BETWEEN THEM TO ENSURE THEY ARE CLEAN.

NOTE: POINTS ARE NOT ADJUSTABLE.

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## **D- JETRONIC THROTTLE SWITCH**

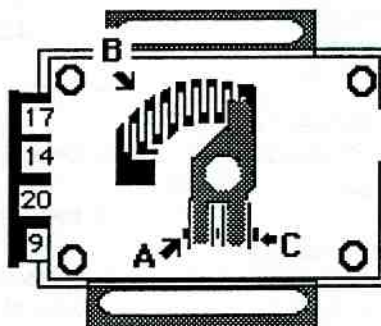
### **CLEANING & SETTING**

WIRES HAVE NUMBERS PRINTED ON THEIR INSULATION.  
NOTE: WIRE LOCATION ON SWITCH IS SOMETIMES REVERSED. CHECK WIRE NOS & SW NOS.  
✓ CHECK THAT WIRES ARE NOT BROKEN OFF THEIR TERMS & THAT THEY ARE CONNECTED TO PROPER THROTTLE SW TERMINALS.

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-----FUNCTIONS-----  
A- IDLE MODE SIGNAL (C/O)  
B- ACCELERATION  
INJECTOR FIRING FOR ENRICHMENT  
C- POINTS FOR ACCELERATION



WIRE NOS & FUNCTIONS  
14 & 17 = IDLE C/O  
9 & 20 = ACCEL ENRICH

-----CLEANING-----  
\* REMOVE COVER SCREWS  
\* SPRAY WITH CARB CLEAN  
\* CLEAN POINTS  
\* WIPE AWAY DIRT

THE THROTTLE SWITCH IS A VERY IMPORTANT COMPONENT OF THE D-JETRONIC FUEL INJECTION SYSTEM. WHEN YOU ARE SERVICING OR DIAGNOSING THE ENG IT IS VITAL THAT YOU ENSURE IT IS OPERATING PROPERLY.

\* THE THROTTLE SWITCH IS USED TO PROVIDE ADDITIONAL INJECTOR FIRINGS FOR ACCELERATION ENRICHMENT. IT IS THE INJECTION SYSTEMS 'ACCELERATOR PUMP'.

\* THE THROTTLE SWITCH IS ALSO USED TO PROVIDE THE 'IDLE MODE' THAT IS NEEDED FOR C/O [AIR/FUEL MIXTURE] ADJUSTMENT.

✓ WITH KEY TO 'RUN' POSITION [KP II], ENG NOT RUNNING, SLOWLY WORK THROTTLE AND LISTEN FOR INJECTORS TO FIRE. THERE SHOULD BE TEN (10) CLICKS. YOU CAN HOLD INJ TO FEEL WHICH INJECTORS THE TRIGGERING POINTS ARE SIGNALING C/U TO FIRE THE INJECTOR.

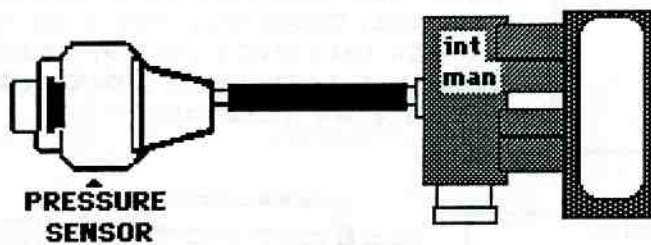
✓ C/O ADJUSTING MODE - SET THROTTLE SW TO ENABLE C/O ADJUSTING.  
BACK 'OFF' THROTTLE STOP SCREW, MAKE SURE THROTTLE PLATE CLOSES.  
NOW TURN SCREW IN UNTIL IT JUST TOUCHES LEVER, THEN TURN 'IN' SCREW 1/2 TURN MORE.

WITH THROTTLE CLOSED, OHM METER BETWEEN TERMS #17 to 14 SHOULD BE = 0 ohms  
ADJUST BY MOVING SWITCH AFTER LOOSENING THROTTLE SWITCH SCREWS.

• BE SURE THAT THE THROTTLE SW IS NOT MOVING THE THROTTLE PLATE WHEN YOU ARE ADJUSTING THE T/SWITCH.

# **D-JETRONIC INJECTION**

## **PRESSURE SENSOR**



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### \*\*\*\*\* PRESSURE SENSOR \*\*\*\*\*

THE PRESSURE SENSOR IS CONNECTED TO THE INTAKE MANIFOLD. THAT WAY IT IS ABLE TO MONITOR ENGINE LOAD WITH THE MANIFOLD VACUUM.

THE VACUUM WILL MOVE AN ANEROID TYPE SENSOR THRU A ELECTRICAL FIELD. THE SENSOR WILL BE IN VARIOUS POSITIONS DEPENDING ON ENG LOAD [VACUUM].

THE ELECTRICAL VALUE WILL LIKE WISE VARY. THE AMOUNT OF CONDUCTIVE ACTION IS THEN FED TO THE EFI C/U. THE C/U WILL THEN USE THAT VARIABLE VALUE TO HELP DETERMINE IF THE AIR/FUEL MIXTURE SHOULD BE INCREASED OR DECREASED. THIS IS DONE BY SHORTENING OR LENGTHENING THE INJECTOR'S 'OPEN TIME' OR DURATION.

### \*\*\*\*\* FAULTS & CHECKS \*\*\*\*\*

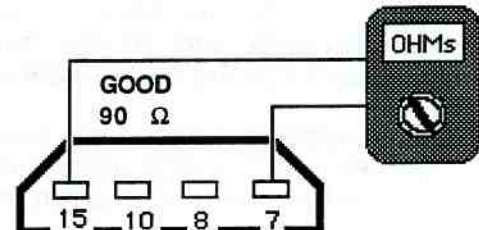
- ✓ **CRACKED, LEAKING HOSE**
- ✓ **BROKEN WIRES OR LOOSE TERMINALS**
- ✓ **GUMMED UP PRESSURE SENSOR**  
[WILL BE STUCK IN ONE POSITION, fuel mixture will be stuck at one level]  
**ENG MAY RUN ONLY AT IDLE**  
OR  
**ENG MAY RUN ONLY AT HIGH RPM**  
OR  
**ENG MAY RUN ONLY AT MID RANGE RPM**

### \*\*\*\*\* PRESS SENSOR \*\*\*\*\*

THIS IS ONLY AN ELECTRICAL TEST, P/SENSOR CAN STILL HAVE A BAD DIAPHRAGM THAT WON'T MOVE.

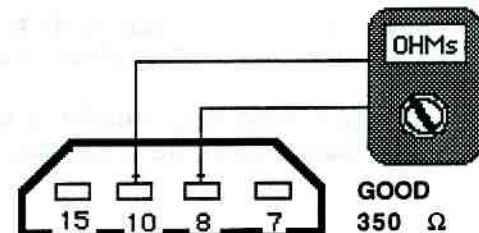
#### **A - PRIMARY CIRCUIT**

TERM #7 to 15 approx 90  $\Omega$  ohms with harness UNPLUGGED  
TEST AT PRESS SENSOR TERMINALS



#### **B - SECONDARY CIRCUIT**

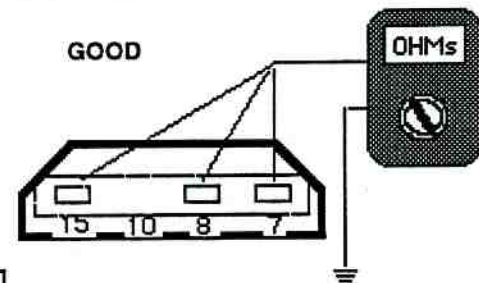
TERM #8 to 10 approx 350  $\Omega$  ohms with harness UNPLUGGED  
TEST AT PRESS SENSOR TERMINALS



#### **C - SHORT TO GROUND(-) WITH KEY OFF [KP 'O']**

NOTE: with harness CONNECTED  
TEST AT HARNESS CONNECTOR

TERM #7,8 & 15 to GRND(-) = OPEN [ $\infty$ ]  
IF '0' OHMs [NOT OPEN], PULL PLUG OFF OF PRESS SENSOR, IF NOW  $\infty$  [OPEN]  
PRESS SENSOR BAD, IF STILL '0' CHK WIRES FOR SHORT TO GRND[-]



23

564



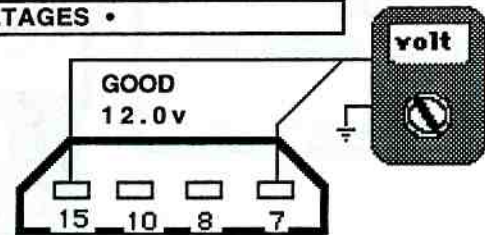
• PRESS SENSOR RUNNING TEST VOLTAGES •

• PRESS SENSOR TEST AT PRESS SENSOR TERMINALS •  
A GOOD PRESSURE SENSOR WILL GIVE YOU THESE APPROX  
TEST VALUES.

••• WITH THE ENGINE RUNNING •••

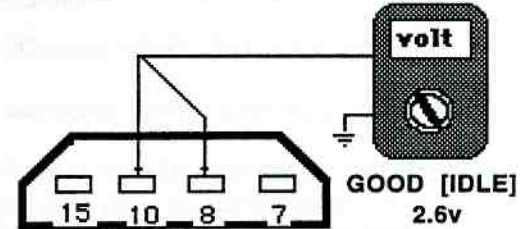
1- PRIMARY CIRCUIT

TERM #7 to GROUND[-] approx 12.0 VOLTS  
TERM #15 to GROUND[-] approx 12.0 VOLTS  
with harness CONNECTED



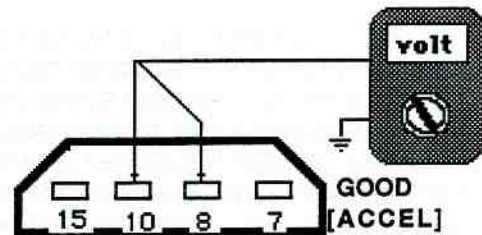
2- SECONDARY CIRCUIT AT IDLE

TERM #8 to GROUND[-] approx 2.6 VOLTS  
TERM #15 to GROUND[-] approx 2.6 VOLTS  
with harness CONNECTED



2- SECONDARY CIRCUIT on ACCELERATION

TERM #8 to GROUND[-] approx 1.9 VOLTS  
TERM #15 to GROUND[-] approx 1.9 VOLTS  
with harness CONNECTED



23

567

\*NOTES\*

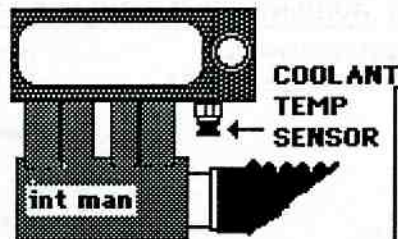
23

569

**D-JETRONIC INJ  
EFI  
TEMP SENSORS  
COOLANT & AIR**

23

581



**\*\*\*\*\* COOLANT TEMP SENSOR \*\*\*\*\***

**\*DO NOT CONFUSE WITH THERMAL TIME SW\***

COOLANT TEMP SENSOR IS LOCATED ON THE FRONT RIGHT SIDE OF THE CYL HD. C/TEMP SENSOR IS A VERY IMPORTANT PART OF THE EFI SENSOR SYSTEM.

IT WILL PROVIDE A RESISTANCE VALUE TO THE EFI C/U THAT WILL REFLECT ENG TEMP. THE SENSOR WORKS ON THE NTC PRINCIPLE, THE LOWER THE TEMP, THE HIGHER THE RESISTANCE. THIS OBVIOUSLY MEANS IF IT IS EITHER UNPLUGGED OR THE WIRES ARE BROKEN THE RESISTANCE WILL BE VERY HIGH AND THE C/U WILL IN TURN 'RICHEN' THE FUEL MIXTURE TO THE ENGINE.

- COOLANT TEMP SENSOR •
- RESISTANCE: APPROX  
15,000  $\Omega$  COLD  
2,500  $\Omega$  Ohms at 68 °F  
300  $\Omega$  at oper temp
- VOLTAGE AT THE TEMP SENSOR  
WITH ENG AT OPERATING TEMP:  
TERM #23 - approx 1.3volts  
TERM #32 - approx 0.0volts

**— NOTE —**

**ENGINE WILL NOT RUN WITH  
WATER TEMP SENSOR  
UNPLUGGED. IT WILL BE TOO  
RICH.**

**IF THE SENSOR IS BRIDGED  
(TERM TO TERM) THE C/U WILL  
THEN 'LEAN' THE FUEL MIXTURE.**

**\*\*\*\*\* AIR TEMP SENSOR \*\*\*\*\***

THE AIR TEMP SENSOR IS LOCATED IN THE RADIATOR CORE SUPPORT NEAR THE AIR FILTER.

THIS SENSOR WILL NOT BE AS INFLUENTIAL AS THE WATER TEMP SENSOR.

IF IT IS UNPLUGGED THE ENG WILL RUN JUST A LITTLE RICHER, HOWEVER IT SHOULD NOT BE OVERLOOKED WHEN DIAGNOSING A ENG RUNNING PROBLEM.

**— AIR TEMP SENSOR —**

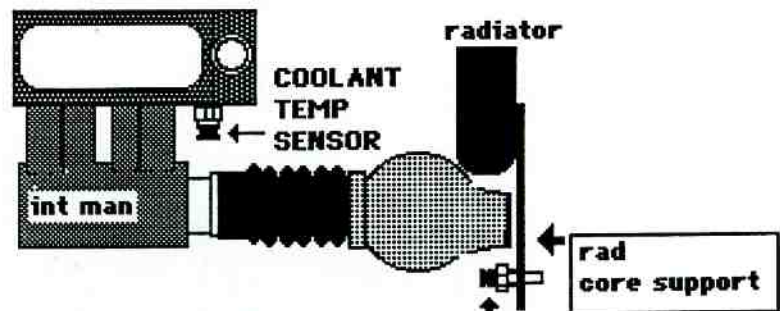
**\*\*\*\*\* FAULTS & CHECKS \*\*\*\*\***

WILL NOT CAUSE A SERIOUS RUNNING PROBLEM. ANY PROBLEM WITH IT, ENG WILL RUN CLOSE TO NORMAL.

IF IT IS UNPLUGGED THE ENG WILL RUN JUST SLIGHTLY RICHER.

IF IT IS SHORTED THE ENG WILL RUN JUST SLIGHTLY LEANER.

RESISTANCE: 300  $\Omega$  at 68 °  
LOW TEMP = HIGH RESISTANCE  
HIGH TEMP = LOW RESISTANCE



23

584

**AIR TEMP SENSOR**

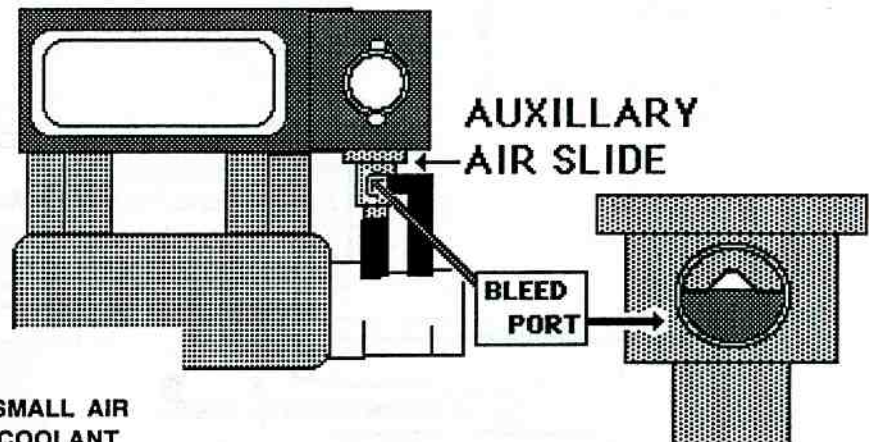


**D-JETRONIC  
INJECTION**

**AUXILLARY AIR  
SLIDE**

23

591



\*\*\* AUXILARY AIR SLIDE \*\*\*

THE AUXILARY AIR SLIDE IS A SMALL AIR BLEED CONTROLLED BY ENGINE COOLANT TEMP. IT'S FUNCTION IS TO PROVIDE AN AIR BLEED PAST THE THROTTLE PLATE.

THE LOWER THE ENG TEMP, THE LARGER THE AIR BLEED. THE AIR SLIDE WORKS LIKE A 'FAST IDLE CAM' ON A CARB. THIS EXTRA AIR BLEED WILL THEN CAUSE THE IDLE TO INCREASE.

IT WILL SLOWLY DECREASE THE AIR BLEED AS THE ENGINE WARMS UP, CAUSING THE ENG RPMs TO SLOWLY DROP.

\*\*\*\*\* FAULTS & CHECKS \*\*\*\*\*

- \* NO FAST IDLE FOR COLD ENG RUNNING.
- \* STICKING OPEN, CAUSING A FAST IDLE.

✓ CHECK THAT THE SLIDE VALVE IS OPEN WHEN ENGINE IS COLD, AND CLOSES AS ENG WARMS UP.

**D-JETRONIC  
INJECTION**

**IDLE /EGR TUBE  
PLUGGING**

23

594

ANY TUBE CONNECTED TO AN EGR VALVE IS LIKELY TO BECOME PLUGGED FROM CARBON FORMING FROM EXHAUST. WHEN THIS HAPPENS TO A TUBE THAT IS ALSO USED FOR THE IDLE CIRCUIT, IT WILL HAMPER ENG IDLE SETTINGS, BOTH COLD ENG FAST IDLE & WARM IDLE MODES.

- \* CHECK & CLEAN ALL FITTINGS , TUBES, IDLE PORTS
- \* CHECK EXHAUST GAS RECIRCULATION (EGR) VALVE  
VALVE PISTON CAN BE SEEN MOVING BACK < > FORTH

OPERATION ---- CHECK VACUUM HOSE  
CHECK EGR VALVE > OPENS WITH VAC  
CHECK EGR VALVE > CLOSES WHEN VAC REMOVED-IT  
MUSTN'T STICK OPEN

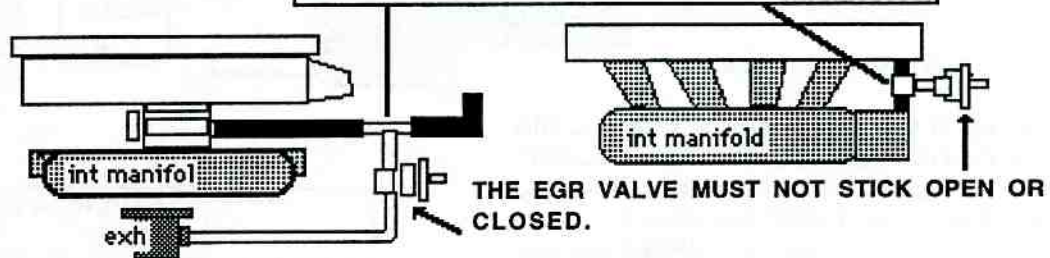
**D-JETRONIC INJ  
IDLE /EGR TUBE  
PLUGGING**

**EGR VALVE TEST**

23

597

THESE SECTIONS OF PIPE BECOME PLUGGED FROM EXHAUST CARBON.  
THE COLD ENG FAST IDLE & WARM IDLE WILL BE STARVED FOR AIR. THE ENG WILL NOT IDLE FAST ENOUGH & UNABLE TO PROPERLY ADJUST IDLE SPEED.



\*CHECK THAT ALL LINES AND  
PIPES ARE NOT PLUGGED

\*CHECK ALL HOSES FOR DRY ROT

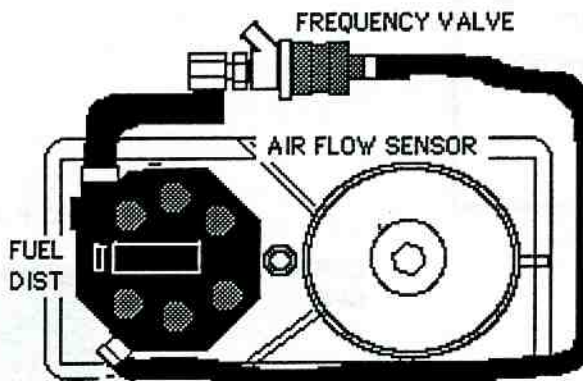
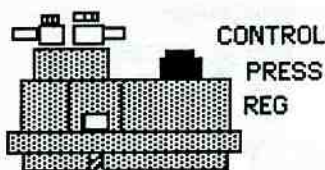
\*CHECK IDLE PORT AND THROTTLE  
PLATE AREA FOR CARBON  
BUILDUP.

IT MUST ONLY OPEN DURING ACCELERATION  
NOT AT IDLE OR THE ENG WILL WANT TO DIE.

USE A HAND VACUUM PUMP OR A VAC HOSE THAT HAS  
VAC AT IDLE TO CHK EGR. IT MUST OPEN WITH VAC, THE  
ENG WILL WANT TO DIE, WHEN VAC IS REMOVED EGR  
MUST CLOSE, ENG WILL THEN RUN NORMALLY AGAIN.



**K-JETRONIC  
FUEL INJECTION  
SYSTEM  
POOR OR NO RUN  
✓ CHECK ITEMS**



✓ **POOR IDLE, COLD RUNNING .....** VACUUM LEAKS - SEALS FOR INJECTORS & INJ HOLDERS (CHK WITH WD-40, CR 5-56, CARB CLEANER ETC).

✓ **ENG WILL START & DIE ...** HOSES FOR AIR SLIDE [LARGE VACUUM LEAKS] HOSE OFF

✓ **MISSING AT IDLE, POOR ACCEL .....** INJECTOR PROBLEMS -POOR SPRAY PATTERN [SEE CHECKING INJ SPRAY PATTERNS]

✓ **NOISY MAIN FUEL PUMP or POOR HOT START,** SURGING DURING CRUISING, STALLING. CHECK PRE-PUMP & PRE-PUMP HOSE AS WELL AS ALL FILTERS, LINES FOR RESTRICTIONS.

✓ **F/PUMP[ '78-ON] NOT WORKING...** NO IGN SIGNAL TO F/INJ RELAY FOR PUMP OPERATION, NO IGNITION IMPULSE MEANS NO F/PUMP

✓ **FUEL PUMP FUSE - POOR , ERRATIC CONTACT DUE TO CORROSION.**

✓ **ENGINE WON'T START .... FUSE #13 [ for FUEL INJ RELAY]**

✓ **F/PUMP TERM CONNECTION & GROUND UNDER REAR SEAT CUSHION.**

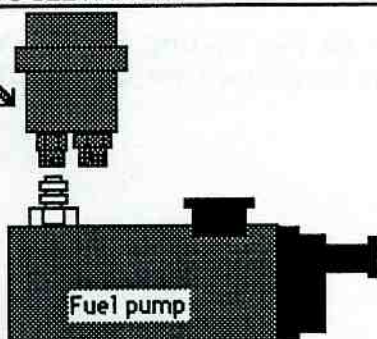
✓ **O2 SENSOR OPERATION & BE SURE FREQUENCY VALVE IS 'BUZZZZING'.**

✓ **POOR COLD RUNNING, HARD COLD START** CONTROL PRESSURE REGULATOR CLOGGED

✓ **AIRFLOW SENSOR PLATE HANGS UP - ENG RUNS WAY 'TOO' RICH,** NORMALLY IT WILL NOT EVEN IDLE. (counter/weight is loose on air flow sensor shaft)

✓ **ENG MISSING, LOW POWER, WON'T RUN, LINE PRESS REG ERRATIC LINE PRESS, ALL SYMPTOMS CAN BE DUE TO CORROSION IN F/DIST.**  
FUEL DIST IS NOT A REPAIRABLE ITEM EXCEPT FOR ADJUSTING & CLEANING LINE PRESS REG VALVE.

**• ACCUMULATOR •**  
TO HELP KEEP FUEL PRESS UP DURING ENGINE SHUTDOWN. WON'T AFFECT ENGINE RUNNING PERFORMANCE, SUCH AS MISSING. PERHAPS A LACK OF POWER IF PLUGGED, WHICH WE HAVE YET TO SEE HAPPEN.



K-JETRONIC FUEL INJECTION SYSTEM			
1974 -75	B-20	4 CYL	
1976 -82	B-21	4 CYL	
1981-85	B-21	TURBO 4 CYL	200 Series
1976-86	B-27,28	V6	200 & 760 Series
.... LAMBDA SOND O2 SENSOR ....			
FREQUENCY VALVE [IT BETTER BE BUZZING]			
1977 - 79	USED ON SELECTED MODELS		
1980 - ON	USED ON ALL MODELS		

**ENGINE RUNS, BUT RUNS POORLY - USE THE 'VITAL SIGN' CHECKING FOR THE AREAS PRONE TO HAVE PRIMARY FAULTS.**

**ENGINE WON'T START - USE THE 'BASIC CHECK' TO DETERMINE IF PROBLEM IS IN FUEL OR IGNITION SYSTEM.**

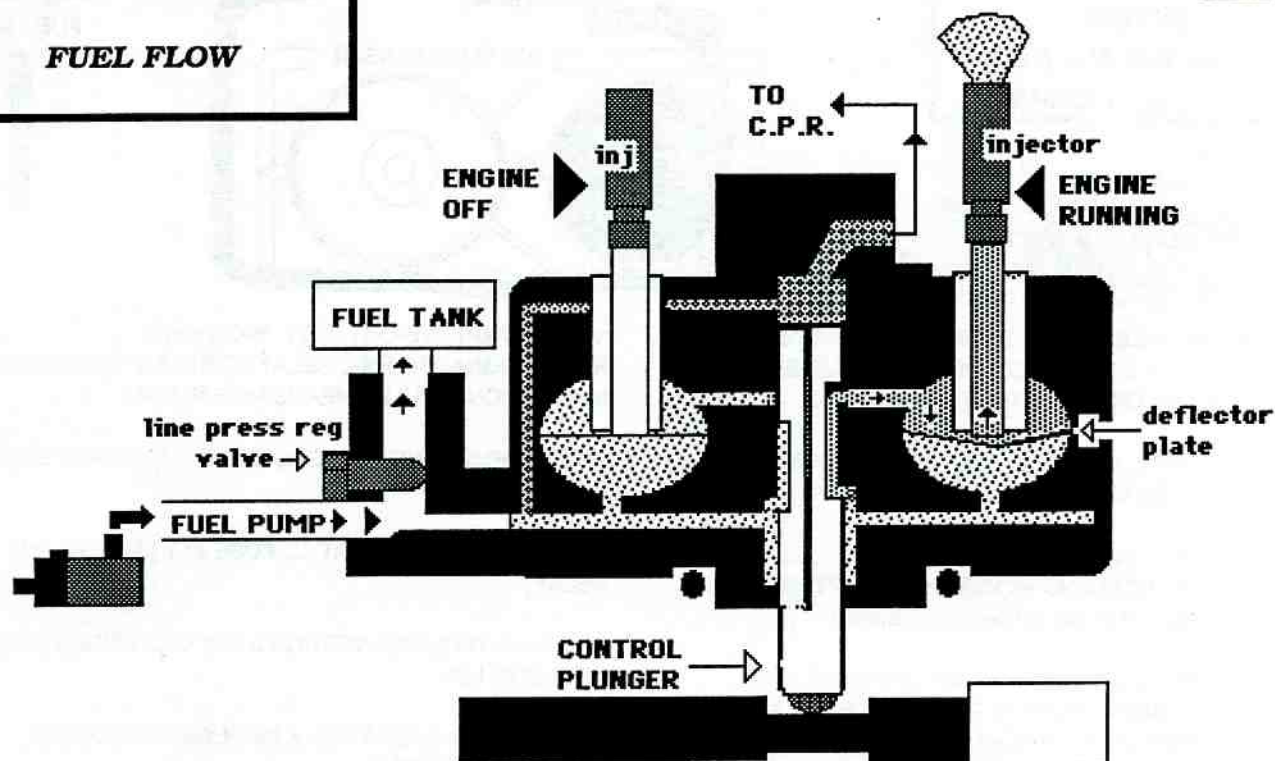
**1981 - 82 WITH 'MPG' IGNITION ENG STARTS & DIES -SEE PROBLEM AREAS FRONT OF 'MPG' IGN SECTION.**

**K-JETRONIC  
FUEL DISTRIBUTOR**

**FUEL FLOW**

24

011



\*\*\* THE FUEL DISTRIBUTOR REGULATES & DISTRIBUTES THE FUEL TO THE INJECTORS. WHENEVER THE ENGINE IS RUNNING THE F/DIST IS DELIVERING FUEL, TO ALL THE INJECTORS AT THE SAME TIME. IT IS A CONSTANT INJECTION SYSTEM, NOT A PULSATING TYPE.

THE AMOUNT OF FUEL IT DELIVERS IS CONTROLLED BY THE CONTROL PLUNGER. THE FUEL DIST HAS AS MANY CHAMBERS AS THE ENG HAS CYLINDERS, EACH CHAMBER IS CONNECTED TO A INJECTOR. THE CHAMBERS ARE SEPARATED INTO TWO (2) HALVES.

THE UPPER CHAMBER GOES TO THE INJECTOR AND IS SEPARATED FROM THE LOWER BY A DEFLECTOR PLATE. THIS PLATE AT ITS' REST POSITION WILL SEAL OFF THE PIPE GOING TO THE INJECTOR, SO NO FUEL IS ALLOWED PAST IT WHEN THE ENG IS NOT RUNNING.

THE LOWER CHAMBER HALF PROVIDES A PRESSURE TO KEEP THAT PLATE FROM MOVING DOWN TO EASILY, WHICH WOULD UNCOVER THE PIPE DELIVERING FUEL TO THE INJ. THAT PRESSURE IS OVERCOME BY A COUNTER ACTING PRESSURE BEING APPLIED IN THE UPPER CHAMBER ON THE PLATE. WHERE THE PRESSURE ON THE PLATE IN THE LOWER CHAMBER REMAINS CONSTANT, THE PRESSURE IN THE UPPER CHAMBER WILL BE INCREASED BY THE CONTROL PLUNGER. AS THE PLUNGER GOES UP INTO THE F/DIST, THE PRESSURE IN THE UPPER CHAMBER IS INCREASED, AND THE DEFLECTOR PLATE IS PUSHED DOWN UNCOVERING THE PIPE. THE FUEL IS THEN ALLOWED TO FLOW TO THE INJECTOR, AND INTO THE CYLINDER.

ALL DEFLECTOR PLATES WILL MOVE THE SAME AMOUNT. SO THE VOLUME OF FUEL TO EACH CYLINDER SHOULD BE THE SAME, UNLESS THE F/DIST, THE INJECTOR LINE OR INJECTOR IS CLOGGED.

24

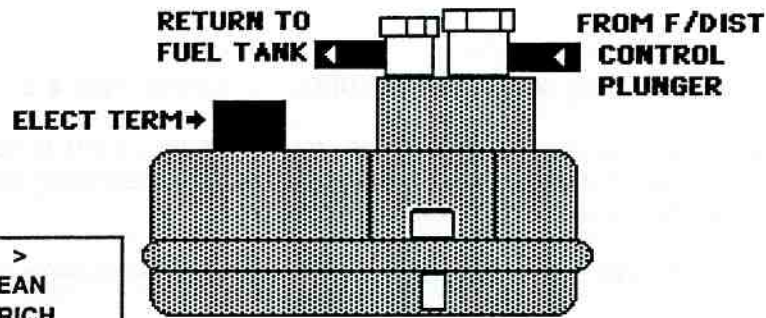
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**K-JETRONIC  
CONTROL  
PRESSURE  
REGULATOR  
C.P.R.**

24

021



**< CONTROL PRESSURE >  
HOT = HIGHER PRESS = LEAN  
COLD = LOWER PRESS = RICH**

THE CONTROL PRESSURE REGULATOR'S PRIMARY FUNCTION IS FOR FUEL ENRICHMENT DURING ENGINE WARMUP. IT OPERATES PRETTY MUCH LIKE A CARB'S CHOKE BUTTERFLY. THERE IS A BIMETALLIC SPRING INSIDE THAT ACTIVATES A PRESSURE BLEED OFF VALVE. THE VALVE BLEEDS OFF PRESSURE BACK TO THE FUEL TANK. THE SPRING IS HEATED BY ELECTRICAL CURRENT AND BY ENGINE HEAT.

WHEN THE SPRING IS COLD IT PULLS DOWN ON THE BLEED VALVE, WHICH OPENS THE RETURN PORT MORE, THIS WILL THEN REDUCE THE PRESSURE ON THE CONTROL PLUNGER OF THE F/DIST. THAT LOWER PRESSURE WILL ALLOW THE C/PLUNGER TO BE PUSHED HIGHER UP INTO THE F/DIST BY THE A/F SENSOR ARM. ALL THIS ACTION WILL IN TURN ALLOW MORE FUEL TO BE DELIVERED TO THE INJECTORS, RESULTING IN A RICHER AIR/FUEL MIXTURE.

THE ELECTRICALLY HEATED BI/METAL SPRING ALONG WITH ENGINE HEAT WILL CAUSE THE BI/MET SPRING TO PARTIALLY CLOSE OFF THE FUEL RETURN PORT, SO THE CONTROL PRESSURE WILL RISE. THAT HIGHER CONTROL PRESSURE WILL NOT ALLOW THE C/PLUNGER TO BE PUSHED AS HIGH UP INTO THE F/DIST BY THE A/F SENSOR ARM. THIS WILL CAUSE THE AIR/FUEL MIXTURE TO GRADUALLY LEAN OUT SOME, THIS IS OK SINCE THE ENGINE WILL NOT NEED AS RICH A MIXTURE AS WHEN IT WAS COLDER.

THE CURRENT THAT IS USED TO HELP HEAT THE BIMETALLIC SPRING COMES FROM THE FUEL INJ RELAY term 87b, IT IS HOT WHEN EVER THE FUEL PUMP IS FED CURRENT.

SINCE THE ENGINE HEAT WILL ALSO CAUSE THE BI/MET SPRING TO PARTIALLY CLOSE OFF THE FUEL RETURN PORT, IF FOR SOME REASON THE ELECTRICAL HEATING MECHANISM DOESN'T OPERATE, THE CONTROL PRESSURE WILL STILL SLOWLY RISE DUE TO ENG HEAT.

**NOTE; THE BLEED OFF VALVE NEVER WILL COMPLETELY CLOSE. THERE WILL ALWAYS BE A BLEED OFF OF THE CONTROL PRESSURE. IF THERE WAS NO BLEED OFF, THE PRESSURE WOULD RISE AS HIGH AS LINE PRESS, APPROX 5.3kp/cm<sup>2</sup>. THE MOST COMMON FAULT WITH A C.P.R. IS PLUGGING OF VALVE, CAUSING IT TO PROVIDE PRESSURE AS HIGH AS LINE PRESSURE ON THE CONTROL PLUNGER, EVEN WHEN THE ENG IS COLD. THIS RESULTS IN A VERY LEAN AIR/FUEL MIXTURE.**

**\*\*\* CONTROL PRESSURE PROBLEMS- FAULTS      GAUGE POS # 2**

**\* HIGH PRESSURE**, WILL PROBABLY BE SAME AS LINE PRESS > C.P.R. IS PLUGGED (will need to be replaced), RETURN LINE FROM C.P.R. IS BLOCKED, EXCESSIVE FUEL TANK PRESSURE DUE TO FAULTY FUEL EVAPORATIVE EMISSION SYSTEM (fuel tank purge valve, canister plugged).

**\* LOW PRESSURE**, LINE PRESS IS CORRECT > C.P.R. IS HELD OPEN, REPLACE C.P.R.

IF THE CONTROL PRESS JUST TAKES TO LONG TO INCREASE, WHEN ENG IS RUNNING CHK FOR BATTERY VOLTAGE AT BLUE WIRE OF C.P.R. CONNECTOR IF NO BAT VOLT CHECK FUEL INJ RELAY. THAT THE BLACK WIRE IS GROUNDED. IF THEY ARE OK, REPLACE C.P.R.

**————— CONTROL PRESSURE —————**  
**POSITION 2 \_ CONTROL PRESSURE approx [INCREASES WITH ENG TEMP]**

**PRESSURE IS LOW > COLD      approx   1.0 Kp/cm2 at 40° F**

**PRESSURE IS HIGH > HOT      approx   3.7 Kp/cm2 at 130° F**

**24**

**027**

**\*NOTES\***

**24**

**029**



\*\*\*\*\* AIR FLOW SENSOR \*\*\*\*\*

THE AIR FLOW SENSOR ASSEMBLY CONSISTS OF AN ARM WITH A COUNTERWEIGHT, AND A SENSOR PLATE.

THE FUEL DIST MOUNTS ON TOP OF THE A.F. SENSOR AND IS ACTIVATED BY THE ARM. THE ARM MOVES UP IN DIRECT RELATION TO THE VOLUME OF AIR BEING PULLED IN BY THE ENG, HENCE THE NAME, AIR FLOW SENSOR. AS MORE AIR IS MOVING INTO THE ENG THE SENSOR PLATE MOVES THE ARM UP, PUSHING THE FUEL DIST PLUNGER UP. THE HIGHER THE PLUNGER MOVES UP INTO THE F/DIST THE MORE FUEL IT WILL DELIVER TO THE ENG THRU THE INJECTORS. THE ARM HAS AN ADJUSTMENT SCREW TO SET THE FUEL/MIXTURE (C/O) WHICH IS ACCESSED THRU A HOLE BETWEEN F/DIST AIRFLOW SENSOR PLATE.

✓ THE COUNTER WEIGHT SOMETIMES CAN BECOME LOOSE CAUSING THE ARM TO JAM IN AN UP POSITION. THE WEIGHT CAN BE PUT BACK ON WHEN SENSOR ASSEMBLY IS TAKEN APART.

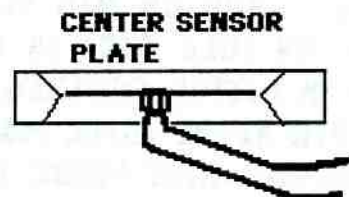
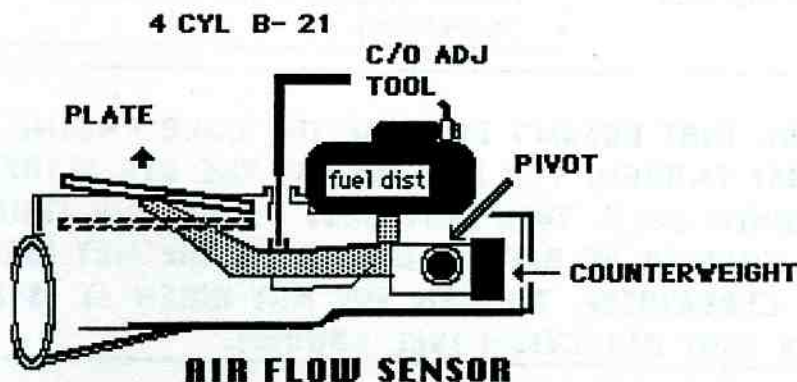
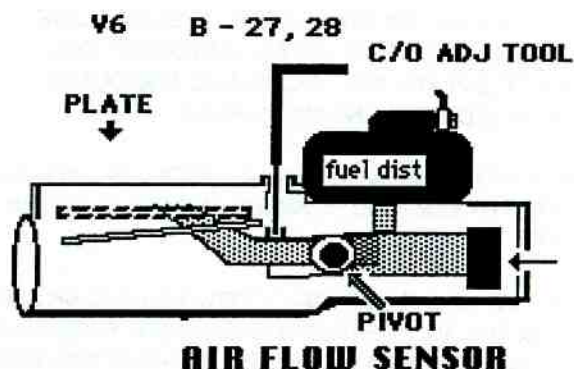
✓ THE SENSOR PLATE CAN ALSO COME LOOSE. REALIGN & TIGHTEN. MAKE SURE IT IS CENTERED SO IT WILL NOT BIND.

• STICKING SENSOR PLATE •

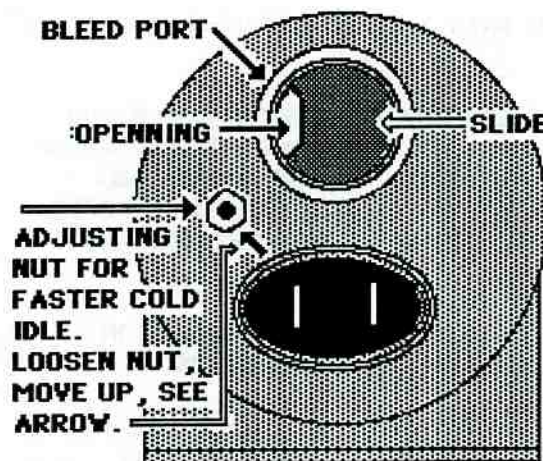
IF PLATE IS BINDING ON THE SIDES, IT IS BECAUSE THE ARM IS EITHER LOOSE OR THE PLATE HAS TO BE CENTERED.

• A LOOSE ARM WILL MEAN THE AIR FLOW SENSOR ASSEMBLY WILL HAVE TO BE TAKEN APART AND REPAIRED.

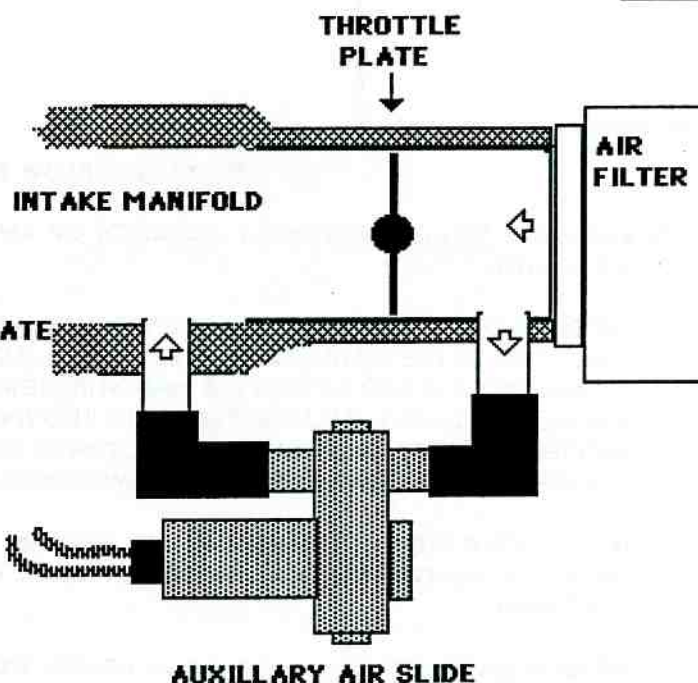
• A PLATE THAT ONLY NEEDS TO BE CENTERED, JUST LOOSEN CENTER BOLT & CENTER THE PLATE, TIGHTEN BOLT.



# AUXILLARY AIR SLIDE



**AUXILLARY AIR SLIDE**



AUXILLARY AIR SLIDE IS LIKE THE FAST IDLE CAM SETUP ON A CARB. THE AIR SLIDE PROVIDES A CONTROLLED AIR BLEED PAST THE THROTTLE PLATE. THIS WILL CAUSE THE IDLE TO INCREASE DURING ENGINE WARMUP.

THERE IS A BIMETALLIC SPRING INSIDE THAT IS BOTH HEATED BY ELECTRIC CURRENT AS WELL AS ENGINE HEAT.

THE IDLE WILL SLOWLY BACK DOWN AS THE AIR SLIDE IS ELECTRICALLY HEATED WITH CURRENT FROM THE FUEL INJECTION RELAY. THE ENGINE HEAT WILL ALSO BE CONDUCTED TO THE AIR SLIDE, AND IT WILL THEN BE WARMED UP IN THAT WAY.

## \*\*\* FAULTS & SYMPTOMS \*\*\*

✓ IF COLD ENGINE STARTS OK, BUT RUNS TOO SLOW [LESS THAN 1,000 rpms]. THEN CHECK AIR SLIDE >

A ' COLD ' AIR SLIDE SHOULD BE OPEN.

A ' HOT ' AIR SLIDE SHOULD BE CLOSED.

BY LOOKING IN THE OPENING OF A ' COLD ' AIR SLIDE TO SEE IF IT IS OPEN TO THE OTHER SIDE. [SEE PICTURE].

## TECH/TIP

IF YOU HAVE AN AIR SLIDE THAT DOESN'T PROVIDE THE COLD ENGINE WITH AN IDLE THAT IS FAST ENOUGH, YOU CAN ADJUST THE AIR SLIDE TO OPEN A LITTLE FARTHER WHEN COLD. THIS MAY JUST BE ENOUGH THAT THE AIR SLIDE WILL NOT HAVE TO BE REPLACED. LOOSEN THE NUT [SEE DRAWING], AND MOVE IT CLOCKWISE, TIGHTEN THE NUT WHEN IT IS AS FAR AS CAN BE MOVED IN THAT DIRECTION [SEE ARROW].



**K-JETRONIC  
FUSES-CHECKING-  
BYPASSING RELAY  
-RUN FUEL PUMP-  
starting with 1979**

24

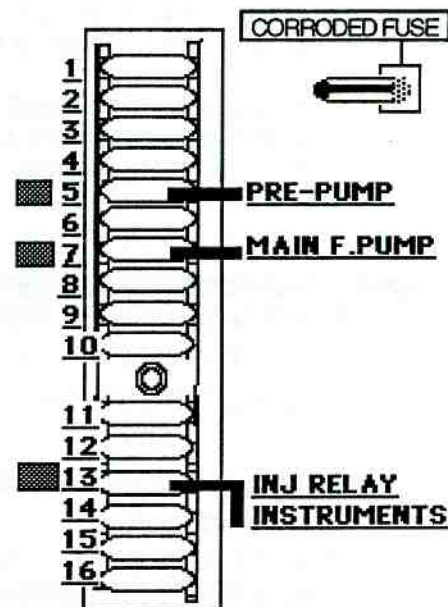
131

IF THE IDIOT LITES(AMP,OIL,BRAKE WARNING ETC) WON'T COME ON WITH IGN SWITCH IN KEY POSITION II [KP II]. IF THE ENG CRANKS BUT WON'T START AND NO FUEL PUMP NOISE CAN BE HEARD, THE FUEL INJECTION RELAY MAY NOT BE ACTIVATING THE FUEL PUMP.

\*THE PROBLEM MAY JUST BE THE FUSE(#13) FOR THE FUEL INJ RELAY NOT MAKING CONTACT WITH THE FUSE BOX TERMINALS. NOTE THE FUSE MAY NOT BE BLOWN, ONLY CORRODED. REPLACE ALL THE FUSES(# 5,7 & 13) FOR THE F/INJ SYSTEM.

**MAKING FUEL PUMP RUN** - BYPASS THE FUSE & F/INJ RELAY BY JUMPING FROM FUSE TERMINALS (#5 to 7), THE PUMP SHOULD RUN,AND ENGINE CAN NOW BE STARTED. THIS WOULD INDICATE THE F/PUMP IS OK BUT THE FUSE OR RELAY IS AT FAULT, CHECK FOR WHERE CURRENT STOPS.

**\*\*BE SURE TO CLEAN ALL CORRODED TERMINALS AND LUBE WITH DIALECTRIC GREASE TO PREVENT FUTURE CORRODING OF FUSES AND TERMINALS.**



**K-JETRONIC  
FUSES-CHECKING-  
BYPASSING RELAY  
79-82 240/260  
'81-85 240 TURBO**

\* NOTE - IGNITION MUST BE OPERATING FOR THE FUEL PUMP RELAY TO TURN 'ON'. THE IGNITION IMPULSES FROM COIL TERM #1 ARE NEEDED BY THE RELAY FOR IT TO HAVE A GROUND[-] CIRCUIT THAT TURNS 'ON' THE RELAY. THIS MEANS -NO IGNITION -- NO FUEL PUMP.

24

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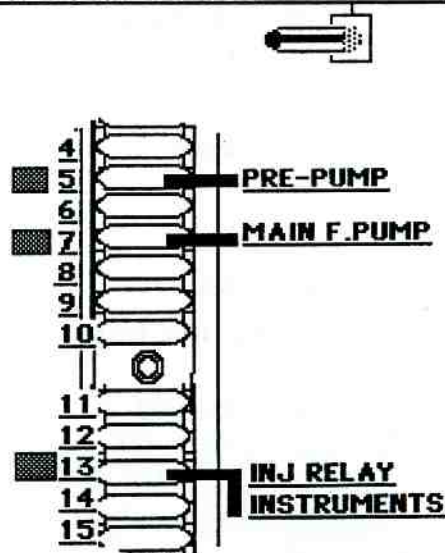
**CORRODED FUSE MAY ONLY CAUSE AN ERRATIC TYPE PROBLEM. IT MAY MAKE & BREAK CONTACT AT TIMES. CAUSING ENG TO DIE, THEN IT MAY RESTART. CLEAN ALL INJ SYSTEM FUSE TERMS LUBE WITH DIALECTRIC GREASE & REPL FUSES.**

**FUSE PRE-PUMP IN TANK  
#5**

FUSE IS SUPPLIED CURRENT FROM FUEL INJECTION RELAY WHEN ENG IS CRANKED OR RUNNING. IT IS ON THE SAME CIRCUIT WITH THE MAIN FUEL PUMP, SO BY JUMPING CURRENT TO THIS FUSE YOU WILL SUPPLY CURRENT TO MAIN FUEL PUMP THEREFORE BYPASSING RELAY.

**FUSE MAIN FUEL PUMP-FUSE IS ALWAYS 'HOT'  
#7**

SUPPLIES WORKING CURRENT TO RELAY THAT WHEN RELAY IS ACTIVATED IS THEN SUPPLIED TO FUEL PUMP,FUSE #5 AND LAMBDA RELAY



**FUSE #13** FUEL INJ RELAY, HOT KEY 'ON' [KP II].

SUPPLIES CURRENT FOR THE FUEL INJ RELAY FOR ITS 'ON - OFF' FUNCTION OF THE RELAY TO TURN ON F/PUMP, HEATER FOR C.P.R., LAMBDA RELAY [IF EQUIPPED]

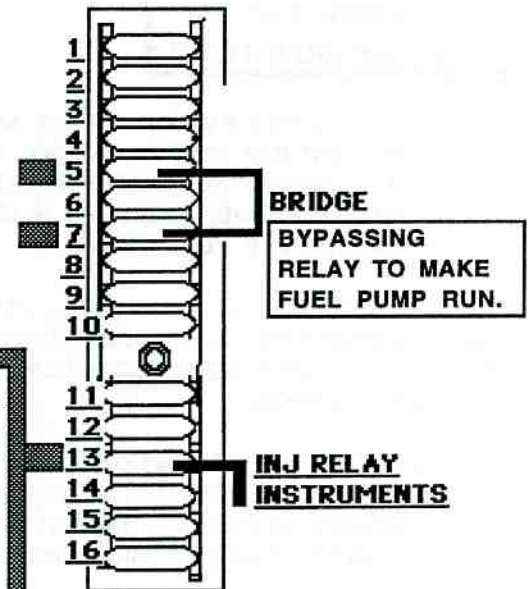
ALSO SUPPLIES CURRENT FOR THE.....  
INSTRUMENTS [IDIOT LAMPS, GAUGES ETC.] & TURN SIGNAL.

**BYPASSING RELAY OR POOR FUSE CONTACTS TO ACTIVATE FUEL PUMP VERIFIES PUMP, ELECT WIRE CIRCUIT OK.**

**TO BYPASS RELAY > JUMP FUSE TERM**

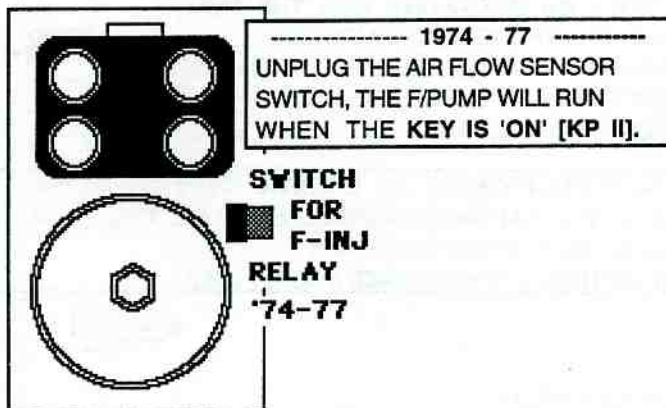
**#5 to #7**

**• BE SURE FUSE # 7 IS GOOD**

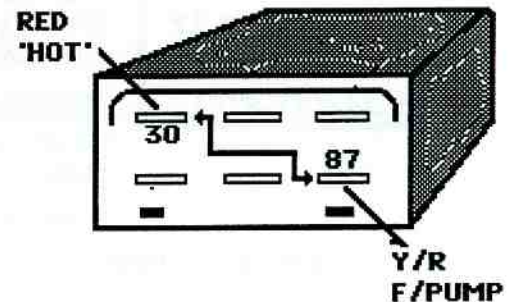


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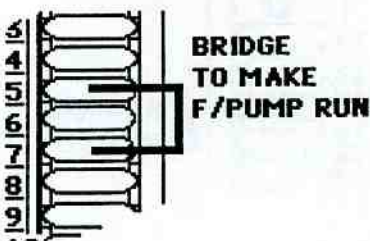


**AIR FLOW SENSOR**



----- 1978 -----  
JUMP TERMS #30 [RED] to #87 [YEL/RED]  
F/PUMP RELAY IS LOCATED UNDER  
DASH ON DRIVER'S SIDE [L SIDE].  
IT IS NEAR THE HOOD RELEASE HANDLE.

**1979 - ON**  
**200 Series FUSE BOX**



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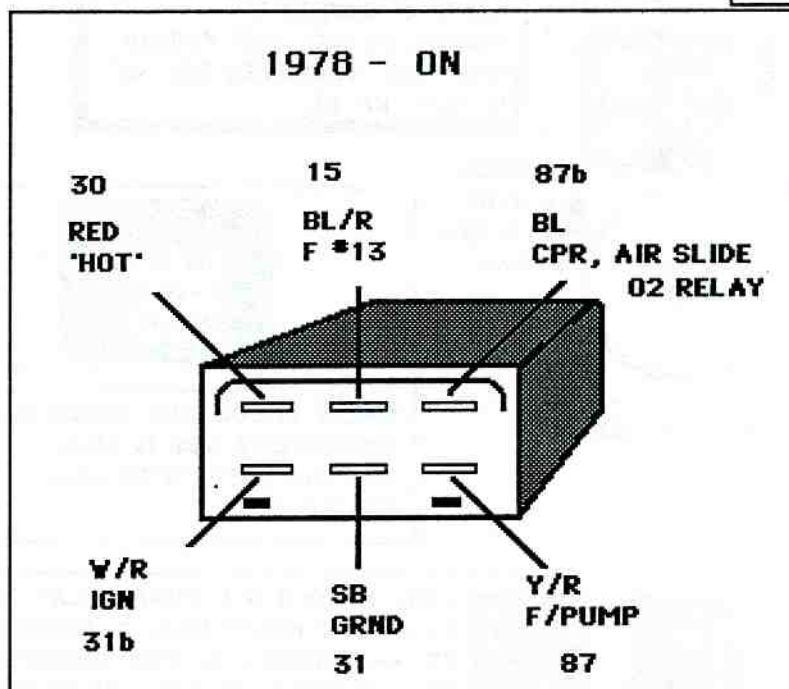
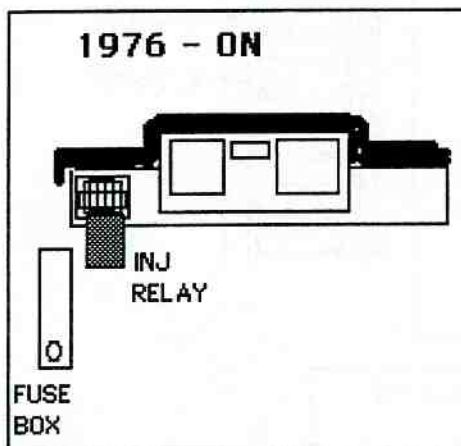
139



**K-JETRONIC**  
**1974 -on**  
**INJECTION RELAY**  
**LOCATION &**  
**FUNCTION**

24

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----- 1978 -----

30 - HOT [FUSE # 7 FROM BAT JUNCTION BOX] RED

15 - FUSE # 5 [HOT KP II] BL/R

31b - TERM # 1 IGN COIL [IMPULSES NEEDED TO TURN ON F/PUMP CIRCUIT OF RELAY] W/R

31 - GROUND WIRE SB [black]

87 - FUEL PUMP [IGN IMPUSES NEEDED TO GET HOT] YEL

87b - AUX AIR SLIDE,C.P.R. [HOT WHEN FUEL PUMP IS HOT] BLUE

----- '79 & ON -----

30 -ALWAYS HOT [FUSE # 7 FROM BAT JUNCTION BOX] RED

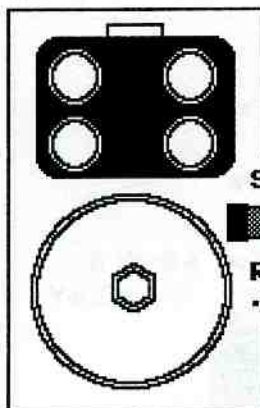
15 - FUSE # 13 [HOT KP II] BL/R

31b - TERM # 1 IGN COIL [IMPULSES NEEDED TO TURN ON F/PUMP CIRCUIT OF RELAY KP III] W/R

31 - GROUND WIRE SB [black]

87 - FUEL PUMP [IGN IMPUSES NEEDED TO GET HOT] YEL/RED  
 ALSO GOES TO FUSE # 5 FOR PRE PUMP

87b - AUX AIR SLIDE,C.P.R. [HOT WHEN FUEL PUMP IS HOT] BLUE



**AIR FLOW SENSOR**

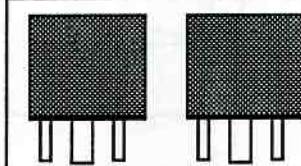
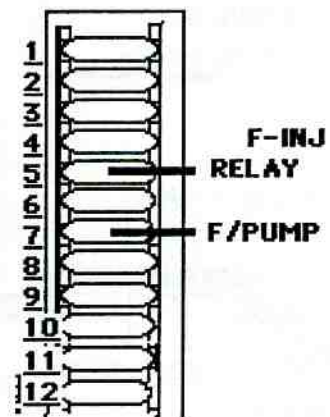
**SWITCH  
FOR  
F-INJ  
RELAY  
'74-'77**

**NOTE; IF SWITCH IS  
DISCONNECTED, THE F/PUMP  
WILL RUN WHENEVER THE KEY  
IS 'ON' [KP II].**



**RELAY IS LOCATED UNDER DASH  
ON DRIVER'S SIDE [L SIDE].  
IT IS NEAR THE HOOD RELEASE  
HANDLE.**

**'74-'78 FUSE BOX**



**F-INJ SYSTEM & F PUMP RELAY LOCATION**

- 74 --- BAT RELAY BAR [L FENDER]
- 75 --- FIREWALL [L SIDE UNDER HOOD]
- 76 --- UNDER LEFT DASH BY HOOD CABLE
- 77 --- UNDER LEFT DASH BY HOOD CABLE

**24**

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**\*NOTES\***

**24**

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**K-JETRONIC F.I.  
CONNECTORS  
WIRE COLOR  
FOR CORRECT  
HOOK-UP**

WIRE COLOR SYMBOLS		
GREEN	GN	or GRN
BROWN	BN	or BRN
RED	RD	
BLUE	BL	
YELLOW	Y	or YEL
BLACK	SB	
PINK	P	
WHITE	W	

BL/Y Y



**COLD START  
INJ**

GN BN



**FREQUENCY  
VALVE**

BL SB



**AIR SLIDE**

BL SB



**C.P.R.**

P SB



**PRESSURE  
DIFFERENTIAL**

**\*\*\*\*\* TECHNICIAN NOTES \*\*\*\*\***

THERE ALWAYS IS THE CHANCE EVEN THOUGH ALL THE CONNECTORS ARE HOOKED UP, THAT THEY COULD BE ON THE WRONG ITEMS.

SO YOU ARE BETTER OFF JUST TO DOUBLE CHECK AND MAKE SURE THAT THEY ARE CORRECT.

THIS IS ESPECIALLY NECESSARY IF ANY ONE HAS WORKED ON THE CAR PREVIOUSLY.

THIS MEANS JOBS SUCH AS WATER PUMP, INTAKE MANIFOLD SEALS AND CYL HEAD GASKETS ETC.

**WHEN IT COMES TO DISASSEMBLY WORK, THE MOST IMPORTANT PART OF THE JOB IS OFTEN BEFORE YOU EVEN REMOVE THE FIRST PART.**

THAT'S RIGHT, KNOWING HOW IT SHOULD LOOK WHEN IT IS ALL BACK TOGETHER GOES A LONG WAY TO ENSURING THE REPAIR WILL BE A SUCCESS. WE AREN'T ALL BLESSED WITH A PHOTOGRAPHIC MEMORY.

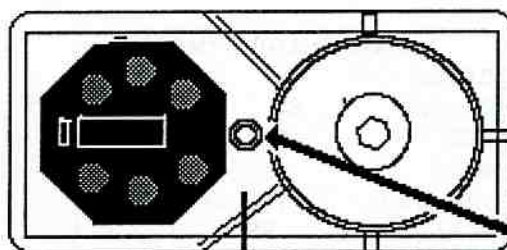
THIS IS WHY IT IS THE SMART TECHNICIAN WHO WILL TAKE TIME TO PERHAPS MAKE A NOTE OR A DRAWING TO AID IN THE PROPER RE-ASSEMBLY. NOTING THE ORDER THAT CERTAIN PARTS ARE IN BEFORE REMOVAL.

**THE MARKING WITH PAINT OR TAGS OF ELECTRICAL CONNECTIONS, FUEL LINES OR HOSES.**

**K-JETRONIC  
FUEL INJECTION  
C/O ADJUSTING  
AIR/FUEL  
MIXTURE**

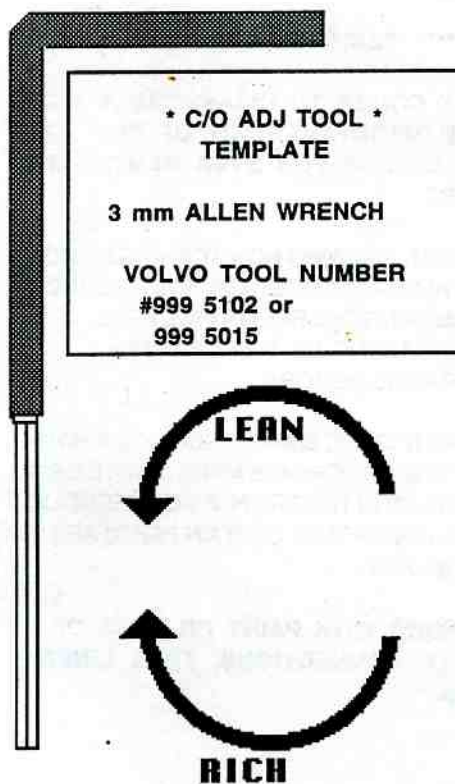
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**C/O ADJUST HOLE**

- \* **WARM ENG TO OPERATING TEMP**
- \* **SET IDLE RPM & IGNITION TIMING**
- \* **ON ENGINES WITHOUT LAMBDA SOND**  
TAP INTO EXH PIPE BEFORE CATALYST  
(C/O SET TO 1.0 %)  
OR INSERT IN TAIL PIPE (C/O SET TO 0.5 %)
- \* **ON ENGINES WITH LAMBDA SOND USE A**  
DWELL METER AT C/O TEST POINT  
(SET DWELL METER TO 4 CYL SCALE)
- 4 CYL '78- 80 (B-21) — C/O 45°
- 4 CYL '81- 82 (B-21) — C/O 55°
- 6 CYL (B-27) ——— C/O 55°
- \* **OR USE A DIGITAL VOLT METER HOOKED**  
UP TO THE O2 SENSOR(BLACK WIRE)  
SET C/O TO 0.5 volts (0.4v-to-0.6v)
- \*\* **TAKE OUT C/O ADJUST TOOL BECAUSE**  
IT IS HEAVY ENOUGH TO INFLUENCE  
THE C/O MIXTURE VALUE.
- \*\*\*\* **REMEMBER THE V6 (B-27,28) MUST**  
HAVE THE C/O ADJUSTING HOLE IN  
AIR FLOW SENSOR PLUGGED OR  
THERE IS A VACUUM LEAK, WHICH  
WILL CAUSE A LEAN FUEL MIXTURE.
- \* **A.I.R. PUMP MUST BE BLOCKED TO SET C/O.**



\* **ONLY ADJUST ENGINES WHEN AT OPERATING TEMP \***

\*\* **IF ENG IS LEAN >**  
TURN ADJUSTING SCREW CLOCKWISE TO RICHEN THE AIR/FUEL MIXTURE (C/O)

\*\* **IF ENG IS RICH >**  
TURN ADJUSTING SCREW COUNTER/CLOCKWISE TO LEAN THE AIR/FUEL MIXTURE (C/O)

**IF NO INSTRUMENTS ARE AVAILABLE TO MONITOR THE C/O, A QUICK TEMPORARY ADJ CAN BE MADE. TURN THE TOOL COUNTER/ CLOCKWISE (LEAN) UNTIL ENG BEGINS TO RUN POORLY. THEN TURN IT CLOCKWISE (RICH) UNTIL ENG SPEED PICKS UP AND RUNS SMOOTHLY.**

**RESET TO PROPER C/O VALUES AS SOON AS POSSIBLE.**

**IMPORTANT-- FEDERAL REQUIRES 1981 AND LATER AUTOS HAVE THE C/O ADJUSTING PORT HOLE BE PLUGGED.**

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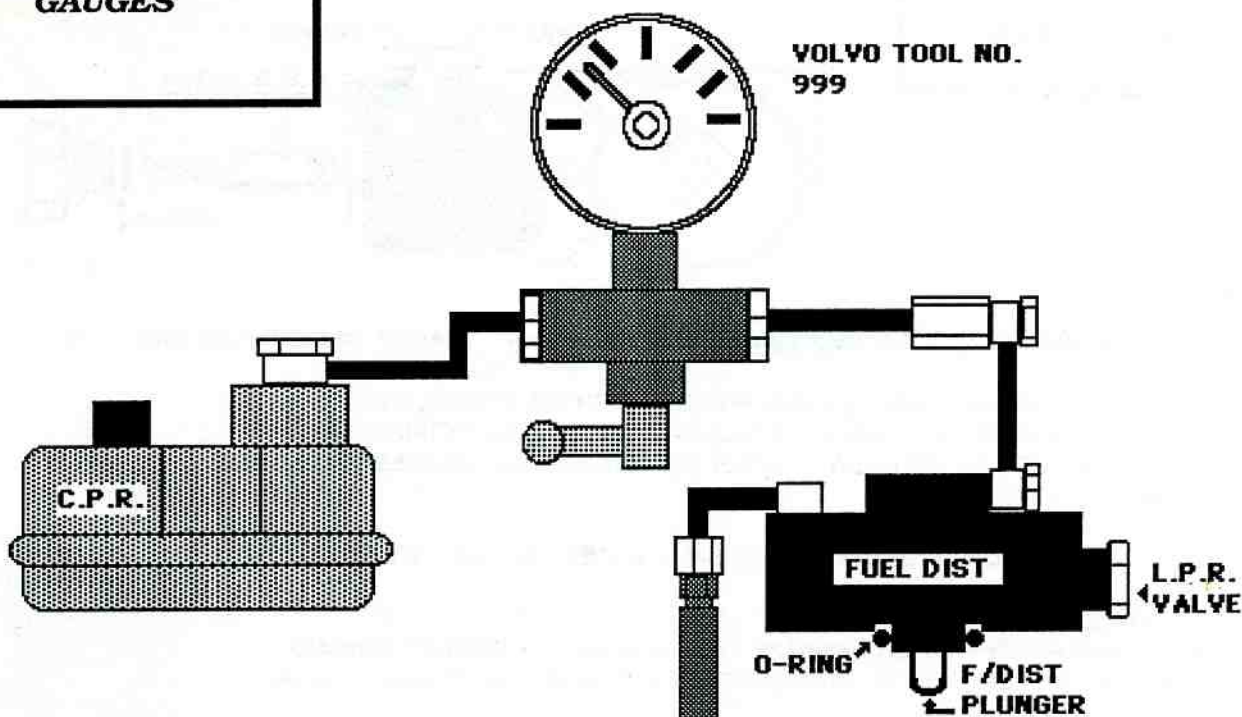
214



# **K-JETRONIC FUEL PRESSURE GAUGES**

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## **\*\* PRESSURE TESTS \*\***

IT IS OFTEN NECESSARY TO KNOW WHAT THE FUEL PRESSURES ARE IN THE K-JET SYSTEM IN ORDER TO FIND THE PROBLEM. THE GAUGE THAT YOU USE WILL PROBABLY ADAPT TO A NUMBER OF OTHER FUEL INJ SYSTEMS.

THERE ARE BASICALLY THREE (3) TYPES OF PRESSURE CHECKS TO BE MADE.

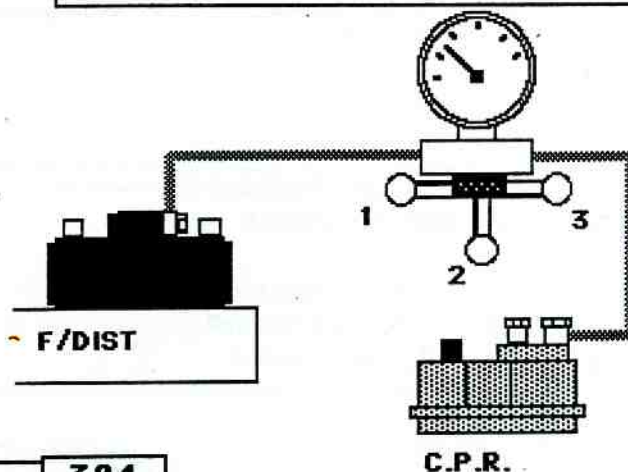
**1 - LINE PRESSURE**, THE LINE PRESSURE REGULATOR, REGULATES FUEL PRESS THE SYSTEM OPERATES WITH. **THIS IS THE HIGHEST PRESSURE IN FUEL CIRCUIT.**

**2 - CONTROL PRESSURE**, THE C.P.R. CONTROLS THIS 'CHOKE' LIKE REGULATED PRESSURE. **PRESSURE LOWER WHEN ENG IS COLD.**

**3 - REST PRESSURE**, THE RESIDUAL PRESSURE THAT IS MAINTAINED FOR A WHILE AFTER THE ENG IS TURNED OFF. **THIS HELPS TO PREVENT VAPOR LOCK, AND FUEL STARVATION ON RESTARTING.**

POSITION 1 _	LINE PRESSURE	approx
4 cyl	4.5 - 5.3 Kp/cm2	
4 cyl TURBO	5.2 - 5.8 Kp/cm2	
6 cyl	4.7 - 5.5 Kp/cm2	

POSITION 2 _	CONTROL PRESSURE	approx
	PRESSURE IS LOW > COLD	
	PRESSURE IS HIGH > HOT	
approx	1.0 Kp/cm2	at 40° F
approx	3.7 Kp/cm2	at oper temp 180° F



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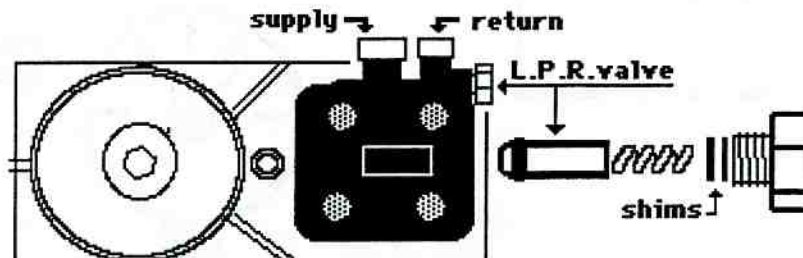
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# **K- JETRONIC** **FUEL PRESSURES**

## **\* LINE PRESS**

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**\*\* LINE PRESSURE**      4.5 - 5.8 Kp/cm2 / 67 - 83 psi      RANGE DEPENDS ON ENG TYPE

LINE PRESSURE IS THE OPERATING FUEL PRESSURE FOR THE SYSTEM. IT IS REGULATED BY THE LINE PRESSURE REGULATOR (L.P.R) LOCATED IN THE FUEL DISTRIBUTOR. THE L.P.R. VALVE IS ADJUSTABLE WITH SHIMS. INCREASING SHIM THICKNESS INCREASES THE LINE PRESSURE.

**L.P.R. VALVE IS LOCATED BY THE SUPPLY & RETURN FUEL LINES.**

## **FUEL VOLUME**

FUEL VOLUME AFTER F/FILTER > APPROX 1 quart IN 30 sec WITH ENG NOT RUNNING.  
TO RUN THE FUEL PUMP - GO TO - 'BYPASSING THE FUEL PUMP RELAY' GROUP 24000.

## **\* LINE PRESSURE PROBLEMS [pump runs] - FAULTS      GAUGE POS # 1**

**LOW PRESSURE** [under 4.0 Kp/cm2] > FUEL PUMP FAULTY(noisy), PRE PUMP OR HOSE IN TANK (if equipped) OR PICKUP PIPE CRACKED, FUEL FILTER CLOGGED, LEAKS, L.P.R. O-RING BROKE, TWISTED OR KINKED SUPPLY LINES (usually by fuel tank, fuel pump or filter).

**IF PRESS IS STEADY BUT JUST LITTLE LOW (4.3 Kp/cm2) ADJUST L.P.R. VALVE(shims)**

**HIGH PRESSURE** > BLOCKED FUEL RETURN LINES (usually by fuel tank, f/dist), L.P.R. VALVE IS BLOCKED.

LINE PRESSURE	
POSITION 1 _	LINE PRESSURE approx
4 cyl	4.5 - 5.3 Kp/cm2
4 cyl TURBO	5.2 - 5.8 Kp/cm2
6 cyl	4.7 - 5.5 Kp/cm2

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**K-JETRONIC  
CHECKING  
INJECTOR SPRAY  
PATTERNS**

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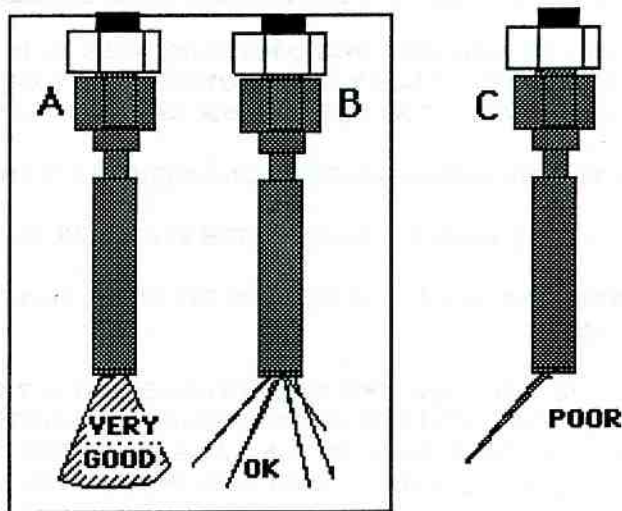
**DANGER**

**DANGER**

**USE EXTREME  
CAUTION**

**CATCH ALL FUEL IN  
A SAFE CONTAINER  
AND DISPOSE OF IT  
PROPERLY.**

**DO NOT SMOKE  
OR ALLOW SPARKS  
AROUND FUEL**



\*\*\* SPRAY PATTERNS \*\*\*

A- BEST POSSIBLE PATTERN, AN EVEN CONE LIKE SPRAY.

B- PASSABLE PATTERN, MULTIPLE STREAMS WITH A GOOD FORCE BEHIND THEM.

C- POOR SPRAY, USUALLY ONLY ONE WEAK SPRAY OR DRIBBLE. CLEAN OR REPLACE.

---USE CAUTION AROUND GASOLINE AND SPARKS---

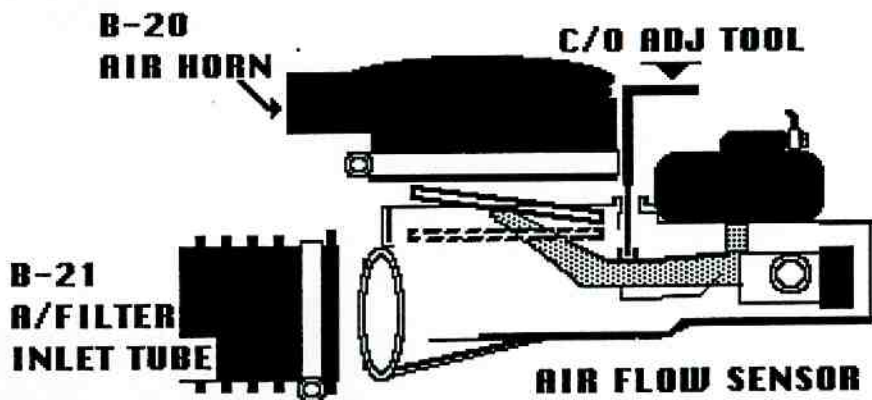
- \* REMOVE ALL THE INJECTORS FROM THEIR HOLDERS.
- \* POSITION THE INJECTORS SO THEIR SPRAY WILL BE CAUGHT IN A SAFE CONTAINER
- \* START F/PUMP BY METHODS DESCRIBED IN:
  - 1974-77 'BYPASSING INJECTION RELAYS' [KP II DISCONNECT AIRFLOW SENSOR SW]
  - 1978 BRIDGE FUEL PUMP RELAY TERMS #30 to #87
  - 1979-85 'MAKING THE FUEL PUMP RUN' [BRIDGE FUSE #5 to #7]

\* LIFT AIR FLOW SENSOR PLATE APPROXIMATELY 1/4 inch WITH C/O ADJ TOOL

\* IF YOU ARE UNABLE TO LIFT THE SENSOR PLATE WITH C/O TOOL, THEN ON THE B-21 PUSH IT UP WITH YOUR FINGERS THRU THE AIR FILTER INLET TUBE, ON B-20 REMOVE THE AIR HORN ..... LIFT THE SENSOR PLATE. REMOVE AIR FILTER FROM B-27 ENG.....PUSH DOWN THE SENSOR PLATE.

\* COMPARE ALL THE SPRAY PATTERNS

--- USE EXTREME CAUTION AROUND ANY FUEL ---



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... IS IT THE INJECTOR OR THE FUEL LINE OR THE FUEL DISTRIBUTOR?? ...

**AFTER YOU DETERMINED THAT AN ENGINE MISS IS IN THE INJ SYSTEM, YOU STILL HAVE TO FIND WHICH PART IS AT FAULT. SUBSTITUTION IS ONE SURE, QUICK WAY TO DO JUST THAT. ONCE YOU LEARN THIS ROUTINE, IT WILL BE AS QUICK AS 1,2,3. LET'S SAY THE MISS IS IN CYL #1.**

**A - REMOVE THE INJECTORS FROM CYLINDERS #1 & 2. [TO I.D. MARK ONE WITH PAINT]**

**B - SWITCH THE INJECTORS, PUT INJECTOR #1 INTO CYL #2 PUT INJECTOR #2 INTO CYL #1**

**C - START ENGINE, IF THE MISS IS NOW IN CYL #2, THE FAULT IS INDEED IN THE F/INJ, INJ LINE OR FUEL DISTRIBUTOR.**

**D - REMOVE THE INJECTORS FROM CYLINDERS #1 & 2 ONCE AGAIN. NOW REMOVE THE INJECTORS FROM THEIR LINES. SWITCH THE LINES, #1 LINE TO #2 INJ #2 LINE TO #1 INJECTOR. PUT THE INJECTORS BACK IN THE SAME CYLINDERS YOU JUST REMOVED THEM FROM. DON'T GET CONFUSED WITH THIS SWITCHING AROUND. TAKE YOUR TIME, WE DON'T WANT YOU GETTING DIZZY.**

**E - START THE ENG, IF THE MISS IS STILL IN CYL #2, THE INJECTOR IS AT FAULT. IF THE THE MISS IS NOW IN CYL #1, THE INJECTOR LINE OR F/DIST IS AT FAULT.**

**F - YOU WILL HAVE TO SUBSTITUTE A LINE TO THE MISSING INJECTOR, IF THEN THE MISS IS GONE, THE LINE IS BAD. STILL HAVE A MISS? THE FUEL DISTRIBUTOR IS AT FAULT.**

[IT IS A GOOD IDEA TO KEEP A LONG INJECTOR LINE AROUND AS A 'TOOL' YOU CAN USE TO SUBSTITUTE.]

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**\*NOTES\***

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**K-JETRONIC INJ  
INJECTOR SEAL  
VACUUM LEAKS**

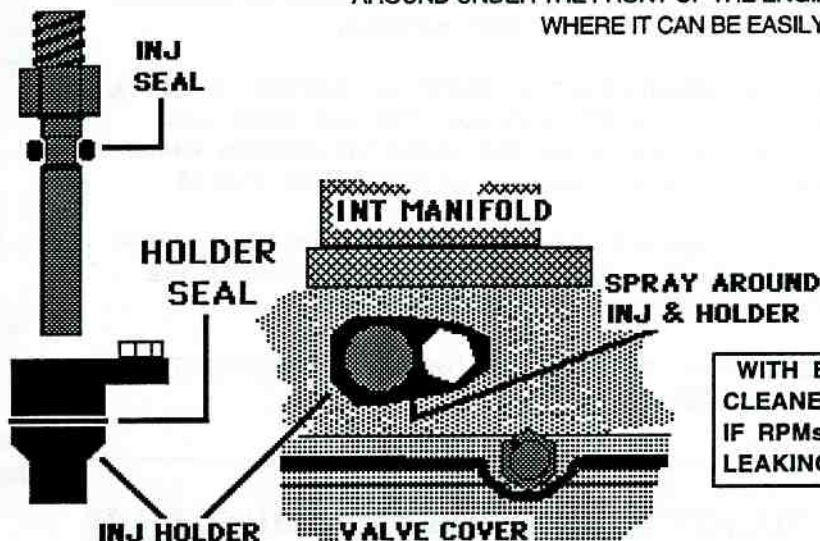
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USE A CARB CLEANER, AEROSOL PENETRATING OIL [WD-40] ETC TO HELP LOCATE LEAKS.

--- USE CAUTION WITH FLAMMABLE FLUIDS ---

CHECK ALL VAC HOSE CONNECTIONS AT BOTH ENDS FOR CRACKING. CHK 'MPG' IGN VAC ADVANCE DIAPHRAGM ON IGN C/U TO ENSURE THERE IS VACUUM PRESENT. THE HOSE ROUTES AROUND UNDER THE FRONT OF THE ENGINE BY CRANK PULLEY, WHERE IT CAN BE EASILY CUT.



WITH ENG RUNNING SPRAY CARB CLEANER AROUND INJ & HOLDER, IF RPMs CHANGE THE SEALS ARE LEAKING AND MUST BE REPLACED.

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VACUUM LEAKS ARE A VERY CRITICAL PROBLEM TO ANY FUEL SYSTEM. MOST VACUUM LEAKS ARE EASILY FOUND AND REPAIRED ON THE K-JET INJ.

MOST OF THE TIME IT IS THE INJ & INJ HOLDER SEALS. USE AN AEROSOL PENETRATING OIL SUCH AS WD-40, 'LIQUID WRENCH' etc, TO HELP LOCATE LEAKS. CHECK ALL VAC HOSE CONNECTIONS AT BOTH ENDS FOR CRACKING. CHK 'MPG' IGN VAC ADV TO INSURE THERE IS VACUUM PRESENT.

--- REMOVAL ---

USE A SMALL PRY BAR AS SHOWN TO REMOVE INJECTOR.

REMOVE THE INJECTOR HOLDER RETAINING BOLT.

INSERT THE SNAP RING PLIERS IN THE INJ HOLDER AND WITH A TWISTING UPWARD MOVEMENT, PULL INJ HOLDER UP.



REMOVAL & INSTALLATION OF THE INJECTOR HOLDER CAN BE EASILY DONE WITH THE USE OF HEAVY DUTY SNAP RING PLIERS , LIKE THE ONES AVAILABLE FROM SNAP-ON, TOOL NUMBER -SRP-3

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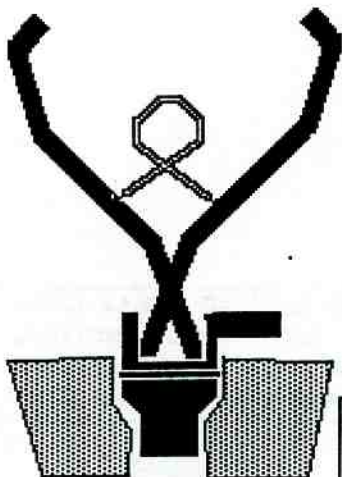
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**--INSTALLATION--**

**CLEAN BORE WITH CARB SPRAY AND A TAPERED WIRE BRUSH.**

AFTER CLEANING HOLDER INSIDE AND OUT WITH CARB SPRAY, LUBRICATE HOLDER, SEAL ON HOLDER, AND SEAL ON INJECTOR WITH A HEAVY COATING OF SILICONE SPRAY.

**SNAP RING PLIERS**



**BEFORE INSTALLING THE INJECTOR HOLDER, SPRAY A HEAVY COATING OF SILICONE INTO THE BORE AND ANOTHER COATING ON THE INJECTOR HOLDER WHILE HOLDING THE HOLDER IN THE SNAP RING PLIERS.**

**PUSH HOLDER IN EVENLY, BE SURE THAT THE TINY HOLDER SEAL DOES NOT WORK IT'S WAY OUT OF THE GROOVE OF THE HOLDER WHEN PUSHING HOLDER IN.**

**NEXT, SPRAY THE SEAL ON THE INJ AND PRESS IT INTO THE HOLDER.**



**BORE  
BRUSH**

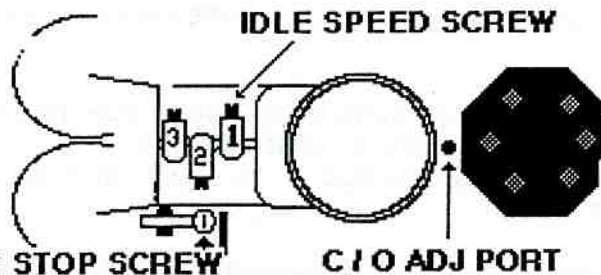
**\*\*\*IMPORTANT\*\*\***

**RECHECK WITH AEROSOL PENETRATING OIL TO MAKE SURE ALL SEALS ARE PROPERLY IN PLACE.**

**NOTES**



**B-27, 28 V6  
IDLE ADJUSTMENT  
K-JETRONIC INJ  
without C.I.S.**



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• THE V6 ENGINE IS REALLY TWO 3 CYLINDER ENGINES WITH A COMMON CRANKSHAFT. THIS IS THE REASON THAT THE INTAKE MANIFOLD IS SO LARGE. THE AMOUNT OF CRANK ROTATION BETWEEN THE CYLINDER FIRINGS IS OF VARYING LENGTHS. THIS IS WHY THE SPACING OF THE TOWERS ON THE DIST CAP ARE SPACED CLOSE TOGETHER, THEN FAR APART.[SEE DRAWING OF DIST CAP] THIS MEANS THAT A REAL SMOOTH IDLE IS VERY HARD TO ACHIEVE. WE FOUND THIS PROCEDURE WILL USUALLY GIVE YOU AN ACCEPTABLE IDLE.

NOTE: THAT ANY TYPE OF MISS WILL USUALLY HAVE A STRANGE AFFECT ON ENGINE IDLE. WE EVEN FOUND THAT IF ALL 3 CYLINDERS ON ONE BANK ARE GROUNDED OUT [CYL BALANCE TEST] THE ENGINE IDLES SMOOTHER.

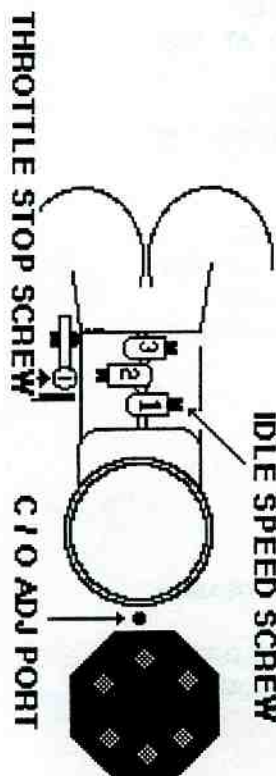
\*\*\*\*\* CHECK THESE ITEMS FOR POOR IDLE CONDITIONS \*\*\*\*\*

- ✓ CHECK FOR VACUUM LEAKS -- WITH ENG RUNNING SPRAY CARB CLEANER AROUND INJ & HOLDER, IF RPMs CHANGE THE SEALS ARE LEAKING AND MUST BE REPLACED.
- ✓ CHECK FOR ARCING OR BAD IGNITION CABLES & DISTRIBUTOR CAP.
- ✓ CHECK FOR BINDING THROTTLE ROD & LEVERS.
- ✓ CHECK FOR POOR INJECTOR SPRAY PATTERNS.

\*\*\*\*\* IDLE ADJUSTMENT PROCEDURE \*\*\*\*\*

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1- RUN ENGINE TO OPERATING TEMPERATURE. A/C & ALL ACCESSORIES MUST BE 'OFF'.

- 2- ADJUST TIMING TO 8-12° BTDC [750 to 850 rpms]  
[ALL VACUUM LINES OFF AND PLUGGED AT DISTRIBUTOR]  
2a- RECONNECT THE VACUUM LINES, THE TIMING SHOULD NOT CHANGE. IF IT DOESN'T CHANGE GO TO ... 3

• IF TIMING CHANGES - THE THROTTLE IS OPEN TOO FAR, ALLOWING VENTURI VAC TO OPERATE VAC ADVANCE. GO TO ... 2b

2b- WITH VAC LINES CONNECTED, ADJUST THROTTLE TO PREVENT THIS ADVANCE FROM HAPPENING IF POSSIBLE. USE A TIMING LITE & A VACUUM GAUGE -TEED IN- TO THE CONNECTED VAC LINES IN ORDER TO MONITOR THE ADVANCE MECHANISM.

• NOTE THAT ON OLDER CARS IT MAY NOT BE POSSIBLE TO ELIMINATE THIS VAC ADVANCE, IN THAT CASE ADJUST TIMING TO 14° BTDC at 900 RPMs WITH VAC LINES CONNECTED.

3- IF THE MANIFOLD HAS SCREWS #2 & #3[SEE DRAWING] FOR THE CYLINDER BANK BALANCING, TURN THEM IN UNTIL THEY BOTTOM. THEN BACK THEM OUT 3 1/2 TURNS. THESE SCREWS ARE FOR FINE BALANCING, YOU MAY USE THEM LATER AFTER ALL THE OTHER ADJUSTMENTS ARE MADE FOR A SMOOTHER IDLE.

4- ADJUST IDLE SPEED [USING IDLE SPEED ADJ SCREW #1] TO ABOUT 900 rpms.

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5- ADJUST C/O.

THE C/O ADJUST PORT MUST BE PLUGGED FOR PROPER C/O READING, OR ELSE THE VACUUM LEAK WILL CAUSE A LEAN MIXTURE.

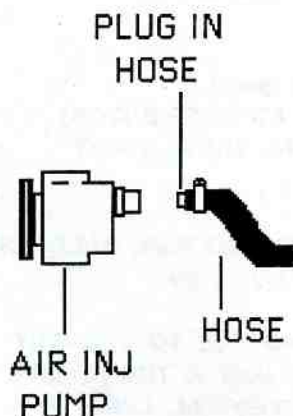
[USING IDLE SPEED ADJ SCREW #1 TO KEEP IDLE AT ABOUT 900 rpms WHILE ADJUSTING C/O]

• WITHOUT Lambda Sond [no O2 sensor] - DISCONNECT & BLOCK OFF THE HOSE FROM THE AIR INJECTION PUMP [note; the hose MUST BE PLUGGED TO PREVENT EXH FROM LEAKING OUT WITHOUT BEING REGISTERED ON C/O GAS ANALYZER AT T/PIPE.] C/O READING SHOULD BE 0.4 to 1.0% at T/pipe AND GO DOWN WHEN THE HOSE TO AIR INJ PUMP IS RECONNECTED, THIS SHOWS PUMP IS WORKING.

• WITH LAMBDA SOND [HAS O2 SENSOR] [SEE GROUP 22 'LAMBDA SOND' FOR MORE INFO IF NEEDED]

5a- WITH O2 SENSOR DISCONNECTED, USE O2 SENSOR OUTPUT VOLTAGE. ADJUST THE C/O SO VOLTAGE COMING FROM O2 SENSOR IS AS CLOSE TO OR OSCILLATING AROUND 0.5v. METER CONNECTED TO BLACK O2 sensor WIRE. AFTER C/O IS ADJUSTED, RECONNECT O2 SENSOR. - OR -

5b- WITH O2 SENSOR CONNECTED, USE DUTY CYCLE at TEST POINT [SEE GROUP 20 'TEST POINTS' ]. ADJUST THE C/O SO DWELL READING IS AS CLOSE TO OR OSCILLATING AROUND 45° ON 4 CYLINDER SCALE.



6- ADJUST THROTTLE BASE IDLE.

NOW TURN IDLE SPEED ADJUST SCREW #1 IN ALL THE WAY[BOTTOMED OUT]. NOW USE THE THROTTLE STOP SCREW TO ADJUST ENGINE IDLE TO 650 - 750 rpm. IF ENGINE IS IN GOOD SHAPE AND THE C/O IS SET PROPERLY THE ENGINE WILL RUN PRETTY GOOD AT THIS LOW RPM RANGE. THIS MEANS WHEN ENGINE IS SUBJECTED TO AN LOAD AT IDLE[IN DRIVE, POWER STEERING OPERATING ETC.] IF IT 'HUNTS' TOO MUCH THE C/O MAY BE TOO RICH.

NOTE: THE VACUUM ADVANCE MUST NOT OPERATE, CAUSING THE TIMING TO ADVANCE, WHICH WILL AFFECT THE IDLE. IF THIS HAPPENS, GO BACK TO ... 2b AND ADJUST TIMING & THROTTLE STOP, THEN JUST LEAVE THE THROTTLE ADJUSTMENT ALONE & GO TO ...7.

7- ADJUST IDLE SPEED.

IDLE SPEED ADJUST SCREW #1 ENGINE IDLE TO 950 - 1050 rpm.

8- RE CHECK C/O.

MAKE ANY NEEDED ADJUSTMENTS TO BOTH IDLE RPMs & C/O.

THE C/O ADJUST PORT MUST BE PLUGGED FOR PROPER C/O READING, OR ELSE THE VACUUM LEAK WILL CAUSE A LEAN MIXTURE.

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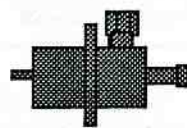


## GROUP 25 LH-JETRONIC INJECTION

- 25- 001 LH-INJECTION SYSTEM COMPONENTS
- 25- 007 LH-INJ SYSTEM THEORY OF OPERATION \_\_ LIMP HOME  
MODE
- 25- 009 LH-INJ \_\_ POOR & NO RUN CHECK ITEMS
- 25- 011 COMMON PROBLEMS \_\_ COMPONENT FAULTS
- 25- 021 MAKING THE FUEL PUMPS 'RUN' [BYPASSING RELAYS]
- 25- 051 LH-INJ \_\_ ERRATIC PROBLEMS \_\_ 25 AMP FUSE \_\_ PROBLEMS
- 25- 061 SMALL FUSES \_\_ BIG PROBLEMS \_\_ IMPORTANT
- 25- 071 LH-INJ \_\_ POOR IDLE \_\_ CHECKING FOR FOULED INJECTORS
- 25- 111 '85 -88 RELAY TERMINAL FUNCTIONS
- 25- 131 '85 - ON 200 SERIES POWER SUPPLY CONNECTOR
- 25- 151 CO ADJUSTING \_\_ TERMINAL TESTING
- 25- 171 A.M.M. TERMINAL FUNCTIONS\_\_ TESTING
- 25- 181 '85 -88 CU TERMINAL FUNCTIONS\_\_ TESTING
- 25- 501 '83 - 84 RELAY TERMINAL FUNCTIONS
- 25- 511 SMALL FUSES \_\_ BIG PROBLEMS \_\_ IMPORTANT
- 25- 541 CO ADJUSTING \_\_ TERMINAL TESTING
- 25- 551 A.M.M. TERMINAL FUNCTIONS\_\_ TESTING
- 25- 571 LH-INJ CONTROL UNIT \_\_ TERMINAL FUNCTIONS  
QUICK CHK  
'83-84 B-23 \_\_ FLAT SPOT ON ACCELERATION

## **LH - JETRONIC**

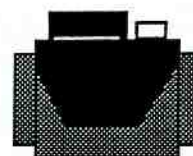
### **FUEL INJECTION SYSTEM**



**FUEL PRESSURE  
REGULATOR**



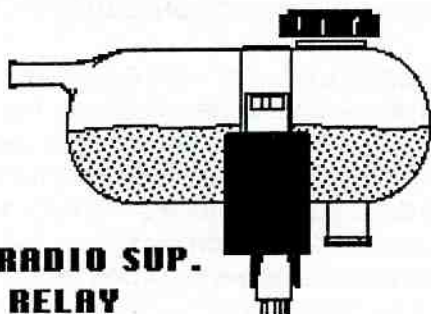
**FUEL  
INJ**



**AIR MASS  
METER**

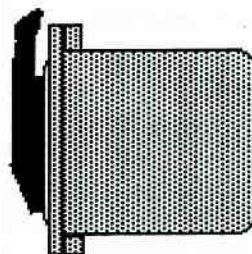
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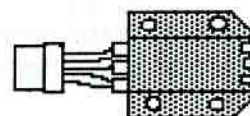


**RADIO SUP.  
RELAY**

- RADIO SUPPRESSION RELAY •
- 1987 - ON 700 SERIES CARS
- LOCATED UNDER HOOD, ON-  
COOLANT EXPANSION TANK BRACKET  
or P/STRNG RESERVOIR BRACKET



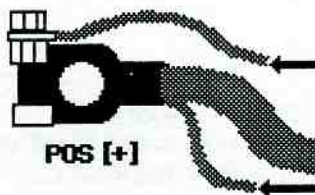
**LH INJ  
CONTROL  
UNIT  
[C/U]**



**700 TURBO INJECTOR  
RESISTOR BLOCK**

SUPPLIES CURRENT FOR INJECTORS  
4 WIRES — #1 BLACK #2 YEL/BLUE  
#3 RED/GREEN #4 RED

700 TURBO RESISTOR BLOCK[4 resistors]  
LOCATED ON LEFT FRONT FENDER.



**MAJOR PROBLEMS START RIGHT  
HERE AT THE POS[+]  
BATTERY TERMINAL.  
POWER SUPPLY WIRES FOR  
FUEL INJECTION & IGNITION  
SYSTEMS.**

**ENGINE WON'T START - USE THE 'BASIC CHECK' TO DETERMINE IF  
PROBLEM IS IN FUEL OR IGNITION SYSTEM.**

**ENGINE RUNS, BUT RUNS POORLY - USE THE 'VITAL SIGN' CHECKING  
FOR THE AREAS PRONE TO HAVE PRIMARY FAULTS.**

CAUTION - ALL AIR MASS METERS ARE NOT THE SAME!! CHECK BOSCH NUMBERS  
'83-84 A.M.M. [with METAL BODY]  
DO NOT INTERCHANGE WITH '85-88 A.M.M.

'85-88 A.M.M. [with PLASTIC BODY]  
DO NOT INTERCHANGE WITH '83-84 A.M.M.

'89-ON 4 CYL A.M.M. [with PLASTIC BODY - WITHOUT C/O ADJUST SCREW]  
'90-ON 4 CYL TURBO A.M.M. [with PLASTIC BODY WITHOUT C/O ADJUST SCREW]  
DO NOT INTERCHANGE WITH '83-84 A.M.M. OR '85-88 A.M.M.

**TO PREVENT DAMAGE,  
KEY MUST BE 'OFF' [KP O]  
BEFORE REMOVING ANY C/U  
OR A.M.M. CONNECTOR.**



THE LH FUEL INJECTION SYSTEM IS AN ELECTRICALLY OPERATED INJ SYSTEM.

THE AIR MASS METER IS USED TO MEASURE BOTH VOLUME & TEMPERATURE OF THE INTAKE AIR AND THUS ENG LOAD. THIS IS DONE BY HEATING UP OF A VERY THIN PLATINUM WIRE, AND THEN MEASURING THE AMOUNT OF CURRENT TO KEEP IT AT THAT VALUE[TEMP].

THE MORE AIR [HIGHER VOLUME] BEING SUCK PAST IT, THE COOLER THE PLATINUM WIRE WILL BE, THE MORE CURRENT NEEDED TO HEAT IT UP. THIS VALUE TELLS THE C/U TO INJECT MORE FUEL [LONGER DURATION]

THIS ALSO WORKS IN THE OPPOSITE WAY. LESS AIR [LOWER VOLUME] C/U INJECTS LESS FUEL [SHORTER DURATION].

THE FUEL INJ C/U MONITORS ENGINE SPEED BY USING A SIGNAL SENT TO IT FROM THE IGNITION C/U. THIS SIGNAL IS ALSO NEEDED SO THE F-INJ C/U WILL PROVIDE THE FUEL PUMP RELAY THE GROUND[-] IT NEEDS TO TURN ON THE FUEL PUMPS. THE SIGNAL IS ALSO USED TO TIME THE INJECTIONS.

THERE ARE TWO MORE SENSORS THAT ALSO HAVE A BEARING ON THE AIR/FUEL MIXTURE:

**1- ENG TEMP SENSOR**

[COLD ENG/HIGH OHMs    HOT ENG/LOW OHMs]

**2- OXYGEN SENSOR [EXH C/O CONTENT]**

THE INJECTORS WILL ALWAYS HAVE CURRENT SUPPLIED TO THEM WHEN ENGINE IS RUNNING. THE CONTROL UNIT FIRES THE INJECTORS BY SUPPLYING THE GROUND[-] TO THEM. THE LENGTH OF TIME THE C/U SUPPLIES THE GROUND[-] DETERMINES THE INJECTOR'S FIRING DURATION. ALL THE INJECTORS FIRE AT THE SAME TIME, ONCE EVERY CRANK ROTATION [TWICE DURING COLD ENG CRANKING].

THE FUEL PRESS REGULATOR SETS THE FUEL PRESSURE & PROVIDES HIGHER PRESSURE FOR ACCELERATION ENRICHMENT. THE FUEL PRESSURE RISES WHEN INTAKE MANIFOLD VACUUM GOES DOWN UPON ACCELERATING. IF VAC HOSE IS TAKEN OFF OF THE PRESS REG, THE PRESS WILL GO UP. THE HIGHER THE FUEL PRESSURE, THE MORE FUEL INJECTED.

**'LIMP HOME' IS THE TERM OF THE FUTURE.** IT ALLOWS THE ENGINE TO RUN AT A VERY LOW PERFORMANCE LEVEL SO THE CAR CAN BE DRIVEN TO THE REPAIR SHOP FOR REPAIR. IT WILL COME INTO PLAY WHEN THERE IS A MAJOR COMPONENT FAILURE IN THE INJECTION SYSTEM OR IF THE IGNITION CONTROL UNIT PROCESSING CIRCUIT IS BAD.

THE INJECTION SYSTEM 'LIMP HOME' WILL USUALLY ASSUME THAT THE ENGINE IS AT OPERATING TEMPERATURE, PROVIDING A 'LEAN' NEARLY FIXED AIR/FUEL MIXTURE. THE COMPONENTS THAT ARE INVOLVED ARE THE: AIR MASS METER [A.M.M.], CONTROL UNIT MICROPROCESSING CIRCUIT.

THERE IS A BIT OF A PARADOX HERE THOUGH. THE A.M.M. SEEMS TO HAVE TO BE UNPLUGGED[OR WIRES CUT] FOR THE 'LIMP HOME MODE' TO TAKE EFFECT. THIS IS A LITTLE HARD FOR THE OWNER/DRIVER TO TAKE ADVANTAGE OF.

• WE CAN USE IT THOUGH, TO CHECK IF INDEED THE A.M.M. IS THE REASON WHY THE ENG WON'T START OR MAYBE WHY IT WON'T STAY RUNNING [STARTS & DIES]. WHEN YOU HAVE A CAR WITH THESE PROBLEMS, WITH KEY IN 'OFF' POSITION[KP 0] UNPLUG THE A.M.M.. START THE ENG, IF IT NOW WILL START & RUN [ACCELERATING MAY KILL IT], IT IS A GOOD BET A.M.M. IS BAD. TRY THIS ON A 'GOOD' RUNNING CAR, SO YOU WILL BE FAMILIAR WITH IT.

## ENGINE WON'T START - USE THE 'BASIC CHECK'

## ENGINE RUNS, BUT RUNS POORLY - USE THE 'VITAL SIGN' CHECKING

- ✓ NO START OR ERRATIC STALLING/NO START CHECK FUSES & POWER SUPPLY  
 ALL MODELS [POWER for 25 AMP MAIN SYSTEM FUSE is SMALL Supply Wire at Pos[+] Bat Term  
 CHECK FOR CORROSION & TIGHT TERMS

200 SERIES FUSES

UNDER HOOD [ALL YEARS] 25 AMP FUEL INJECTION MAIN FUSE

FUSE BOX '83 fuses #12, #5 '84 fuses #13, #5 '85-on fuse #4

CHECK CONNECTIONS [3 TERM on '83-84 OR 4 TERM on '85-ON] BY C/U UNDER GLOVE BOX

700 & 900 SERIES FUSES

700 &amp; 940 series MAIN FUSE #1 [system &amp; MAIN PUMP] &amp; #11 [PRE- PUMP]

760 &amp; 960 series '88 - ON MAIN FUSE #31 [system &amp; MAIN PUMP] &amp; #30 [PRE-PUMP]

OTHER ITEMS TO CHECK

✓ C/O ADJUST ✓ O2 SENSOR OUTPUT, IF C/O IS UNABLE TO BE SET, IT STAYS TOO LOW, O2 SENSOR OUTPUT VOLTAGE OF 0.10 or less, CHECK FOR VACUUM LEAKS [FLAME ARRESTOR HOSE OFF], CLOGGED INJECTORS.  
 COMMON PROBLEM 1983-84 AIR MASS METER C/O ADJUSTING CIRCUIT GOES BAD, MAKING IT IMPOSSIBLE TO ADJUST C/O, IT WILL ALWAYS BE TOO LEAN.

✓ CLOGGED INJECTORS (CHK VOLTAGE AT OXY SENSOR SEE 'CHK CLOGGED INJ')

✓ ERRATIC PROBLEMS CHECK 'VITAL SIGNS' & 'WIGGLE' COMPONENT CONNECTIONS WHILE THE ENGINE IS RUNNING TO SEE IF A FAULT WILL APPEAR. [TEMP SENSOR, C/U, AIR MASS METER, INJ RELAY]

✓ FUEL PRESSURE (AT IDLE & ACCEL)

	B-23F, 230F		B-230F-TURBO
	2.0kp/cm2	IDLE	2.5kp/cm2
	2.5kp/cm2	ACCEL	3.0kp/cm2

✓ ADJUST BASE IDLE THIS IS VERY IMPORTANT [IF BASE IDLE SPEED IS TOO LOW, ENG WILL DIE AT COLD STARTUPS & during BRAKING] ✓ THROTTLE LINKAGE & THROTTLE SWITCH ADJUSTMENT [CHECK FOR 'CLICK/CLICK' OF THROTTLE SWITCH], CONSTANT IDLE VALVE OPERATION ] SEE C.I.S. GROUP 29

✓ TEMP SENSOR IS 'NTC' TYPE [the LOWER the temp - the HIGHER the resistance - the HIGHER the voltage]  
 NOTE - WHEN ENGINE IS RUNNING, IF SENSOR IS UNPLUGGED, ENG WILL RUN A BIT ERRATIC. IT MAY RUN RICHER & FASTER, OR IT MAY START FOULING OUT, CAUSING IT TO RUN VERY POORLY. WHEN ENGINE IS WARM & 'OFF', IF SENSOR IS UNPLUGGED, THE ENG WON'T RESTART OR BE VERY HARD TO RESTART.

• ENG AT OPERATING TEMP approx volt at C/U TERM #2 [TEMP sensor voltage] '83-84 0.1v '85-on 0.4v

700 & 900 SERIES ADDITIONAL ITEMS

✓ TURBO RESISTOR BLOCK [4 resistors] LOCATED ON LEFT FRONT FENDER.

✓ 2 [8 PIN] TERMS BLOCKS UNDER RIGHT SUPPORT BRACKET NEAR RIGHT HOOD HINGE.

✓ '87 - ON RADIO SUPPRESSION RELAY [ part no. 1323 592 ]

USES A RADIO SUPPRESSION RELAY TO SUPPLY CURRENT TO THE F/INJECTORS.

THE CURRENT COMES RIGHT FROM THE BAT. THE RELAY IS TURNED 'ON' BY THE F/INJ RELAY [SYSTEM RELAY SECTION]. THE RADIO SUPPRESSION RELAY SHOULD COME ON WHEN KEY IS 'ON' [KP II].

RADIO SUPPRESSION RELAY LOCATION

'87-ON 4 CYL NON TURBO EXPANSION TANK.

'87-ON 6 CYL [87-ON] &amp; 4 CYL TURBO LEFT SIDE ON POWER STEER RESERVOIR BRACKET.



HERE ARE THE MAJOR COMPONENTS AND THE MOST COMMON PROBLEMS THEY EXPERIENCE. CONSIDERING ALL THE ENGINES THAT USE THIS FUEL INJECTION SYSTEM, THE RATE OF FAILURES OF THESE COMPONENTS ARE VERY LOW. MAJOR FAILURES ARE INDEED RARE, SO BE SURE TO CHECK THE FUEL INJECTION, IGNITION SYSTEM and CONSTANT IDLE SYSTEMS OUT THOROUGHLY BEFORE CONDEMNING ANY OF THESE COMPONENTS.

#### **---- AIR MASS METER ----**

A faulty A.M.M. can have a few different symptoms. Here are the most common.

**The engine runs fine but all of a sudden will die.** This usually occurs while stopping or while idling. The engine may start right back up with no problem. Frequency of stalling will increase and re-starts will become increasingly difficult as the A.M.M. becomes worst. Finally the engine will stall and not re-start.

**The engine starts and dies, will NOT run.** For this type of problem we recommend the following steps to determine if the A.M.M. is bad. **IF YOU THINK A.M.M. IS BAD.**

1. TURN KEY 'OFF' [KP O],
2. DISCONNECT A.M.M. HARNESS
3. Attempt to start engine. IF ENG WILL NOW START & RUN THE A.M.M. IS BAD.  
IF ENG WILL START BUT **WON'T** RUN, THE A.M.M. IS PROBABLY NOT THE REASON.  
NOTE; HARD ACCEL WILL KILL ENG SINCE THE INJ SYSTEM IS IN 'LIMP HOME' MODE.

**1983-84 AIR MASS METER C/O ADJUSTING CIRCUIT GOES BAD,** MAKING IT IMPOSSIBLE TO ADJUST C/O, IT WILL ALWAYS BE **TOO LEAN**. The engine will run but will be too lean at idle. The C/O adjusting screw won't have much of a bearing on the air/fuel mixture. Monitor the C/O by using **Oxy Sensor voltage** or C/O content in the exhaust with an exhaust gas analyzer. REPLACEMENT OF A.M.M. IS UP TO YOU SINCE THE ENGINE WILL STILL RUN. A TOTAL A.M.M. FAILURE MAY OCCUR LATER.

#### **---FUEL INJECTION CONTROL UNIT---**

There are **VERY FEW** BAD CONTROL UNITS. They do occur, BUT ARE RARE. THE MOST COMMON PROBLEM with a BAD C/U is that it will not provide the **NEEDED GROUND[-]** for the INJECTION RELAYS to TURN 'ON'. The engine will **NOT** START. SEE '**FUEL INJECTION RELAY TEST**' in the **BASIC CHECK** GROUP, use the '**TEST FUEL INJECTION CONTROL UNIT GROUND[-]CIRCUITS FOR RELAYS**' TO CHECK C/U.

#### **.... FUEL PRESSURE REG PROBLEMS ....**

**HARD HOT OR WARM START** [ FUEL PRESS REGULATOR leaks fuel back to the tank, long cranking time due to rest pressure drop off, 'VAPOR LOCK' SYMPTOM ] **THIS WILL ACT THE SAME AS A BAD FUEL PUMP CHECK VALVE.** SEE GROUP 22 '**HARD HOT START**' LONG CRANKING F/PUMP CHECK VALVE.

**ANOTHER PROBLEM --** We have seen some FUEL PRESS REGs that will ALL OF A SUDDEN BLOCK THE RETURN OF THE FUEL TO THE TANK. The FUEL PRESSURE WILL THEN GO WAY UP, CAUSING THE ENGINE TO PERFORM VERY POORLY OR THE ENGINE TO DIE. You can remove the return hose from the F/PRESS REG FITTING. Then install another hose onto the F- P- R FITTING, put the other end of the hose into a SAFE GAS CAN. Run ENGINE or F/PUMP, if NO FUEL IS GETTING THRU THE F/PRESS REG & GOING INTO GAS CAN, THE F/PRESS REG MAY BE BLOCKED.

**-- USE CAUTION WITH GAS --**

#### **---- CLOGGED INJECTORS ----**

**PARTIALLY CLOGGED FUEL INJECTORS** can cause ERRATIC IDLE & STUMBLE WHEN ACCELERATING. Replacement isn't always necessary, INJECTOR CLEANER ADDITIVES along with the use of PREMIUM GRADE GASOLINE (SHELL SU-2000, AMOCO GOLD, MOBIL PREMIUM, CHEVRON ETC) can clean them, IF they aren't TOO BADLY CLOGGED. SEE '**FUEL INJECTOR CHECK**'



**---- MAIN FUEL PUMP ----**

**BAD FUEL PUMPS DON'T HAVE TO BLOW FUSES.** Just because the MAIN FUSE for the fuel injection system isn't blown doesn't mean the pump can't be bad. When the fuel pump goes it is more likely to fail because of an open or weaken circuit inside of it. This means it will be drawing less amps than if it was still good. So with even less strain on the fuse there is no reason for it to blow. A fuel pressure test is the best way to check the fuel pump. **OPTIONAL TEST SEE 'MAKING THE FUEL PUMPS RUN' THIS GROUP.**

**NOISY FUEL PUMP. THIS MAY BE NORMAL OR THE BEGINNING OF THE END.**

Some noise is normal. The **normal** sound is usually a **high pitched humming** and it stays pretty much **constant** though **not very loud**. The noise may become louder during sustained high speed driving especially during higher outside temperatures. The noise should stay at a constant level, not going up and down or **GETTING HEAVIER** and **RUMBLING**.

These noises are **not** normal. A **gravelly, screeching noise that changes pitch and volume at times. DRONING, RUMBLING and RATTLING NOISES ARE TROUBLE.**

**PRE-PUMP FAILURES MAKE THE MAIN PUMP NOISY AND MAY EVENTUALLY CAUSE THE MAIN PUMP TO WEAR OUT.** PRE-PUMP FAILURE causes are most likely a fuse blown, poor connections, in tank pre-pump hose deterioration or the pre-pump is worn out.

You can hear what a pre-pump failure will sound like by just running your engine, listen under the car by the rear door for the fuel pump noise, then go pull your pre-pump's fuse.

**PRE-PUMP FUSE**                      200 Series ..... '83-84 fuse # 5    '85-on fuse # 4  
740 Series ..... fuse # 11      760 Series up to '87 ... fuse # 11      760 Series '88-on..... fuse # 30

Go back and listen to the pump, after 10-15 seconds the fuel pump should start making a louder noise. This is the noise you will most likely hear if there is a pre-pump failure. If the noise doesn't change, you may already have a pre-pump failure. **SEE 'FUEL PUMP NOISE' QUICK CHECK GROUP 22**

If the noise does change, when you put the pre-pump fuse back in, the fuel pump should quiet down once again.

**POOR CONNECTIONS CAUSING PUMP PROBLEMS.**

**200 Series** have connections under the rear seat cushion for the MAIN FUEL PUMP. There is a power feed wire with a terminal connection that can come loose. This connection may become erratic especially while or after someone has been sitting back there. Check to make sure it is completely connected. The ground[-] wire is screwed down near there. Make sure the terminals is clean and the screw is tight.

**PRE-PUMP GROUND[-] & POWER CONNECTOR ARE IN THE TRUNK ON THE LEFT SIDE UNDER THE MAT.**

**700 Series** have THE GROUND[-] for the MAIN FUEL PUMP behind the right front kick panel, to the right of the front passenger's feet. This ground[-] bar is one of the most critical because so many components have their grounds[-] here. The fuel pump, gauges, fuse box/relay ground[-], power windows, radio ground[-] here.

**PRE-PUMP GROUND[-] & POWER CONNECTOR ARE IN THE TRUNK ON THE LEFT SIDE UNDER THE MAT.**

**POOR CONNECTIONS CAUSING ALL KINDS OF PROBLEMS.**

Any and all connections can give you problems. A computer controlled system is very susceptible to the smallest amount of resistance changes in its circuits. Vibrations that you can mimic by wiggling the various connections will running the engine or attempting to start the engine may help pinpoint a problem. **VOLVOs HAVE THEIR WIRING AND CONNECTION PROBLEMS, MORE OFTEN THAN COMPONENT FAILURES.**



## LH F-INJ

### MAKING THE FUEL

#### PUMPS RUN

BYPASSING RELAY OR POOR FUSE CONNECTIONS TO ACTIVATE FUEL PUMP TO VERIFY PUMP, ELECT WIRING CIRCUIT TO FUEL PUMP IS OK.

**\*\* NOTE; IGNITION SIGNALS F-INJ C/U TO GIVE F/P RELAY A GROUND (-), TURNING IT 'ON'.**

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#### \*\*\* ENGINE WON'T START & FUEL PUMP WON'T RUN \*\*\*

IF THE ENGINE WON'T START, AND YOU DON'T HEAR THE FUEL PUMP RUN WHEN YOU CRANK THE ENG, TRY BYPASSING THE FUEL PUMP RELAY, FUSE AND THE F-INJ C/U RELAY GROUNDING FUNCTION.  
USE THESE METHODS TO RUN THE FUEL PUMPS WHEN IT IS NECESSARY TO DO SO FOR CHECKING CIRCUITS AND THE FUEL PUMPS PERFORMANCE.

JUMP CURRENT FROM A 'HOT' FUSE TO THE PRE-PUMP FUSE BECAUSE THE PRE-PUMP FUSE IS WIRED IN TO THE MAIN PUMP CIRCUIT. ANY CURRENT AT PRE PUMP FUSE WILL FEED THE MAIN FUEL PUMP.

IF PUMPS RUN, GO TO 'BASIC CHECK' LH INJ RELAY TESTING OR GO TO 'ENGINE WON'T START' [11 - 001]

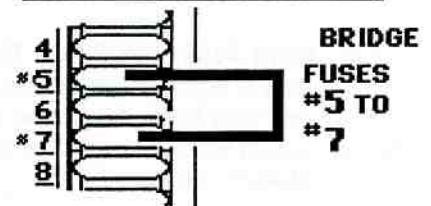
**700 SERIES FUSE METHOD TO RUN PUMP FOR CHECKING.**  
THE FUSES HAVE TO BE GOOD FOR THIS TO WORK.

1984 - 88 740 YOU CAN JUMP FROM FUSE #1 TO PRE-PUMP FUSE # 11

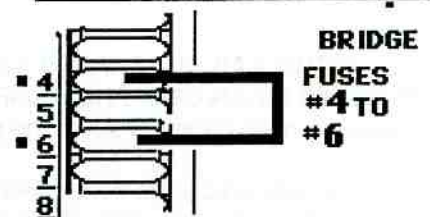
1984 - 87 760 YOU CAN JUMP FROM FUSE #1 TO PRE-PUMP FUSE # 11

1988 - ON 760 YOU CAN JUMP FROM FUSE #31 TO PRE-PUMP FUSE #30

#### '83 - 84 200 SERIES

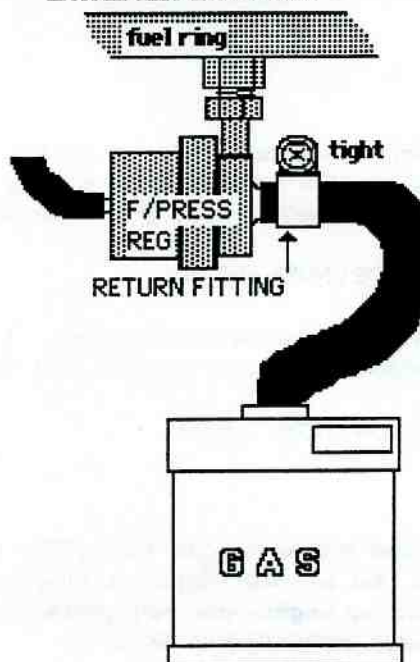


#### '85 - ON 200 SERIES



#### OPTIONAL TEST - NO PRESSURE GAUGE USE EXTREME CAUTION FOR THIS TEST!!!!

**CAUTION GAS  
EXTREMELY EXPLOSIVE**



A fuel pressure gauge is the best way to check the fuel pump. You can use another method to see if there is enough pressure to start the engine.

**BE CAREFUL. GAS, SMOKING AND SPARKS DON'T MIX.**

The test is to simply take the hose off the return side of the pressure regulator and put on a longer hose that will fit **TIGHTLY** on the **F/PRESS REG RETURN FITTING**. PUT THE OTHER END OF THE HOSE INTO A **SAFE GAS CAN**, MAKING SURE THE HOSE WILL STAY IN THE CAN ONCE THE PUMP IS RUNNING. **USE EXTREME CAUTION!!!!!!**

NOW RUN THE FUEL PUMP AS DESCRIBED ABOVE AND SEE IF FUEL COMES THROUGH THE F/PRESS REG AND INTO THE GAS CAN. IF FUEL IS BEING STRONGLY PUMPED INTO THE CAN, YOU CAN BE 90% SURE THE FUEL PUMP IS DEVELOPING ENOUGH PRESSURE AND VOLUME TO RUN THE ENGINE.

POSSIBLE CAUSES FOR NO FUEL -- FUEL PUMP BAD or Wiring/Connector Problems, F/PRESS REGULATOR BLOCKED, FUEL FILTER BLOCKED [rarely seen with Bosch filters], CAR OUT OF GAS [fuel gauge incorrect]



**LH-2 25 AMP  
MAIN FUSE  
PROBLEMS**

**200 SERIES**

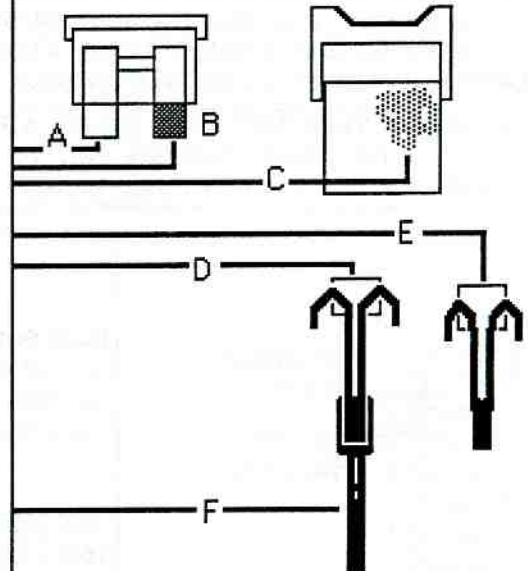
**IMPORTANT  
IMPORTANT  
IMPORTANT**

**25**

**051**

**FUSE HOLDER  
VOLVO PART  
NO. 1323 312**

- A - CLEAN CONTACT SPADE**
- B - DISCOLORED CONTACT SPADE > MEANS POOR OVERHEATED CONNECTION**
- C - DEFORMITY OF FUSE HOLDER > SIGN OF EXCESSIVE HEAT FROM FUSE TERM**
- D - GOOD FUSE TERM**
- E - BAD FUSE TERM, HEAT HAS SPREAD THE TERM APART, CAUSING POOR CONTACT WITH FUSE**
- F - CHECK FOR LOOSE WIRE TERM OR WIRE CORROSION AT FUSE HOLDER OR BAT POS[+] TERM. [Power Supply for 25 amp SYSTEM FUSE is small Wire at POS[+] BAT TERM]**



**25 AMP FUEL INJ SYSTEM FUSE - LOCATED UNDER HOOD BY THE BATTERY ON THE RELAY BRACKET.**

**IT SUPPLIES CURRENT TO >INJ RELAYS, FUEL PUMP, A.M.M. INJECTORS, C/U, IDLE VALVE.**

**✓ FUSE Power Supply is SMALL WIRE at POS[+] BAT TERM.**

**... SYMPTOMS ...**

**\*\* JUST ABOUT ANY KIND OF ENGINE FAULT SYMPTOM SEEMS TO BE POSSIBLE WITH THE 25 AMP FUSE.**

**WE HAVE SEEN SO MANY DIFFERENT & STRANGE ONES THAT THIS FUSE AND HOLDER SHOULD BE CHECKED AND CHANGED AT BOTH MAJOR SERVICES AND WHENEVER SOME ERRATIC PROBLEMS CROP UP. LISTED BELOW ARE SOME EXAMPLES.**

**\* ERRATIC EPISODES OF HAVING LONG PERIODS OF CRANKING ENGINE TO START, THEN ENG ALL OF A SUDDEN ENG WILL JUST START UP.**

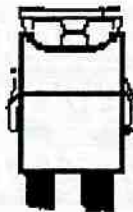
**\* ENG ERRATICALLY CUTS OUT BUT WILL POSSIBLY RESTART RIGHT BACK UP [MAY ONLY HAPPEN ONCE DURING EACH WARMUP PERIOD].**

**\* PARTIAL CONTACT > CAUSING ERRATIC INJECTION RELAY OPERATION ( SOMETIMES IT WILL BUZZ).**

**✓ WIRE AT BAT FOR 25AMP FUSE IS NOT CORRODED > MAKE SURE IT IS TIGHT & CLEAN. CHECK POWER SUPPLY WIRE at POS[+] BAT TERM.**



**SMALL FUSES  
BIG PROBLEMS  
IMPORTANT  
IMPORTANT**



**200 SERIES  
25 AMP MAIN FUSE  
FUSE HOLDER**

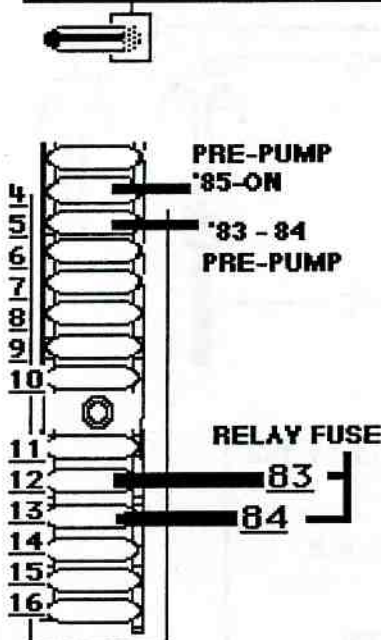
**PART NO. 1323 312**

**25**

**061**

There are at least 2 fuses that involved with the LH INJECTION SYSTEM. The 1983 & 84 200 series uses 3 fuses. The importance of these fuses can not be overstated. The Fuse Listing Sticker can be confusing. Here are the LH INJECTION SYSTEM FUSES. KEEP IN MIND THAT JUST A LOOSE FUSE, LOOSE WIRE AT THE FUSE BOX OR A CORRODED FUSE TERMINAL CAN CAUSE ALL KINDS OF TROUBLE.

**CORRODED FUSE MAY ONLY CAUSE A ERRATIC TYPE PROBLEM. IT MAY MAKE & BREAK CONTACT AT TIMES. CAUSING ENG TO DIE, THEN RESTART.  
CLEAN ALL INJ SYSTEM FUSE TERMS, LUBE WITH DIALECTRIC GREASE & REPLACE FUSES.**



**200 SERIES**

**MAIN FUSE**

**MAIN POWER** source for components [FUEL PUMP, RELAYS, A.M.M. etc]  
25 AMP FUSE LOCATED UNDER THE HOOD LEFT SIDE ON RELAY BAR NEAR BATTERY. SUPPLIES TOTAL SYSTEM  
SEE '25 AMP MAIN FUSE PROBLEMS'

**PRE-PUMP FUSE 8 amp**

1983 - 84 FUSE #5  
1985 - ON FUSE #4

**FAULT SYMPTOMS** ENGINE WILL RUN,'VAPOR LOCK' LIKE FUEL STARVATION LIKELY, HARDER THAN USUAL HOT STARTING, MAIN FUEL PUMP WILL BE NOISY.

IF YOU JUMP CURRENT TO THIS FUSE THE MAIN FUEL PUMP SHOULD RUN.

**FUEL PUMP RELAY FUSE 8 amp**

[THIS FUSE IS OFTEN OVERLOOKED AS A SOURCE OF PROBLEMS, CARS BEING TOWED JUST BECAUSE THIS FUSE WAS NOT CHECKED]

1983 FUSE #12 [also on fuse A/C, BACK-UP LAMPS, P/W RELAY]

1984 FUSE #13 [also on fuse TURN SIGNALS, GAUGES, IDIOT LAMPS]

**FAULT SYMPTOMS** ENGINE WON'T RUN, MAY BE ERRATIC IF IT IS ONLY A CORRODED FUSE, A FUSE THAT IS LOOSE OR FUSE THAT IS CRACKED.

**700 SERIES FUSES**

**MAIN FUSE 25 amp**

**MAIN POWER SOURCE** FOR SYSTEM COMPONENTS [FUEL PUMP, RELAYS, A.M.M. etc]

740 & 940 series ALL 760 series UP TO '87 ..... FUSE #1

760 & 960 series '88 - ON ..... FUSE #31

**FAULT SYMPTOMS** ENGINE WON'T RUN, MAY BE ERRATIC IF IT IS ONLY A CORRODED FUSE, A FUSE THAT IS LOOSE.

**PRE- PUMP 15 amp**

740 & 940 series ALL 760 series UP TO '87 ..... FUSE #11

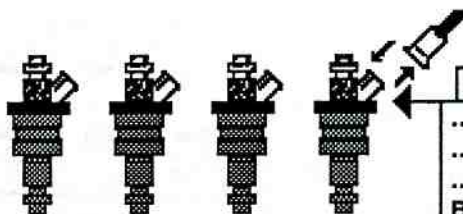
760 & 960 series '88 - ON ..... FUSE #30

**FAULT SYMPTOMS** ENGINE WILL RUN,'VAPOR LOCK' LIKE FUEL STARVATION LIKELY, HARDER THAN USUAL HOT STARTING, MAIN FUEL PUMP WILL BE NOISY. IF YOU JUMP CURRENT TO THIS FUSE THE MAIN FUEL PUMP SHOULD RUN.

**LH 2  
FUEL INJECTOR  
CHECK  
PARTIAL CLOGGED  
CONDITION**

25

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**BOSCH NUMBERS**

...357 TURBO	Nos. on
...209 up thru '86	HOUSING
...734 from '87 & 88	
Bosch No. 123 4567 891	

**NOTE; WHEN REPLACING FOULED[CLOGGED]  
INJECTORS, MAKE SURE THEY ARE THE SAME TYPE.  
THE FLOW CAPACITIES ARE NOT ALL THE SAME.  
CHECK BOSCH PART NUMBERS.**

PARTIALLY CLOGGED FUEL INJECTORS CAN CAUSE ERRATIC IDLE & MISSING UNDER ACCELERATION. REPLACEMENT ISN'T ALWAYS NECESSARY, INJECTOR CLEANER ADDITIVES ALONG WITH THE USE OF A TOP GRADE GASOLINE (SHELL SU-2000, AMOCO GOLD, MOBIL PREMIUM, CHEVRON ETC) CAN CLEAN THEM, IF THEY AREN'T TOO BADLY CLOGGED.

A CLOGGED INJ (RUNNING LEAN) WILL NOT BE DELIVERING THE SAME AMOUNT OF FUEL AS A CLEAN INJ (RICHER). THAT MEANS THE FUEL MIXTURE WILL NOT BE AS LEAN WHEN A CLOGGED INJ IS DISCONNECTED AS WHEN A CLEAN INJ IS DISCONNECTED.

**'ODD MAN OUT THEORY' LOOK FOR ONE THAT IS DIFFERENT FROM THE REST.**

**NOTE; THE ENGINE MUST BE IN A GOOD STATE OF 'TUNE', THAT IS THE PLUGS, PLUG WIRES, DIST CAP AND ROTOR ARE ALL GOOD. THE ENGINE MUST ALSO BE MECHANICALLY IN GOOD SHAPE, THE COMPRESSION EVEN AND NO VACUUM LEAKS. THE TEST RESULTS WILL BE ALTERED BY ANY FAULTS IN THESE AREAS.**

**— CHECKING FOR FOULED INJECTORS —**

**1--RUN ENG TO OPERATING TEMP**

**2--SET C/O TO SPECS & SET BASIC IDLE TO 700 rpm.**

**3--DISCONNECT OXY SENSOR, HOOK DIGITAL VOLT METER TO OXY SENSOR CONNECTOR (BLACK WIRE) VOLT READING SHOULD BE APPROX 0.38-TO-0.78 v**

**4--DISABLE CONSTANT IDLE SYS (GROUND OUT TEST TERM)**

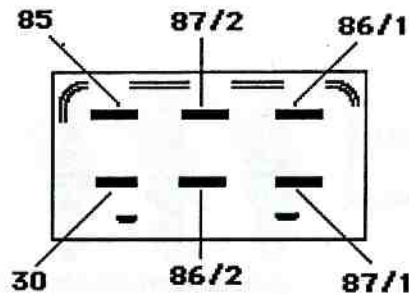
**5-- DISCONNECT EACH INJ WIRE TERM & LET OXY SENSOR VOLT STABILIZE, NOTE READING ( READINGS SHOULD NORMALLY BE BELOW 0.07 v, THEY WILL USUALLY BE IN THE 0.02 TO 0.01v RANGE ).**

**6--THEN RE-CONNECT INJ & CHK NEXT INJ. IF ALL INJECTORS ARE EVEN, FAULT IS IN SOME OTHER AREA OR COMPONENT.**



**LH 2 F-INJ  
RELAY TERMINAL  
FUNCTION  
1984 - 86  
4 CYL 700 SER**

25 AMP FUSE CURRENT FOR FUEL INJ SYSTEM COMES FROM SMALL SUPPLY WIRE AT POS[+] BAT TERM.



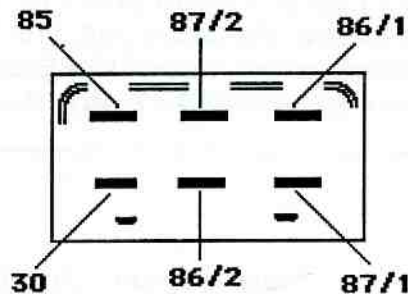
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RELAY TERM	WIRE COLOR	SOURCE/ DESTINATION	FUNCTIONS [POWERS or GROUNDS]	NOTES
30	BN	25 AMP FUSE	ALL F/INJ COMPONENTS	ALWAYS 'HOT'
85	BL/Y	IGN SW	'ON-OFF' OF F/PUMP RELAY	HOT WITH KP II
86/1	RED	# 21 C/U	GROUND[-] FOR MAIN RELAY	[-] WITH KP II
87/1	BL/Y	A.M.M. & C/U	SUPPLIES A.M.M., C/U	HOT WITH KP II
86/2	Y/SB	# 17 C/U	GROUND[-] FOR F/P RELAY	[-] IGN SIGN NEEDED
87/2	Pink	F/PUMP F#11	FUEL PUMPS, INJECTORS	HOT WHEN ENG RUNS

**LH 2 F-INJ  
RELAY TERMINAL  
FUNCTION  
1987 - 88  
4 CYL 700 SER**

25 AMP FUSE CURRENT FOR FUEL INJ SYSTEM COMES FROM SMALL SUPPLY WIRE AT POS[+] BAT TERM.



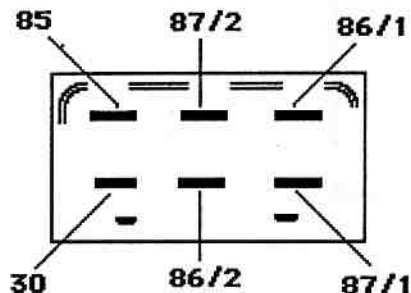
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RELAY TERM	WIRE COLOR	SOURCE/ DESTINATION	FUNCTIONS [POWERS or GROUNDS]	NOTES
30	BN	25 AMP FUSE	ALL F/INJ COMPONENTS	ALWAYS 'HOT'
85	BL/Y	IGN SW	'ON-OFF' OF F/PUMP RELAY	HOT WITH KP II
86/1	RED	# 21 C/U	GROUND[-] FOR MAIN RELAY	[-] WITH KP II
87/1	BL/Y	A.M.M. & C/U	SUPPLIES A.M.M., C/U, RADIO SUP RELAY RADIO SUP RELAY FOR INJECT	HOT WITH KP II
86/2	Y/SB	# 17 C/U	GROUND[-] FOR F/P RELAY	[-] IGN SIGN NEEDED
87/2	Pink	F/PUMP F#11	FUEL PUMPS	HOT WHEN ENG RUNS

**LH 2 F-INJ  
RELAY TERMINAL  
FUNCTION  
1985 AND ON  
B-230F 200 SER**

25 AMP FUSE CURRENT FOR FUEL INJ  
SYSTEM COMES FROM SMALL SUPPLY  
WIRE AT POS[+] BAT TERM.



25

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RELAY TERM	WIRE COLOR	SOURCE/ DESTINATION	FUNCTIONS [POWERS or GROUNDS]	NOTES
30	RED	25 AMP FUSE	ALL F/INJ COMPONENTS	ALWAYS 'HOT'
85	R/SB	IGN SW	'ON-OFF' OF F/PUMP RELAY	HOT WITH KP II
86/1	Y/SB	# 21 C/U	GROUND[-] FOR SYS RELAY	[-] WITH KP II
87/1	BN & OR	A.M.M. & C/U	SUPPLIES A.M.M., C/U	HOT WITH KP II
86/2	BL/GN	# 17 C/U	GROUND[-] FOR F/P RELAY	[-] IGN SIGN NEEDED
87/2	Y/R	F/PUMP F#4	FUEL PUMPS, INJECTORS	HOT WHEN ENG RUNS

**\*NOTES\***

25 AMP FUSE CURRENT FOR FUEL INJ  
SYSTEM COMES FROM SMALL SUPPLY  
WIRE AT POS[+] BAT TERM.

TO PREVENT DAMAGE, THE KEY MUST BE  
'OFF' [KP O] BEFORE REMOVING ANY C/U  
OR A.M.M. CONNECTOR.

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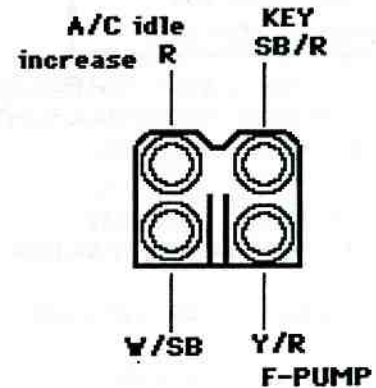
# **LH INJECTION SYSTEM**

**1985 AND ON  
200 SERIES**

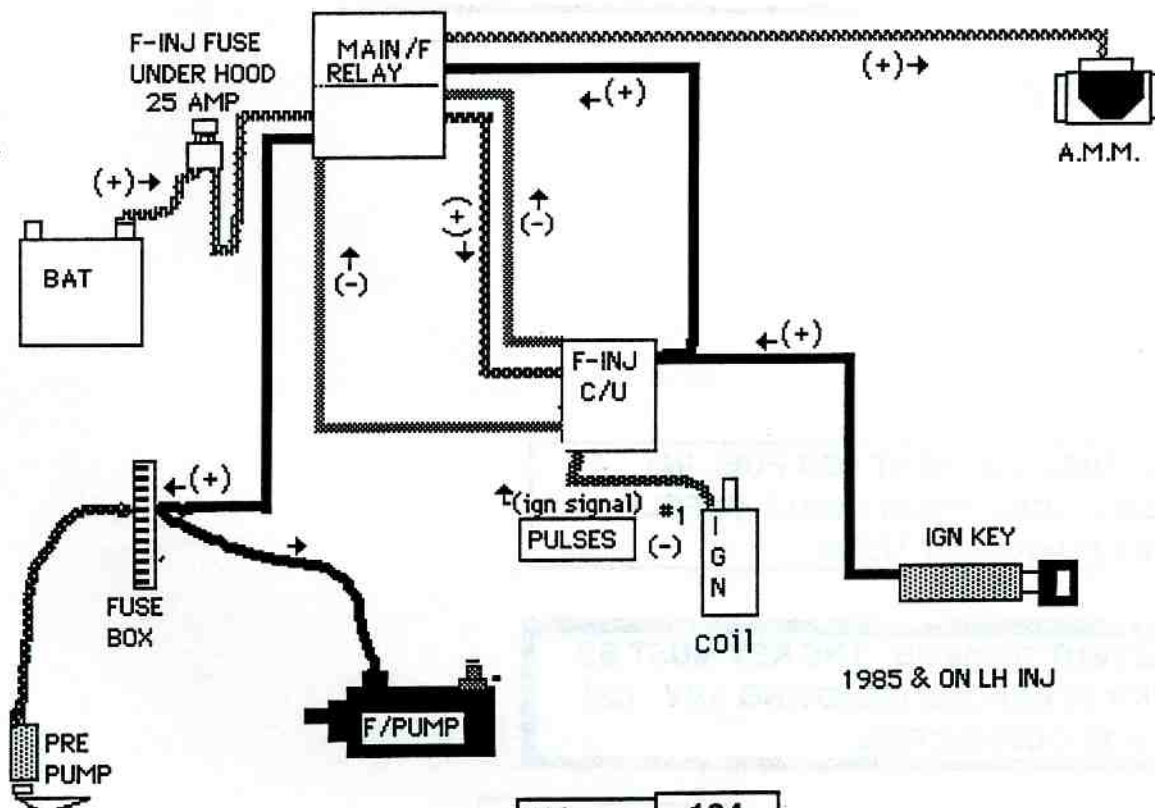
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- \* 25 AMP FUSE SUPPLIES CURRENT TO MAIN & F/ PUMP RELAY (ALWAYS HOT, COMES FROM A SMALL SUPPLY WIRE AT POS[+] BAT TERM )
- \* MAIN RELAY SUPPLIES CURRENT TO F-INJ C/U
- \* IGN COIL SUPPLIES A SIGNAL TO F-INJ C/U, WHICH WILL THEN SUPPLY A GROUND (-) TO F/P RELAY NEEDED TO TURN IT 'ON'
- \* F/PUMP RELAY SUPPLIES CURRENT TO PRE PUMP FUSE#4 & ALSO CURRENT TO F/PUMP, FUEL INJECTORS.
- \* IGN SWITCH [R/SB WIRE] SUPPLIES CURRENT FOR THE INITIAL TURNING 'ON' OF THE C/U, AND THE 'ON - OFF' FUNCTION OF THE F/PUMP RELAY.



- MAIN HARNESS PLUG UNDER GLOVE BOX NEAR THE FUEL INJECTION C/U. THESE CONNECTIONS ARE SOMETIMES LOOSE CAUSING A 'NO START' OR AN 'ERRATIC STALLING' PROBLEM.



1985 & ON LH INJ

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**LH II FUEL INJ  
C/O ADJUSTMENT  
'85- 88 B-230 F  
'85- 89 TURBO**

**\*\* FEDERAL LAW REQUIRES THAT A NEW  
PLUG BE INSTALLED IN C/O ADJUST HOLE**

25

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----- LH II INJ AIR/FUEL MIXTURE (C/U) -----

\* SCREW CAN BE TURNED ENDLESSLY BUT THERE ARE FIFTEEN (15) TURNS FROM MAX LEAN SETTING TO MAX RICH SETTING.

\* C/O ADJUSTING SCREW FUNCTION CAN BE CHECKED WITH AN OHM METER -  
0 ohms (LEAN) UP TO 1,000 ohms (RICH)  
MEASURE BETWEEN TERMS #6 - #2 (with wire harness disconnected)

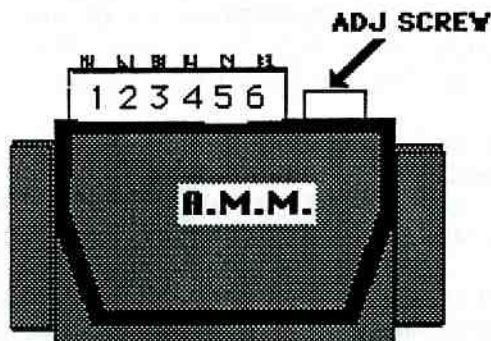
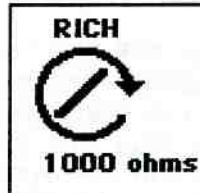
\* TURNING SCREW CLOCKWISE WILL INCREASE FUEL CONTENT (RICH)  
- HIGH OHMS -

\* TURNING SCREW COUNTER/CLOCKWISE WILL DECREASE FUEL CONTENT (LEAN)  
- LOW OHMS -

\*\*\*\*\* CORRECT C/O - FUEL MIXTURE \*\*\*\*\*

AT TEST POINT >>PULSING 20 - 70 deg DWELL

AT O2 SENSOR >>PULSING approx 0.38 - 0.69v



**LH II FUEL INJ  
C/O  
ADJUSTMENT**

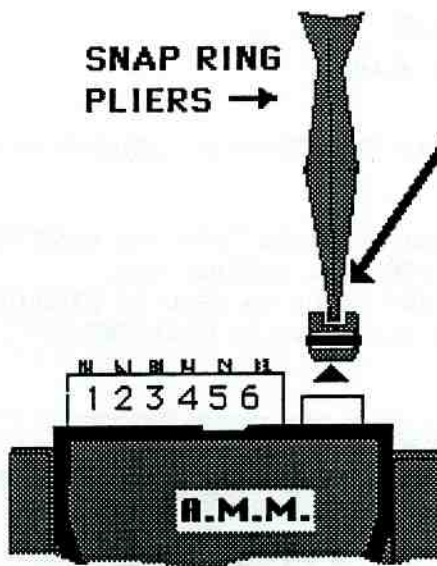
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\*\*\* REMOVAL OF C/O PLUG \*\*\*

-DRILL A 3/16" HOLE IN CENTER OF PLUG  
-DRILL ONLY SOFT METAL, STOP AT HARD METAL PLATE IN PLUG  
-USE A SNAP RING PLIERS INSERT IN HOLE> TWIST & PULL UP

SNAP RING  
PLIERS →



\*\*\*\* IMPORTANT FEDERAL LAW \*\*\*\*

—FEDERAL LAW REQUIRES—  
AFTER SETTING THE C/O (FUEL/ AIR MIXTURE) TO THE CORRECT VALUE BE SURE TO INSTALL A NEW PLUG SO THE SETTING CAN'T BE TAMPERED WITH.



**CHECKING OHMS  
& VOLTAGE  
AT TERMINALS**

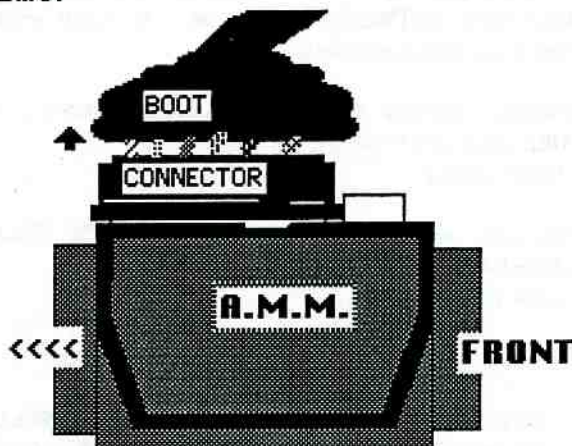
**CAUTION: NEVER DISCONNECT ANY  
CONTROL UNIT OR A.M.M. WITH THE KEY ON  
[KP II]**

**\*\*\* DAMAGE WILL RESULT \*\*\***

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\*\*\*\* TESTING VOLTAGES \*\*\*\*  
YOU MUST CHECK VOLTAGES FROM THE  
BACK SIDE OF THE CONNECTORS THAT ARE  
IN USE IN THE LH INJECTION AND EZK IGN  
SYSTEMS.

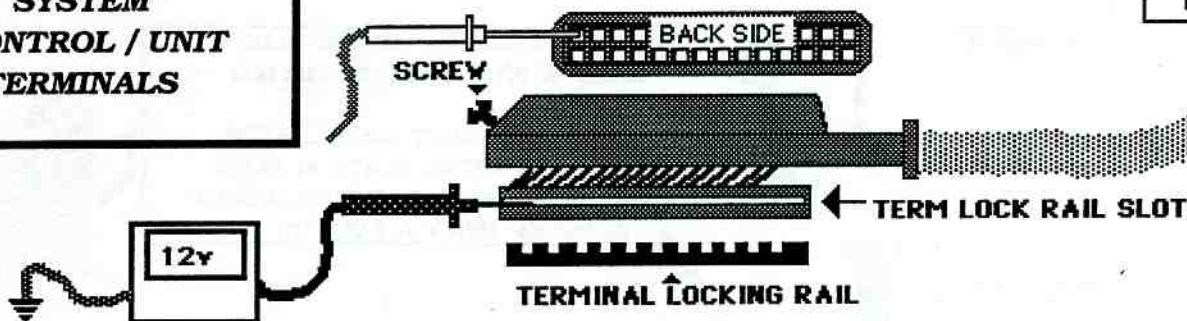


PEEL BACK THE BOOT SO YOU CAN GO INTO  
THE CONNECTOR FROM THE BACK OF THE  
TERMINAL. THE BOOT WILL USUALLY JUST  
ROLL BACK. THIS WILL GIVE YOU ACCESS TO  
THE TERMS FOR A VOLT/OHM METER  
PROBE. THE TERMINALS ARE FRAGILE AND IF  
YOU PULL THE CONNECTOR OFF OF THE  
VARIOUS UNITS THEN GO IN FROM THE FRONT,  
DAMAGE TO THE TERMS CAN RESULT.

IT IS WISE TO PULL OFF THE TERMINAL  
CONNECTOR TO CHECK FOR TERMS THAT MAY  
HAVE PULLED OUT OF THE CONNECTOR OR  
BECOME CORRODED.

CARE MUST BE TAKEN IN  
REMOVING/INSTALLING TERMS IN THE  
CONNECTORS.

**LH-2 INJECTION  
SYSTEM  
CONTROL / UNIT  
TERMINALS**



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\*\* THERE ARE TWO WAYS TO CHECK FOR  
VOLTAGE OR OHM READINGS AT THE  
CONTROL UNIT HARNESS CONNECTOR.  
THRU THE T-L/RAIL HOLES or BACK SIDE.

THE CONNECTOR TERMS CAN EASILY BE  
DAMAGED IF THEY ARE PROBED FROM  
THE FRONT SIDE (CONTACT SIDE).

\*\* SO REMOVE ANY TAPE FROM THE WIRE  
HARNESS & HARNESS CONNECTOR.  
REMOVE THE SCREW THAT HOLDS THE  
INNER PIECE IN. SEPARATE THE 2 PIECES.

\* REMOVE THE TERMINAL LOCKING RAIL.

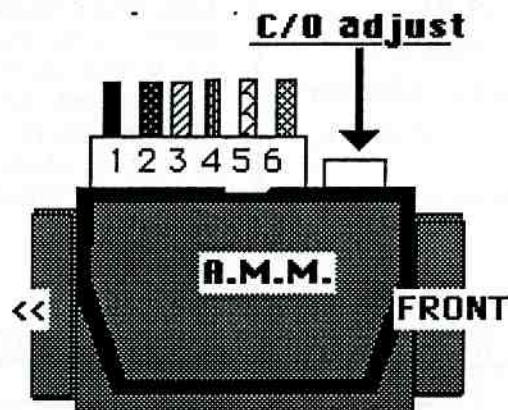
\* CAREFULLY PROBE THRU THE SLOT FOR  
THE TERMINAL LOCKING RAIL.  
DO NOT PROBE SO HARD AS TO CAUSE  
THE TERMINALS TO COLLAPSE.

**TO PREVENT DAMAGE, KEY MUST BE  
'OFF' [KP O] BEFORE REMOVING ANY**

**C/U OR A.M.M. CONNECTOR.**

**'85-88 B-230  
AIR MASS METER  
TERMINAL NO.s  
FUNCTIONS  
240 SERIES**

CAUTION - '85-88 A.M.M. DO NOT  
INTERCHANGE WITH '83-84 A.M.M.  
USE ONLY '85-88 A.M.M.  
[with PLASTIC BODY]



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A.M.M.	WIRE COLOR	FUNCTION	CONTROL/ UNIT
6 -	YELLOW	C/O ADJUST (0.0 -2.6 v)	14
5 -	ORANGE	BAT voltage	9
4 -	WHITE	BURN OFF	8
3 -	WHITE/RED	A.M.M. Output v (1.2-3.0)	7
2 -	GREEN/YEL	ground (thru C/U)	6
1 -	BLACK	ground	intake man

700 SERIES '85 -88 B -230 F  
'85 -89 4 CYL TURBO

A.M.M.	WIRE COLOR	FUNCTION	CONTROL/ UNIT
6 -	WHITE	C/O ADJUST (0.0 -2.6 v)	14
5 -	BLUE/YEL	BAT voltage	9
4 -	BLUE/ WHITE	BURN OFF	8
3 -	BLUE/RED	A.M.M. Output v (1.2-3.0)	7
2 -	BLUE/GRN	ground (thru C/U)	6
1 -	BLACK	ground	intake man

**IF YOU THINK A.M.M. IS BAD.  
TURN KEY 'OFF' [KP 0], DISCONNECT A.M.M.  
HARNESS, IF ENG WILL NOW START & RUN THE  
A.M.M. IS BAD.  
NOTE; HARD ACCEL WILL KILL ENG SINCE THE  
INJ SYSTEM IS IN 'LIMP HOME' MODE.**

**WIRE VOLTAGES  
UNPLUG HARNESS  
KEY 'ON' KP II**

#6 — 5.1v  
#5 — 12.0v  
#3 — 0.0v

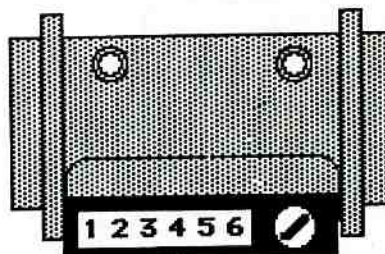
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**'85-88 B-230  
'85-89 TURBO  
AIR MASS METER  
FAULT TRACING**

PEEL BACK RUBBER BOOT. CHK VOLTAGES FROM BACKSIDE OF CONNECTOR. BE SURE CONNECTOR IS FIRMLY IN PLACE, TERM CLEAN. READINGS TAKEN TERM-TO- GROUND



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**HOOK DIGITAL V/METER NEG[-] TO A GOOD GROUND & POS[+] TO BACK OF TERMINALS**

TERM#	IGNITION	FUNCTION TEST	TEST VALUE
6	ON	C/O ADJUSTMENT RANGE	lean (0.0v) >> (2.6v) rich
6	750 rpm	C/O SETTING VOLTAGE	1.3-1.7v (average)
If voltage doesn't vary with adj screw action A.M.M. IS AT FAULT			
If voltage at max(2.6v) but C/O IS LOW CHK-vac leaks, plugged injector in injectors			

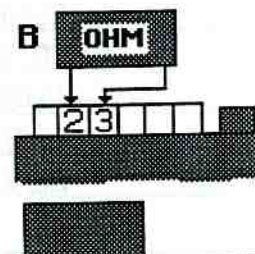
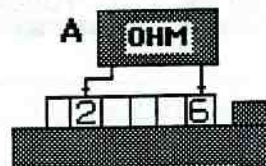
TERM#	IGNITION	FUNCTION TEST	TEST VALUE
3	ON [KP II][eng 'OFF']	Air Mass Meter output	1.2v
3	750 rpm (idle)	A.M.M. idle/output	2.2v
3	accel to 3,500 rpm	A.M.M. accel/output	increases to 3.0v
If volt not to specs, CHK-WIRING, VOLT SUPPLY(term#5), GROUND(#1,2)			
VACUUM LEAKS(hoses) etc, if OK A.M.M. AT FAULT			

**CHECKING A.M.M. INTERNAL CIRCUIT RESISTANCE WITH DIGITAL OHM METER**

A - CONNECT OHM METER to TERM #6 TO #2  
0 - 1,000 OHMs [C/O ADJUST]

B - CONNECT OHM METER to TERM #5 TO #2  
2.6 - 4.0 OHMs [A.M.M. OUTPUT]

IF READINGS HIGHER OR LOWER A.M.M. IS BAD



1 2 3 4 5 6

IF YOU THINK A.M.M. IS BAD. TURN KEY 'OFF' [KP O], DISCONNECT A.M.M. HARNESS, IF ENG WILL NOW START & RUN THE A.M.M. IS BAD. NOTE; HARD ACCEL WILL KILL ENG SINCE THE INJ SYSTEM IS IN 'LIMP HOME' MODE.

**WIRE VOLTAGES  
UNPLUG HARNESS  
KEY 'ON' KP II**  
#6 — 5.1v  
#5 — 12.0v  
#3 — 0.0v

25

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**LH-2 INJECTION  
SYSTEM  
CONTROL / UNIT  
TERMINALS**

**'85-88 B-230**

**CAUTION: NEVER DISCONNECT ANY  
CONTROL UNIT OR A.M.M. WITH THE KEY ON  
[KP II] \*\*\* DAMAGE WILL RESULT \*\*\***

**25**

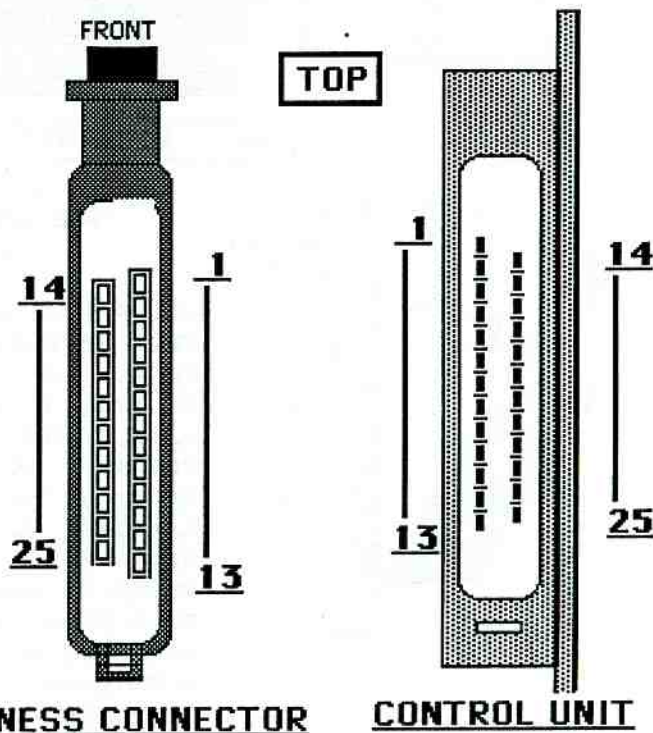
**181**

KEY MUST BE 'OFF' [KP 0] BEFORE  
REMOVING ANY CONNECTOR.

CARE MUST BE TAKEN NOT TO DAMAGE  
TERMINALS. TESTING SHOULD BE DONE  
FROM SIDE OF HARNESS CONNECTOR  
AFTER DISASSEMBLY.

CHECK TERMINALS FOR BOTH  
TIGHTNESS & THAT  
THEY ARE NOT CORRODED.

CONNECTOR SHOULD FIT IN CONTROL  
UNIT FIRMLY- AS WITH ALL  
CONNECTIONS RUN ENG, WIGGLE  
CONNECTOR TO TEST FOR POOR  
CONNECTION.



**HARNESS CONNECTOR**

**CONTROL UNIT**

----- VOLTAGES ARE WITH HARNESS CONNECTED -----

\*\* 700 series - TERMS ARE THE SAME, THE WIRE COLORS WILL BE DIFFERENT.

\*\* TERMINALS \*\*

- 1- IGNITION SIGNAL [GREY] 9.8v at idle
- 2- TEMP SENSOR [BL] 0.4v at oper temp
- 3- THROTTLE SW [IDLE CIRCUIT] [OR]  
[#4 NOT USED]
- 5- SHIELD GRND[-] for O2 Sensor wire
- 6- GROUND[-] for A.M.M. [GN/Y]
- 7- A.M.M. OUTPUT [2.2v at idle] [W/R]
- 8- A.M.M. BURN OFF [W]
- 9- POWER for C/U [BN]
- 10- IDLE VALVE [SLOW] [BN/W]
- 11- GROUND[-] [SB]
- 12- THROTTLE SW[FULL THROTTLE] [BL/W]
- 13- GROUND[-] for INJECTORS [GN/W]

\*\* TERMINALS \*\*

- 14- A.M.M. C/O ADJ SCREW [Y]
- 15- CIS IDLE TP[to disable] [BL/W]
- 16- A/C IDLE SPEED INCREASE [R]
- 17- GRND[-] for F/PUMP RELAY [BL/GN]
- 18- POWER for basic C/U OPER [R/SB]
- 19- GROUND[-] [SB]
- 20- O2 SENSOR [0.5v] [GN]
- 21- GROUND[-] MAIN RELAY [Y/SB]  
[#22 NOT USED]
- 23- IDLE VALVE [FAST] [GN/R]  
[#24 NOT USED]
- 25- GROUND[-] [SB]

**25**

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**LH-2 INJECTION  
SYSTEM  
CONTROL / UNIT  
TERMINALS  
'85- 88 B- 230**

REMOVE TAPE FROM AROUND HARNESS END OF THE  
CONNECTOR & SCREW FROM OTHER END, PULL OUT  
WIRE FRAME FROM CONNECTOR BODY.

25

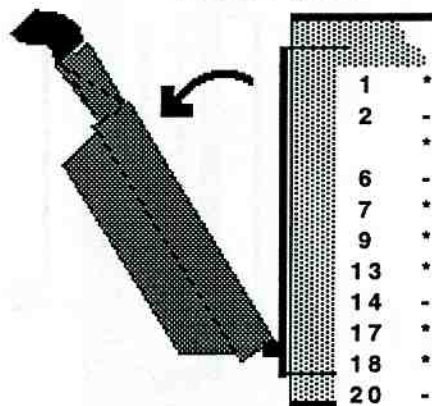
187



KEY OFF .... KP O  
SYSTEM FUSE REMOVED  
BEFORE DISCONNECTING

----- VOLTAGES ARE WITH HARNESS CONNECTED -----

F/INJ C/U



- |    |   |                                       |                    |
|----|---|---------------------------------------|--------------------|
| 1  | * | IGNITION SIGNAL [GREY] 12.0v          | KP IIS             |
| 2  | - | TEMP SENSOR [BL][ 4.7v t/sens unplug] | 0.4v op/temp       |
|    | * | TERMs #5,11,19,25, GROUND[-]          | [SB] 0.04v or less |
| 6  | - | GROUND[-] for A.M.M. [GN/Y]           | 0.03v              |
| 7  | * | A.M.M. OUTPUT [approx. 1.3v ]         | [W/R]              |
| 9  | * | POWER for C/U [BN]                    | 12.0+v             |
| 13 | * | GROUND[-] for INJECTORS [GN/W]        |                    |
| 14 | - | A.M.M. C/O ADJ SCREW [Y]              | 0.1v -to- 2.6v     |
| 17 | * | GROUND[-] for F/PUMP RELAY [BL/GN]    |                    |
| 18 | * | POWER for basic C/U OPER [R/SB]       | 12.0+v             |
| 20 | - | O2 SENSOR [0.5v] [GN]                 |                    |
| 21 | * | GROUND[-] MAIN RELAY [Y/SB]           |                    |

• 'GOOD' APPROX VOLTAGES •  
\*\* 700 series - TERMs ARE THE SAME, THE WIRE COLORS WILL  
BE DIFFERENT.

**\*NOTES\***

**CAUTION: NEVER DISCONNECT ANY  
CONTROL UNIT OR A.M.M. WITH THE KEY ON  
[KP II]. \*\*\* DAMAGE WILL RESULT \*\*\***

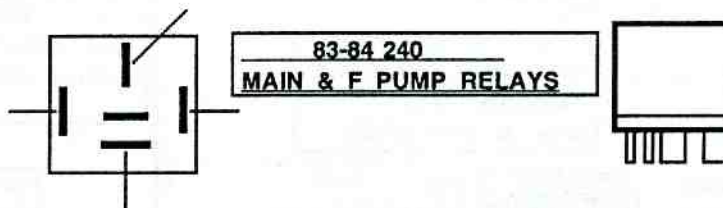
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189

**LH 2 F-INJ  
'83 & '84  
FUNCTION OF THE  
FUEL INJECTION  
RELAY**

25

501



**% NOTE; IGN SIGNALS F-INJ C/U TO GIVE F/P RELAY A GROUND (-)  
THIS GROUND WILL THEN TURN RELAY ON TO FEED 12v to F/PUMPS**

\* RELAYS ARE LOCATED ON THE RIGHT SIDE ABOVE THE LOWER DASH PANEL ON PASSENGER SIDE. THEY WILL BE ON A BRACKET MOUNTED TO THE INTERIOR FIREWALL.

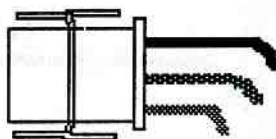
\*\*\* MAIN RELAY IS OPERATED WHEN THE IGNITION IS ON. IT SUPPLIES THE INJECTION C/U AND THE AIR MASS METER WITH THEIR MAIN VOLTAGE SUPPLIES.

\*\*\* FUEL PUMP RELAY - WHEN ENG IS CRANKED > IGNITION IMPULSES ARE FED TO INJECTION C/U > INJ C/U THEN WILL PROVIDE FUEL PUMP RELAY WITH A GROUND CIRCUIT > THE FUEL PUMP RELAY WILL THEN TURN ON > F/PUMP RELAY SUPPLIES CURRENT TO FUEL PUMP, THE FUEL INJECTORS, THE C.I.S. IDLE VALVE, THE IN TANK PRE PUMP FUSE #5.

**'83 & 84 LH INJ  
MAIN &  
FUEL PUMP RELAY  
ACTIVATION**

25

504



- \* FUSE #12 ['83] OR #13 ['84] SUPPLIES CURRENT FOR THE INITIAL TURNING 'ON' OF THE C/U, AND THE 'ON - OFF' FUNCTION OF THE F/PUMP RELAY.
- \* 25 AMP FUSE SUPPLIES CURRENT TO MAIN & F/PUMP RELAYS (ALWAYS HOT, COMES FROM BATTERY)
- \* MAIN RELAY SUPPLIES WORKING CURRENT TO F-INJ C/U
- \* IGN COIL SUPPLIES A SIGNAL TO F-INJ C/U, WHICH WILL THEN SUPPLY A GROUND (-) TO F/P RELAY NEEDED TO TURN IT 'ON'
- \* F/PUMP RELAY SUPPLIES CURRENT TO PRE PUMP FUSE #5 & ALSO CURRENT TO F/PUMP, FUEL INJECTORS
- \*\* RELAYS ARE LOCATED ON THE RIGHT SIDE ABOVE THE LOWER DASH PANEL ON PASSENGER SIDE. THEY WILL BE ON A BRACKET MOUNTED TO THE INTERIOR FIREWALL.

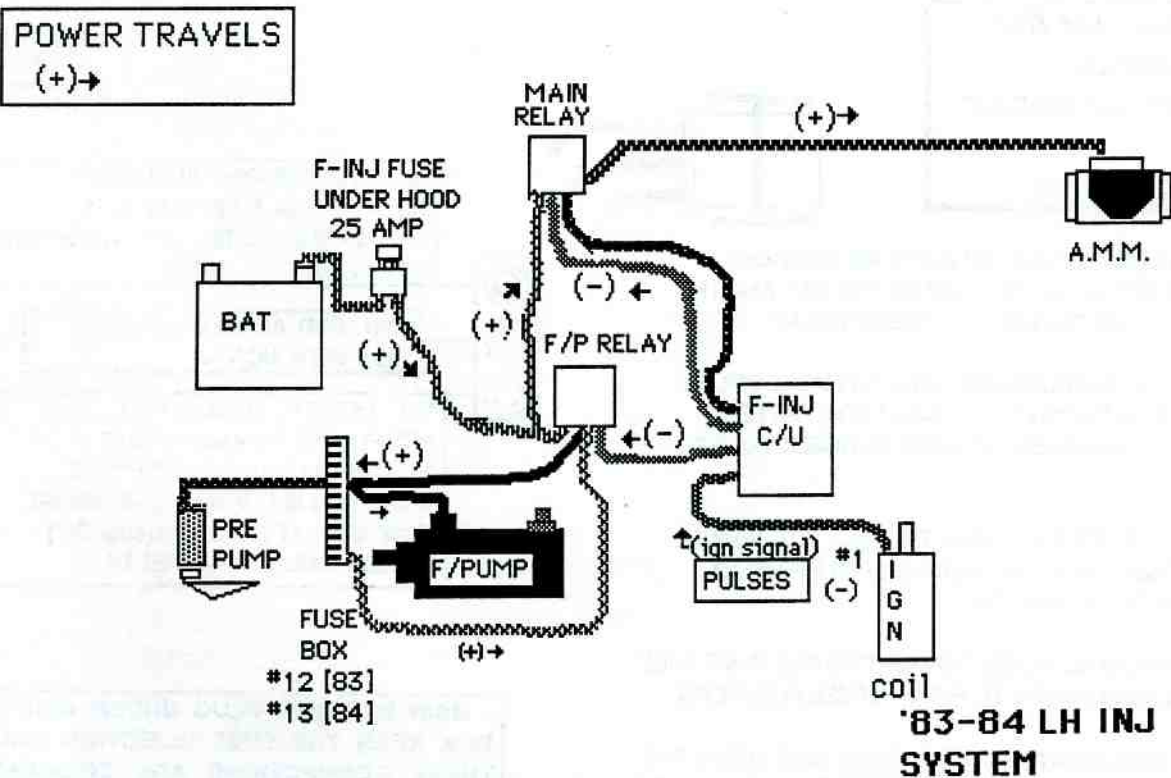
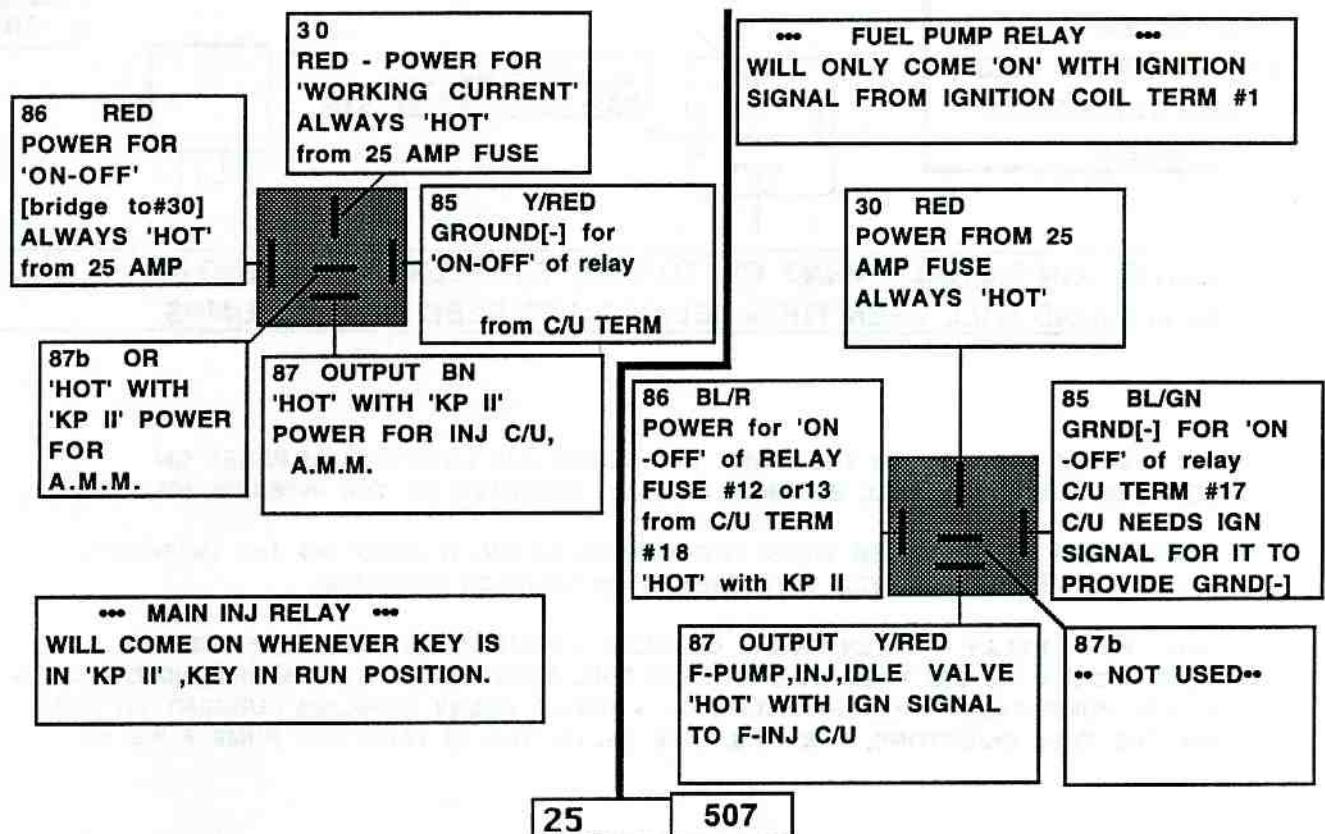
BL/R FOR 'ON-OFF' FUEL PUMP RELAY FROM FUSE # 12 '83 & # 13 '84 SHOULD BE 'HOT' [12.0v] WITH KEY IN 'ON' POS [KP II]

RED FOR A/C IDLE INCREASE 'HOT' WITH A/C 'ON'

Y/R GOES TO FUSE #5 FOR PRE-PUMP & TO MAIN F/PUMP 'HOT' WHEN CRANKING [KP III] & WHEN ENG IS RUNNING [IGN SIGNAL IS NEEDED AT C/U to turn relay 'ON'] COMES FROM F/PUMP RELAY

**• MAIN HARNESS PLUG UNDER GLOVE BOX NEAR THE FUEL INJECTION C/U. THESE CONNECTIONS ARE SOMETIMES LOOSE CAUSING A 'NO START' OR AN 'ERRATIC STALLING' PROBLEM.**





**LH 2 FUSES  
FUNCTIONS  
83 & 84  
240 SERIES**

25

511

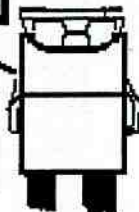
FUEL INJ SYSTEM FUSE - IS LOCATED UNDER HOOD BY THE BATTERY ON THE RELAY BRACKET  
IT SUPPLIES CURRENT TO > INJ RELAYS, FUEL PUMP, A.M.M. INJECTORS, C/U, IDLE VALVE

**FUSE  
#5**

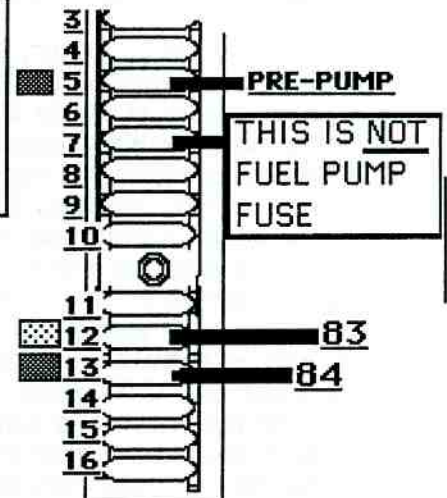
PRE-PUMP IN TANK  
FUSE IS SUPPLIED CURRENT FROM THE FUEL PUMP RELAY. IT IS ON THE SAME CIRCUIT WITH THE MAIN FUEL PUMP, SO BY JUMPING CURRENT TO THIS FUSE YOU WILL SUPPLY CURRENT TO MAIN FUEL PUMP THEREFORE BYPASSING RELAY.

**FUEL INJ SYS  
F/PUMP FUSE**

FUSE HOLDER  
VOLVO PART  
NO. 1323 312



CORRODED

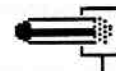
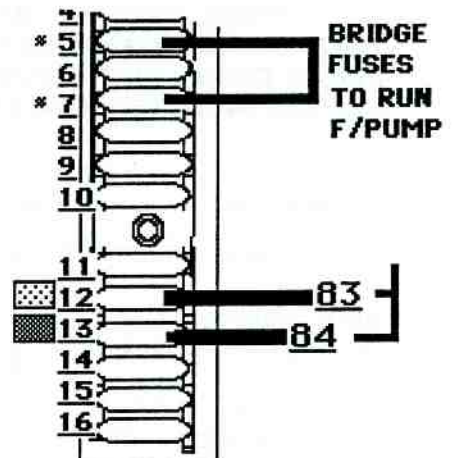


**FUSE  
#12  
1983**

FUSE IS HOT WITH IGN 'ON'[KP II] SUPPLIES CURRENT FOR THE "ON-OFF" FUNCTION OF F/PUMP RELAY.  
IGN IMPULSES FROM THE IGN COIL (-) TERM #1 SIGNAL F-INJ C/U TO SUPPLY GRND (-) FOR F/PUMP RELAY TO COME 'ON' WHEN ENG IS CRANKED[KP III] OR IS RUNNING.

**FUSE  
#13  
1984**

INJ RELAY, GAUGES, IDIOT LITES, T-SIGNALS.  
FUSE IS HOT WITH IGN 'ON'[KP II] SUPPLIES CURRENT FOR THE "ON-OFF" FUNCTION OF F/PUMP RELAY.  
IGN IMPULSES FROM THE IGN COIL (-) TERM #1 SIGNAL F-INJ C/U TO SUPPLY GRND (-) FOR F/PUMP RELAY TO COME 'ON' WHEN ENG IS CRANKED[KP III] OR IS RUNNING.



CORRODED FUSE MAY ONLY CAUSE A ERRATIC TYPE PROBLEM. IT MAY MAKE & BREAK CONTACT AT TIMES. CAUSING ENG TO DIE, THEN RESTART.  
CLEAN ALL INJ SYSTEM FUSE TERMS, LUBE WITH DIALECTRIC GREASE & REPL FUSES.

25

514



**LH 2 F-INJ**  
**'83 & 84**  
**FUSES-CHECKING-**  
**BYPASSING RELAY**

25

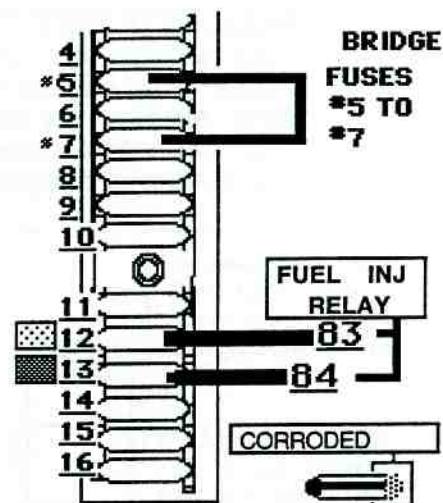
521

BYPASSING RELAY OR POOR FUSE CONNECTIONS TO  
 ACTIVATE FUEL PUMP VERIFY PUMP, ELECT WIRING  
 CIRCUIT TO FUEL PUMP IS OK.

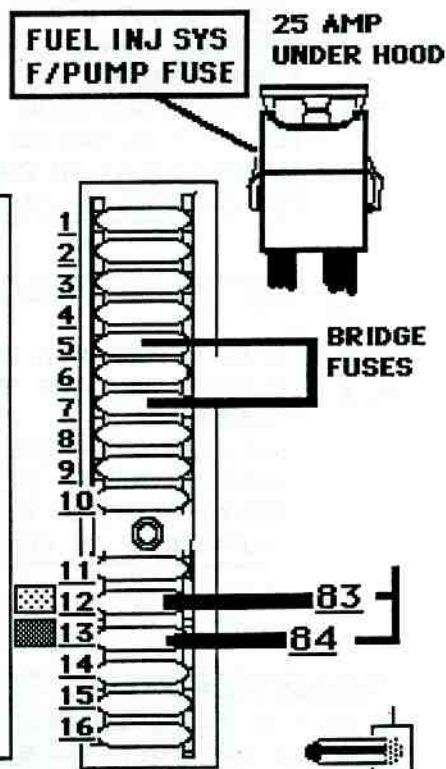
**\*\* NOTE; IGN SIGNALS F-INJ C/U TO GIVE F/P RELAY A  
 GROUND (-), TURNING IT 'ON'.**

**\*\* ENGINE WON'T START & FUEL PUMP WON'T RUN \*\***

IF THE ENGINE WON'T START, AND YOU DON'T HEAR THE  
 FUEL PUMP RUN WHEN YOU CRANK THE ENG, TRY  
 BYPASSING THE FUEL PUMP RELAY, FUSE AND THE F-INJ  
 C/U RELAY GROUNDING FUNCTION. THE WIRE FOR THE  
 MAIN F/PUMP IS WIRED TO THE PRE PUMP FUSE #5 AND  
 THEN IT GOES TO THE MAIN PUMP. REMEMBER THE POWER  
 FOR MAIN PUMP DOESN'T GO THRU THE PRE PUMP FUSE, IT  
 ONLY GOES THERE TO SUPPLY PRE PUMP FUSE WITH  
 CURRENT. HOWEVER, SINCE ANY CURRENT THAT IS  
 SUPPLIED TO THAT PRE PUMP FUSE WILL GO TO THE MAIN  
 PUMP, YOU BYPASS A NUMBER OF COMPONENTS[F-INJ  
 RELAY, F-INJ C/U, IGN SIGNAL, 25 AMP FUSE, FUSE #12 OR  
 #13 ] WHEN YOU JUMP THE CURRENT TO FUSE #5. NOW IF  
 MAIN PUMP RUNS THE PROBLEM IS IN ONE OF THE THOSE  
 COMPONENTS, OR THE GROUND (-) FUNCTION CIRCUIT FOR  
 F/PUMP RELAY PROVIDED BY F-INJ C/U.



**\*\*\* CHECK FOR DWELL AT IGNITION COIL. IF THERE IS NO  
 DWELL, THERE CAN'T BE ANY IGNITION SIGNAL TO THE  
 F-INJ C/U. THIS MEANS THE C/U WILL NOT PROVIDE A  
 GROUND CIRCUIT TO THE FUEL PUMP RELAY AND SO IT  
 WILL NOT ACTIVATE, RESULT NO CURRENT TO F/PUMP.**



**BRIDGE FUSE #5 > TO #7**

**PUMP RUNS CHECK>>**

- 1- FUSE #12 or #13
- 2- FUEL INJ SYSTEM  
FUSE UNDER HOOD
- 3- F/PUMP RELAY  
#87 TERM MUST  
BE HOT WHEN ENG  
IS CRANKED
- 4- IGN SIGNAL TO  
F-INJ C/U  
CHK FOR DWELL  
AT TERM #1 at C/U

**BRIDGE FUSE #5 > TO #7**

**PUMP WON'T RUN  
CHECK >>**

- 1- F/PUMP GROUND &  
CURRENT (YEL/RED)  
UNDER REAR SEAT  
CUSHION LEFT SIDE
- 2- TAP F/PUMP, IF THE  
PUMP NOW RUNS, IT  
IS BAD. REPLACE  
F/PUMP

25

524

**LH II FUEL INJ  
C/O  
ADJUSTMENT  
B-23**

**\*\* FEDERAL LAW REQUIRES THAT A NEW PLUG  
BE INSTALLED IN C/O ADJUST HOLE**

25

541

----- LH II INJ AIR/FUEL MIXTURE (C/U) -----

\* SCREW CAN BE TURNED ENDLESSLY BUT THERE ARE FIFTEEN (15) TURNS FROM LEAN SETTING TO RICH SETTING

\* C/O ADJUSTING SCREW FUNCTION CAN BE CHECKED WITH AN OHM METER -  
0 ohms (LEAN) UP TO 1,000 ohms (RICH)  
MEASURE BETWEEN TERMS #6 - #12 (with wire harness disconnected)

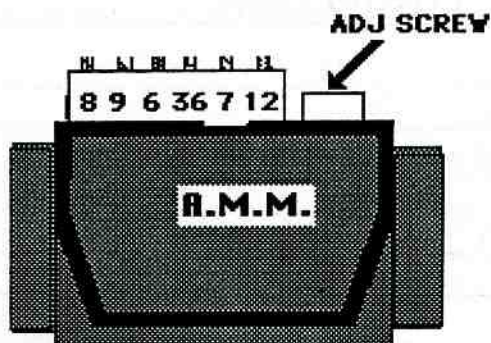
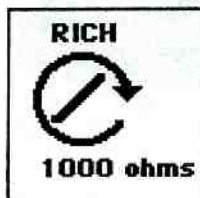
\* TURNING SCREW CLOCKWISE WILL INCREASE FUEL CONTENT (RICH)  
- HIGH OHMS -

\* TURNING SCREW COUNTER/CLOCKWISE WILL DECREASE FUEL CONTENT (LEAN)  
- LOW OHMS -

\*\*\*\*\* CORRECT C/O - FUEL MIXTURE \*\*\*\*\*

✓ AT - TEST POINT >>PULSING 20 - 70 deg DWELL  
[use 4 cyl scale]

✓ AT - O2 SENSOR >>PULSING approx 0.38 - 0.69v



**LH II FUEL INJ  
C/O  
ADJUSTMENT**

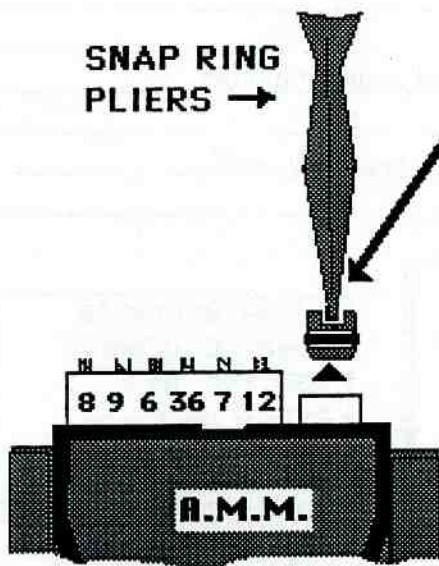
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544

**\*\*\* REMOVAL OF C/O PLUG \*\*\***

- DRILL A 3/16" HOLE IN CENTER OF PLUG
- DRILL ONLY SOFT METAL, STOP AT HARD METAL PLATE IN PLUG
- USE A SNAP RING PLIERS INSERT IN HOLE> TWIST & PULL UP

**SNAP RING  
PLIERS →**



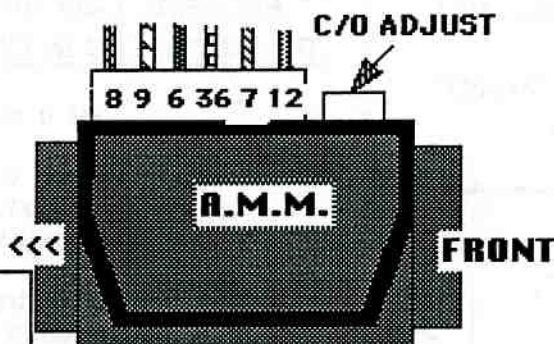
**\*\*\*\* IMPORTANT FEDERAL LAW \*\*\*\***  
—FEDERAL LAW REQUIRES—  
AFTER SETTING THE C/O (FUEL/ AIR MIXTURE) TO THE CORRECT VALUE BE SURE TO INSTALL A NEW PLUG SO THE SETTING CAN'T BE TAMPERED WITH.



**83-84 B-23  
AIR MASS METER  
TERMINAL NO.s  
FUNCTIONS  
240 SERIES**

25

551



CAUTION - '83-84 A.M.M. DO NOT  
INTERCHANGE WITH '85-88 A.M.M.  
USE ONLY '83-84 A.M.M. [with METAL  
BODY]

A.M.M.	WIRE COLOR	FUNCTION	CONTROL/ UNIT
12 -	yellow	C/O ADJUST (0.0 -2.6 v)	14
7 -	white-red	A.M.M. output (1.2-3.5v)	7
36 -	black	ground	at intake manifold
6 -	green-yellow	ground (thru C/U)	6
9 -	orange	volt supply (BAT VOLT)	sys relay # 87
8 -	white	burn off	8

**'83-84 B-23 TURBO  
700 SERIES**

A.M.M.	WIRE COLOR	FUNCTION	CONTROL/ UNIT
12 -	WHITE	C/O ADJUST (0.0 -2.6 v)	14
7 -	BLUE/RED	A.M.M. output (1.4-3.5v)	7
36 -	BLACK	ground	at intake manifold
6 -	BLUE/GREEN	ground (thru C/U)	6
9 -	BLUE/YEL	volt supply (BAT VOLT)	sys relay # 87
8 -	BLUE/WHITE	burn off	8

**IF YOU THINK A.M.M. IS BAD.  
TURN KEY 'OFF' [KP 0], DISCONNECT A.M.M.  
HARNESS, IF ENG WILL NOW START & RUN  
THE A.M.M. IS BAD.  
NOTE; HARD ACCEL WILL KILL ENG SINCE  
THE INJ SYSTEM IS IN 'LIMP HOME' MODE.**

**WIRE VOLTAGES  
UNPLUG HARNESS  
KEY 'ON' KP II**

#12— 5.1v  
#7— 0.0v  
#9— 12.0v

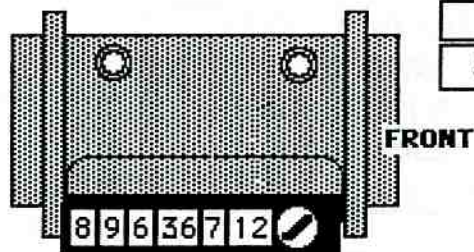
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554



**83-84 B-23 LH  
AIR MASS METER  
FAULT TRACING  
USE DIGITAL VOLT  
AND OHM METER**

PEEL BACK RUBBER BOOT  
CHK VOLTAGES FROM BACK  
SIDE OF CONNECTOR. BE  
SURE CONNECTOR IS FIRMLY  
IN PLACE, TERMINALS CLEAN



25

557

HOOK DIGITAL V/METER NEG[-] TO A GOOD GROUND & POS[+] TO BACK OF TERMINALS

TERM#	IGNITION	FUNCTION TEST	TEST VALUE
12	ON	C/O ADJUSTMENT RANGE	lean (0.0v) >> (2.6v) rich
12	750 rpm	C/O SETTING VOLTAGE	1.3-1.7v (average)
If voltage doesn't vary with adj screw action A.M.M. IS AT FAULT			
IF VOLTAGE at MAX(2.6v) but C/O IS LOW CHECK ✓ VACUUM LEAK, PLUGGED FUEL INJECTORS OR THE AIR MASS METER HAS AN INTERNAL FAULT THAT VOLT & OHM TESTS WILL NOT DETECT, YOU'LL HAVE TO TRY A NEW AIR MASS METER.			

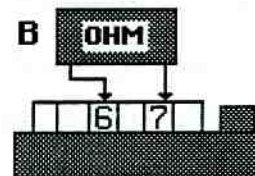
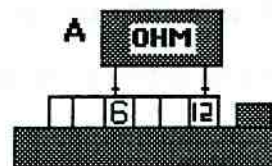
TERM#	IGNITION	FUNCTION TEST	TEST VALUE [APPROX]
7	ON [ENG STALLED]	Air Mass Meter output	1.6v
7	750 rpm (idle)	A.M.M. idle/output	2.7v
7	accel to 3,500 rpm	A.M.M. accel/output	increases to 3.5v
If volt not to specs, CHK-WIRING, VOLT SUPPLY(term#9), GROUND(#36.6)			
VACUUM LEAKS(hoses) etc, if OK A.M.M. AT FAULT			

**CHECKING A.M.M. INTERNAL CIRCUIT RESISTANCE WITH DIGITAL OHM METER**

A - CONNECT OHM METER to TERM #12 TO #6  
0 - 1,000 OHMs [C/O ADJUST]

B - CONNECT OHM METER to TERM #36 TO #6  
2.6 - 4.0 OHMs [A.M.M. OUTPUT]

IF READINGS HIGHER OR LOWER A.M.M. IS BAD



IF THE ENG WILL NOT START AND YOU THINK  
A.M.M. IS BAD. WITH THE IGNITION 'OFF', JUST  
DISCONNECT A.M.M. HARNESS. NOW TRY AND  
START ENG. IF ENG WILL NOW START & RUN THE  
A.M.M. IS BAD.  
NOTE; HARD ACCEL WILL KILL ENG SINCE THE INJ  
SYSTEM IS IN 'LIMP HOME' MODE.

WIRE VOLTAGES  
UNPLUG HARNESS  
KEY 'ON' KP II  
#12— 5.1v  
#7— 0.0v  
#9— 12.0v



**LH-2 INJECTION  
SYSTEM  
CONTROL / UNIT  
TERMINALS  
'83 - 84 B- 23**

25

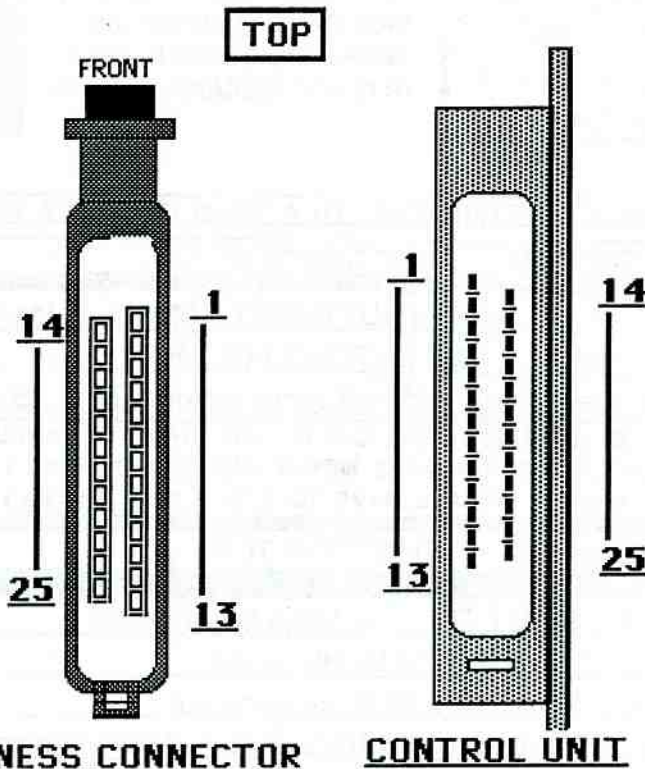
571

KEY MUST BE 'OFF' [KP 0] TO  
DISCONNECT ANY C/U OR A.M.M.

CARE MUST BE TAKEN NOT TO DAMAGE  
TERMINALS. TESTING SHOULD BE DONE  
FROM SIDE OF HARNESS CONNECTOR  
AFTER DISASSEMBLY.

CHECK TERMINALS FOR BOTH  
TIGHTNESS & THAT  
THEY ARE NOT CORRODED.

CONNECTOR SHOULD FIT IN CONTROL  
UNIT FIRMLY- AS WITH ALL  
CONNECTIONS RUN ENG, WIGGLE  
CONNECTOR TO TEST FOR POOR  
CONNECTION.



**\*\* TERMINALS \*\***

- 1- IGNITION SIGNAL [GREY] 9.8v at idle  
12.0v with KEY 'ON' ENG NOT RUNNING.
- 2- TEMP SENSOR [BL] 0.1v at oper temp
- 3- THROTTLE SW [IDLE CIRCUIT] [R]  
[#4NOT USED]
- 5- SHIELD GRND[-] for O2 Sensor wire
- 6- GROUND[-] for A.M.M. [Y/GN]
- 7- A.M.M. OUTPUT [2.6v at idle] [W/R]
- 8- A.M.M. BURN OFF [W]
- 9- POWER for C/U [BN]
- 10- IDLE VALVE [SLOW] [W]
- 11- GROUND[-] [SB]
- 12- THROTTLE SW[FULL THROTTLE] [W/SB]
- 13- GROUND[-] for INJECTORS

**\*\* TERMINALS \*\***

- 14- A.M.M. C/O ADJ SCREW [Y]
- 15- CIS IDLE TP[to disable] [BL/W]
- 16- A/C IDLE SPEED INCREASE [R]
- 17- GROUND[-] for F/PUMP RELAY [Y/R]
- 18- POWER for basic C/U OPER [BL/R]
- 19- GROUND[-] [SB]
- 20- O2 SENSOR [0.5v] [GN]
- 21- GROUND[-] MAIN RELAY [Y/SB]  
[#22 NOT USED]
- 23- IDLE VALVE [FAST] [GN/R]  
[#24 NOT USED]
- 25- GROUND[-] [SB]

**\*\* 700 series - TERMS ARE THE SAME, THE WIRE COLORS WILL BE DIFFERENT.**

25

574

# **LH-2 INJECTION SYSTEM CONTROL / UNIT TERMINALS**

**KEY 'OFF'. DISCONNECT C/U. Remove the tape from harness connector & screw from other end, pull out wire frame from the connector body. CONNECT WIRE FRAME TO C/U. PROBE TERMS**

**25**

**577**



**KEY MUST BE 'OFF'  
[KP 0] BEFORE  
REMOVING**

**----- VOLTAGES ARE WITH HARNESS CONNECTED IGNITION 'ON' KP II -----**

## **----- MAJOR TERMINALS -----**

FOR QUICK CHK WHEN ENG WON'T RUN [\*] 'GOOD' approx voltages  
IF voltages found INCORRECT CHECK CONNECTIONS, WIRING & TERM USER

<u>TERMINAL USED FOR</u>		<u>'83-84</u>	<u>'85- 88</u>
1	* IGNITION SIGNAL	[eng stalled].....12.0v	12.0v
		[eng running].....9.8v	9.8v
2	- TEMP SENSOR	eng temp180 degrees..... 0.1v	0.4v
	voltage goes up as eng temp goes down ... open circuit voltage shown.. 4.9v max voltage 4.7v		
	* TERMS #5,11,25, GROUND[-]	all years 0.04v or less	
6	- GROUND[-] for A.M.M.	all years 0.03v	
7	* A.M.M. OUTPUT	[eng stalled] ..... 1.5v	1.3v
		[eng idling]..... 9.8v	9.8v
9	* POWER for C/U	all years 12.0+v	
13	* GROUND[-] for INJECTORS	check term for tight connection	
14	- A.M.M. C/O ADJ SCREW.....	all years 0.1v - to - 2.6v	
17	* GROUND[-] for F/PUMP RELAY	check term for tight connection	
18	* POWER for basic C/U OPER	all years 12.0+v	
20	- O2 SENSOR .....	O2 sensor unplugged ..... all years 0.5v	
21	* GROUND[-] MAIN RELAY	check term for tight connection	

## **FLAT SPOT ON ACCELERATION. 1983-84 200 SERIES EMISSION RECALL. AGAINST FEDERAL LAW TO TAMPER WITH!!!**

**IT IS AGAINST FEDERAL LAW TO TAMPER WITH!!!**

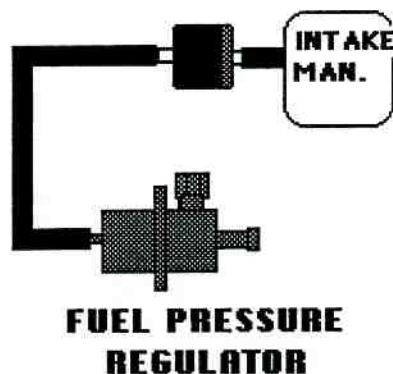
MOST 1983-84 200 SERIES HAVE HAD AN EMISSION RECALL DONE ON THEM. THE MAIN CHANGE WAS THAT THE FUEL PRESSURE REGULATOR THAT IS USED TO PROVIDE AN ACCELERATION ENRICH- MENT HAD A VACUUM CHECK VALVE PUT IN ITS HOSE TO THE INTAKE MANIFOLD.

THIS CHECK VALVE WILL DELAY THE VACUUM BLEEDING OFF THE F/PRESS REG, SO WHEN YOU ACCELERATE, THE CHECK VALVE WILL HOLD VACUUM IN THE F/PRESS REG FOR A FEW SECONDS. THIS VACUUM REMAINING PRESENT WILL PREVENT THE F/PRESS REG FROM PROVIDING A RICHER MIXTURE [DUE TO HIGHER FUEL PRESSURE].

THIS IS NECESSARY TO MEET THE FEDERAL EMISSION STANDARDS, DO NOT REMOVE THE CHECK VALVE. EXPLAIN THIS TO THE VOLVO OWNER IF HE COMPLAINS ABOUT A FLAT SPOT ON ACCEL.

**NOTE: THE VALVE MUST BE IN THE HOSE TO THE INTAKE MANIFOLD. THE SMALL GREEN SECTION OF THE CHECK VALVE SHOULD FACE THE INT MANIFOLD, THE BLACK SECTION FACING THE FUEL PRESSURE REGULATOR. IF THE CHECK VALVE IS PUT IN THE HOSE BACKWARDS, THE MIXTURE WILL STAY WAY TOO RICH AT IDLE RIGHT AFTER YOU ACCELERATE AND THEN LET OFF THE THROTTLE.**

**CUSTOMER WILL HAVE TO LIVE WITH THE FLAT SPOT. DO NOT REMOVE CHECK VALVE.**





**GROUP 26 WATER PUMPS, BELTS ETC**

- 26- 111 WATER PUMP REPLACEMENTS TIPS B-21, 23, 230
- 26- 121 A/C BELT & CRANK PULLEY REPLACEMENT TIPS

**GROUP 27 DIESEL**

- 27- 001 DIESEL TUNE UP CHECK LIST
- 27- 100 DIESEL GLOW PLUG & TEMP SENSOR LOCATIONS
- 27- 101 DIESEL GLOW PLUG \_\_ GLOW PLUG CONTROL UNIT \_\_  
BASICS
- 27- 110 POOR PERFORMANCE \_\_ FUEL STARVATION \_\_ FUEL FILTER
- 27- 130 PUMP TIMING ADJUSTMENT
- 27- 140 BLEEDING COOLING SYSTEM
- 27- 151 DIESEL CYLINDER HEAD CHECKING
- 27- 153 DIESEL CYLINDER HEAD BOLTS
- 27- 157 DIESEL CYLINDER HEAD GASKETS & TORQUE PROCEDURES
- 27- 161 DIESEL INJECTOR SEALS
- 27- 171 'HARD' BRAKE PEDAL \_\_ POOR POWER BRK ASSIST  
VAC PUMP

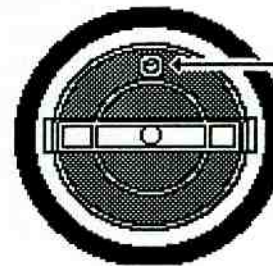
**WATER PUMP  
TIPS  
B- 21,23 B-230**

**OLD NARROW SEAL**



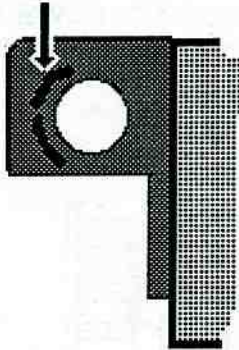
26

111



**BLEED HOLE**  
install with hole on  
top to bleed off  
air properly

**METAL DETERIORATION**



**NEW WIDER SEAL**



**CHECK  
HTR PIPE SEAL IN STRAIGHT**

↑  
UP  
2

1-IN→

**CYL HEAD**

**BLOCK**

**order of assembly**

**\*\*\*\* WATER PUMP NOTES \*\*\*\***

**THERE ARE TWO MAIN AREAS FOR VOLVO  
WATER PUMP LEAKS.**

THE MOST COMMON IS THE PUMP ITSELF, BUT RUNNING  
A CLOSE SECOND IS THE UPPER SEAL RING AT THE  
CYLINDER HEAD.

THE CYLINDER HEAD MATING AREA IS QUITE OFTEN  
CORRODED, WITH METAL DETERIORATION. THIS AREA IS  
SOMEWHAT OUT OF SIGHT AND THEREFORE IS OFTEN  
OVERLOOKED WHEN REPLACING THE W/PUMP.  
YOU SHOULD BE SURE THAT IT IS AS SMOOTH AS IT CAN  
BE WHEN REPLACING THE W/PUMP.  
**THE SEALING AT THIS POINT IS CRUCIAL. USE  
SOME FINE SAND PAPER OR EMORY CLOTH.**

LUBE BOTH THE AREA AND THE SEAL SO THE SEAL IS  
LESS LIKELY TO BE DRAGGED CROOKED WHEN  
INSTALLING THE PUMP.

**BE CAREFUL THAT THIS DOESN'T OCCUR  
WHEN YOU ARE SEATING THE NEW PUMP.**

✓ **CHECK FOR HEATER PIPE SEAL BEING  
PINCHED OUT OF W/P HOLE.**

THIS CAN EASILY HAPPEN WHEN YOU PUSH THE  
PUMP ON TO THE PIPE. YOU MAY NOT NOTICE THE  
SEAL IS PARTIALLY OUT OF THE BORE.

✓ **MAKE SURE THAT NONE OF THE NUTS  
AND WASHERS FROM THE W/PUMP  
FALL DOWN INTO THE TIMING BELT  
CRANK AREA.**

WE HAVE SEEN QUITE A FEW CARS TOWED TO THE  
SHOP BECAUSE A WASHER HAS CUT THE TIMING  
BELT.

**AND YES, THOSE CARS JUST HAD W/PUMPS  
RECENTLY REPLACED.**

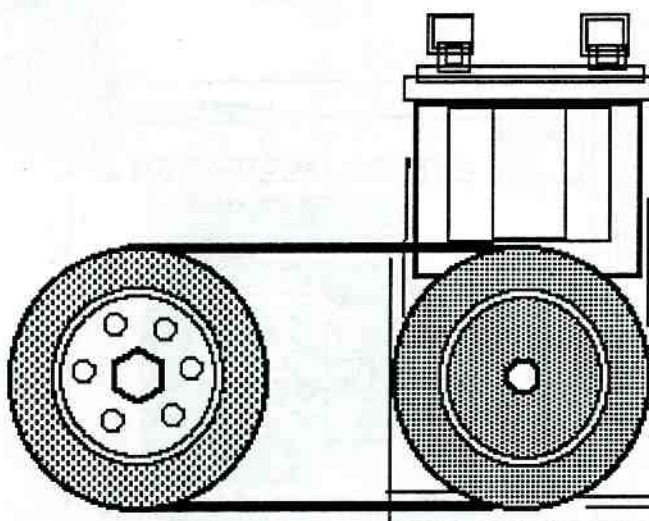


**A/C BELT  
B-21, B-23  
CRANK PULLEY  
INSTALLATION**

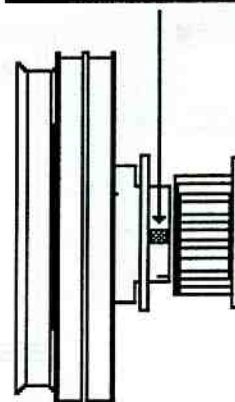
- \* FIVE (5) SHIMS BETWEEN CRANK PULLEY HALVES
- \* INSTALL BELT ON PULLEYS (A/C to CRANK)
- \* FACE KEY TO A/C COMP
- \* LINE UP KEY -TO - GROOVE OF PULLEY
- \* START CRANK BOLT BY HAND & TIGHTEN
- BE SURE KEY STAYS IN SLOT OF GEAR

26

121



**LINE UP KEY -TO- KEY WAY**



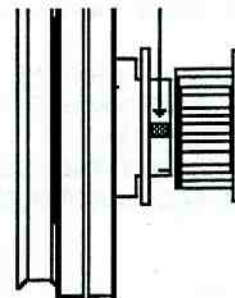
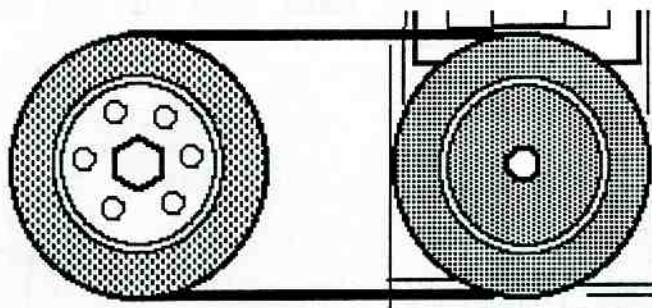
WHEN ADJUSTING OR REPLACING THE A/C BELT, IT CAN BE EASIER TO REMOVE THE CRANK PULLEY COMPLETELY FROM THE ENG, BY REMOVING THE CENTER CRANK BOLT. THEN CHANGE THE SHIMS ONCE IT IS OFF. '5' SHIMS SEEM TO WORK BEST. AFTER WHICH YOU REINSTALL THE CRANK PULLEY AND BELT TOGETHER.

26

124

THIS WORKS BETTER THAN PLAYING AROUND WITH THE SHIMS WITH THE PULLEY ON. THEN HAVING TO INSTALL THE BELT WHILE WALKING AROUND THE PULLEY TIGHTENING THE SIX (6) BOLTS. THAT'S THE METHOD VOLVO RECOMMENDS, IT CAN BE A REAL HASSLE.

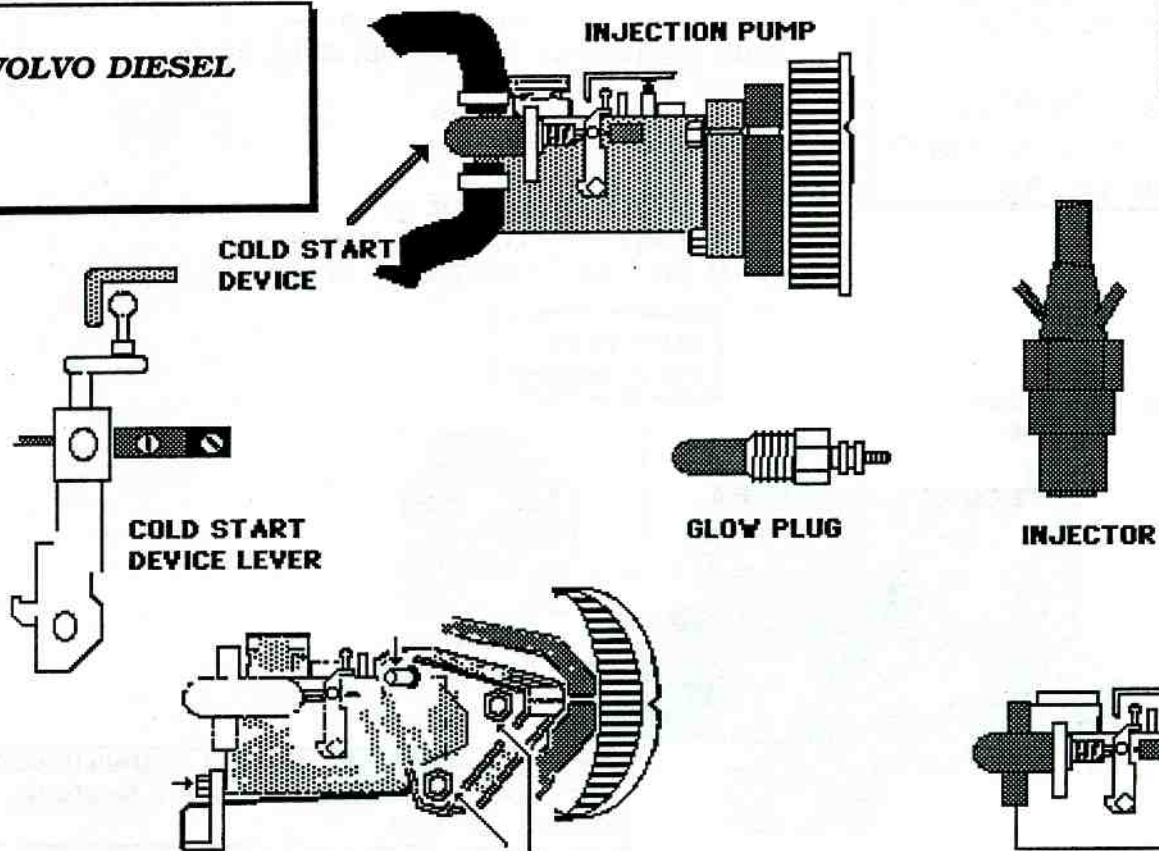
CAUTION SHOULD BE TAKEN LOCATING THE KEY IN THE PULLEY AND CRANKSHAFT. TIGHTEN THE CRANKSHAFT CENTER NUT TO 120 FT/ LBS.



## VOLVO DIESEL

27

001

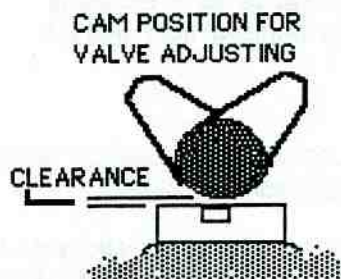


## DIESEL

### TUNE UP CHECK LIST

27

004



THIS IS THE WAY THE  
CAM SHOULD BE FOR  
CHECKING & ADJUSTING  
VALVE CLEARANCE.

- ✓ VALVE ADJUSTMENT [WITH SHIMS]
- ✓ TIMING BELT & PUMP BELT TENSION
  - LOOSE BELTS MEANS LATE CAM & PUMP TIMING•
- ✓ GLOW PLUG TESTING\ FUSE\ G-P TEMP SENSOR
- ✓ FUEL SYSTEM LEAKS & CONDITION
- ✓ INJECTOR CONDITION / IS INJ LOOSE in cyl head?
- ✓ AIR FILTER
- ✓ V-BELTS
- ✓ ALT OUTPUT [55 AMPs]
  - LOW CHARGE BAT WON'T START ENG •
- ✓ BATTERY CONDITION & REQUIREMENTS
  - [hold 8.0 volts at 450 AMP LOAD for 30 secs]
- ✓ FUEL SHUT OFF SOLENOID [sticking ??]
- ✓ COLD START DEVICE[advancing timing & idle RPM increase]
- ✓ IDLE\FULL THROTTLE SETTING
  - [CHK THAT THROTTLE MOVES PUMP CONTROL LEVER TO MAX ON FULL PEDAL DEPRESSION]



## DIESEL D-24

### GLOW PLUG & ENG TEMP SENSOR LOCATIONS

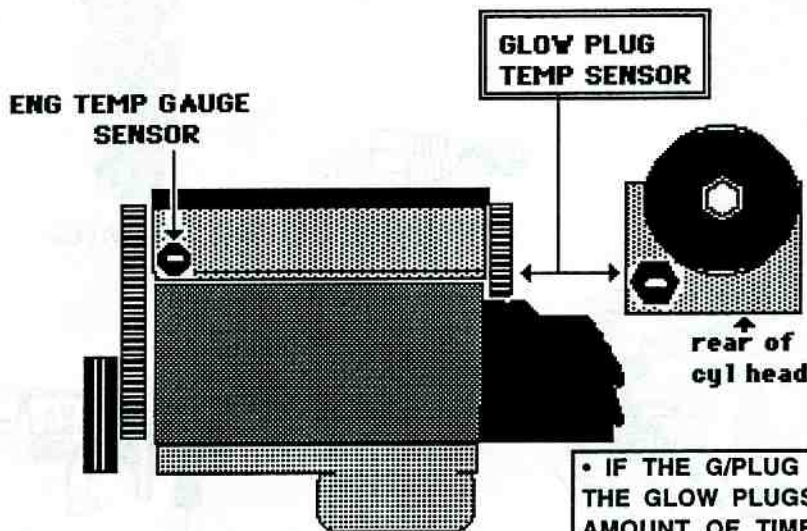
... GLOW PLUG TEMP SENSOR ...  
OHMS [RESISTANCE TO GROUND] GOES DOWN  
AS ENG TEMP GOES UP.  
COLD----- HIGH OHMS  
WARM/HOT----- LOW OHMS

27

100

#### .... MAXIMUM ON TIME ....

✓ EARLY['80] LITE 'ON' 0- 50 secs  
✓ LATE ['81 - on] LITE 'ON' 0- 20 secs



### GLOW PLUG CONTROL UNIT & CIRCUIT TESTING

BEFORE STARTING A DIESEL THE SWIRL CHAMBERS ARE HEATED TO AID IN THE COMBUSTION PROCESS. THE HEATING IS DONE BY THE GLOW PLUGS. THE AMOUNT OF TIME THAT THEY ARE TURNED ON IS DETERMINED BY THE ENGINE COOLANT TEMP. THE COLDER THE ENGINE THE LONGER THE GLOW PLUGS WILL BE ON. A WARMER ENGINE WILL NEED VERY LITTLE, OR EVEN NO GLOW PLUG HEATING TO ASSIST IN THE ENGINE STARTING.

27

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**NOTE:** When the engine starts and there is a MISS that clears up in after a short time, there probably is a glow plug or plugs that are not working. This causes those cylinders not to have complete combustion because the heat that is needed is missing. After the friction induced heat buildup occurs these cylinders stop MISSING.

WHEN THE KEY IS TURNED TO THE 'ON' POSITION [KP II], THE GLOW PLUG C/U WILL BE SUPPLIED CURRENT SO IT CAN COME ON IF THE GLOW PLUG TEMP SENSOR RESISTANCE TO GROUND[-] IS HIGH ENOUGH[cold eng temp].

NOW IF THE G/P RELAY IS TURNED 'ON', THE GLOW PLUGS WILL BE FED CURRENT FOR A SPECIFIED TIME DEPENDING ON ENGINE TEMP. THE 'GLOW PLUG LITE' ON THE INSTRUMENT PANEL WILL ALSO BE 'ON'. AFTER THAT SPECIFIED TIME THE G/P LITE WILL GO 'OFF', THE GLOW PLUGS HOWEVER MAY STAY 'ON' AN ADDITIONAL 0 - 14 SECONDS LONGER. WHEN THE G/P LITE GOES 'OFF' THIS IS WHEN THE ENGINE SHOULD BE CRANKED OVER TO START.

WHEN THE ENGINE IS NOW BEING CRANKED OVER, FOR A TIME THE GLOW PLUGS WILL ALSO BE TURNED 'ON' TO AID IN THE STARTING. THEIR AMP DRAW DURING CRANKING IS APPROX HALF OF WHAT THE FULL GLOW PLUG SYSTEM AMP DRAW IS WHEN THE KEY IS IN 'KP II'.

THE CRANKING[KP III] AMP DRAW IS APPROX 60 amps.

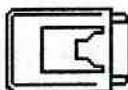
**GLOW PLUG  
SYSTEMS  
200 & 700 SERIES**

- TWO DIFFERENT GLOW SYSTEMS ARE USED •
- \* 200 SERIES USES BOTH A C/U [TIMER RELAY] UNDER DASH DRIVER'S SIDE, & A GLOW PLUG RELAY UNDER THE HOOD.[for CURRENT SUPPLY to G/P]
- \* 700 SERIES USES A C/U UNDER HOOD TO DO BOTH FUNCTIONS [TIMER & 'ON / OFF'].

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**200 SERIES**



**CONTROL  
UNIT**

C/U FOR 'TIMER' FUNCTION. THIS C/U WILL ACTIVATE G/P RELAY. THE C/U WILL USE THE INFO FROM G/P TEMP SENSOR TO SET PRE HEAT TIME.

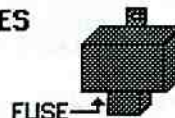


**GLOW PLUG  
RELAY**

C/U WILL TURN THE RELAY 'ON/OFF'.

GLOW PLUG RELAY WILL TURN THE GLOW PLUGS 'ON' BY SUPPLYING THEM WITH CURRENT FROM THE BATTERY.

**700 SERIES**



**CONTROL  
UNIT**

THE C/U WILL PROCESS THE INFO FROM THE G/P SENSOR TO SET PREHEAT TIME.

IT WILL THEN TURN THE GLOW PLUGS 'ON' BY SUPPLYING THEM WITH CURRENT FROM THE BATTERY. IT CONTROLS 'ON' TIME FOR THE GLOW PLUGS.

- HAS 80 AMP FUSE BAR ON UNDERSIDE.

**GLOW PLUG QUICK CHECK AMP DRAW TEST**

27

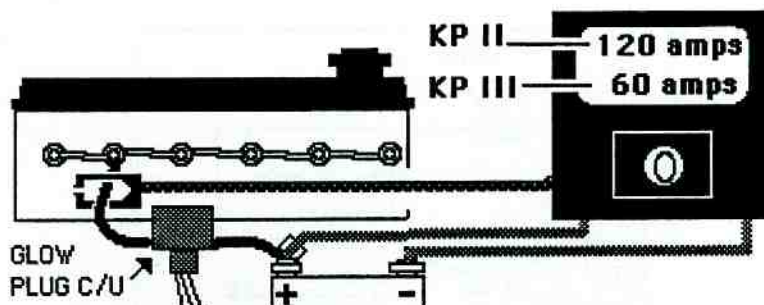
103

QUICK CHECK FOR GLOW PLUG PRE HEATING SYSTEM.

USE: AMP METER

NOTE; IF ENG WARM, UNPLUG TEMP SENSOR TO OBTAIN MAXIMUM G/P 'ON' TIME.

TEST	AMP DRAW KP II	AMP DRAW KP III
AMPERAGE DRAW OF GLOW PLUGS	APPROXIMATELY 114 to 144 AMP DRAW  WILL STEADILY GO DOWN AS THE G/PLUGS HEAT UP. WHEN IT REACHES ABOUT 60 AMPS IT WILL THEN GO DOWN TO 0 amps RATHER QUICKLY.	APPROXIMATELY 60 AMP DRAW



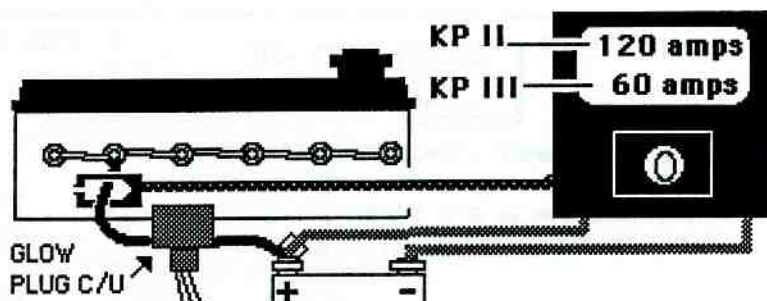


IF 2 OR MORE GLOW PLUGS ARE BAD REPLACE ALL OF THE GLOW PLUGS. THIS IS BECAUSE THOSE GLOW PLUGS THAT ARE STILL FUNCTIONING HAVE BEEN OVERWORKED AND THEY WILL LIKELY END UP BURNING OUT SHORTLY ANYWAY.

• GLOW PLUG AMP DRAW •

APPROX 19 to 24 amps [each]  
AMP DRAW APPROX

6 G/PLUGS - 114 to 144 amps  
5 G/PLUGS - 100 to 120 amps  
4 G/PLUGS - 80 to 100 amps



NOTE; THE DIFFERENCE IS MORE THAN WHAT 1 GLOW/PLUG WILL DRAW. IF DRAW IS 115 AMPS BUT ENG STARTS WITH A 'MISS' THAT GOES AWAY AFTER ABOUT 30 SECS, THERE IS LIKELY 1 or 2 BAD GLOW PLUGS.

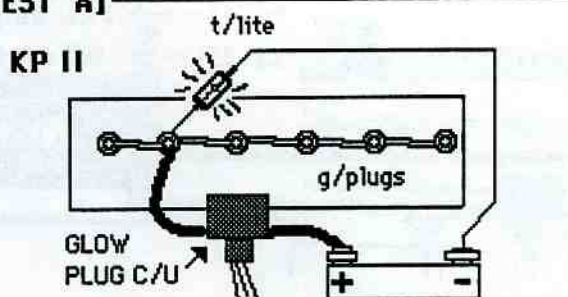
**GLOW PLUG SYS. QUICK CHECK '84-on 700 SERIES**

USE: TEST/LITE THE MOST IMPORTANT THING HERE IS THAT G/PLUGS ARE BEING SUPPLIED CURRENT. IF TIMES ARE WAY OFF, C/U COULD BE AT FAULT.

NOTE; IF ENG WARM, UNPLUG TEMP SENSOR TO OBTAIN MAXIMUM G/P 'ON' TIME.

T/LITE HOOK TO	TEST	T/LITE ON	T/LITE 'OFF' CHECK
GRND[-] TO GLOW PLUG	[A] TURN KEY 'ON' [KP II]	✓ T/LITE 'ON' TIME 0 SECS at OPER TEMP 8-20 SECS COLD ENG	• CONTROL UNIT CURRENT •
GLOW PLUG SUPPLY CABLE [RED]		✓ DASH LITE 'ON' TIME eng temp 0°F - 6 secs 68°F - 4 secs 122° F - 0 secs ALL TIMES APPROXIMATE	✓ TERM #30 [RED] IF 'HOT' CHECK C/U 80 amp FUSE & GROUND[-] WIRE[sb]  IF NO CURRENT CHECK WIRE TO POS[+] BAT TERM.  ✓ TERM #15 [bl] IF 'HOT' - C/U BAD IF NO CURRENT CHECK FUSE #11 & TERM #15 IGN SW  ✓ TERM 'T' [temp sensor] CHECK RESISTANCE TO GRND [-] IF 0 ohms WIRE[bn] MAY BE SHORTED TO GROUND.

TEST A]



**TEST B**

**T/LITE  
HOOK TO**

GRND[-]  
TO  
GLOW PLUG

GLOW  
PLUG  
SUPPLY  
CABLE  
[RED]

**TEST**

[B]  
CRANK  
[KP III]

CRANKING  
G/P  
HEATING

**T/LITE ON**

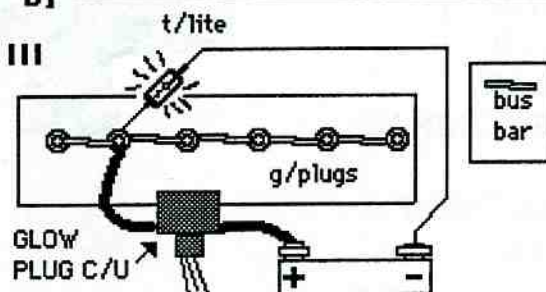
T/LITE 'ON'  
IF ENG IS CRANKED OVER BUT  
WILL NOT START, THE C/U WILL  
TURN 'OFF' TH GLOW PLUGS  
AFTER AWHILE.

**T/LITE 'OFF' CHECK**

T/LITE 'OFF'  
CHECK >  
VOLTAGE AT CONTROL UNIT  
TERM #50 [bl/gn]  
IF 'HOT' C/U BAD  
IF NO CURRENT THE WIRE MAY  
HAVE A BREAK IN IT FROM  
THE N/SAFETY SW.

**TEST B**

KP III



**GLOW PLUG  
QUICK CHECK WITH THE BUS BARS REMOVED  
USE TEST/LITE OR DIGITAL OHM METER**

**T/LITE  
HOOK TO**

POS[+]  
TO  
GLOW PLUG

GLOW  
PLUG  
BUS BARS  
REMOVED

**TEST**

[C]  
EVERY  
GLOW PLUG

GO FROM  
G/P to G/P

**T/LITE ON**

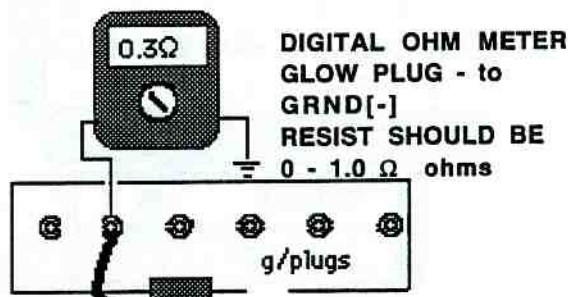
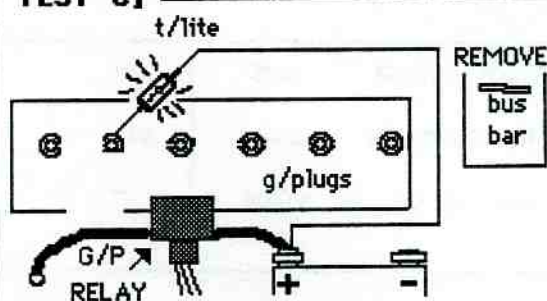
T/LITE 'ON'  
DIGITAL OHM METER  
GLOW PLUG - to GRND[-]  
RESIST SHOULD BE  
0 - 1.0  $\Omega$  ohms

**T/LITE 'OFF' CHECK**

T/LITE 'OFF'  
GLOW PLUG IS BAD  
[WON'T PROVIDE GRND -]

NOTE; A G/PLUG THAT IS  
WEARING OUT MAY ALLOW  
T/LITE TO COME ON BUT BE  
DIMMER.

**TEST C**





### LOW ENG POWER

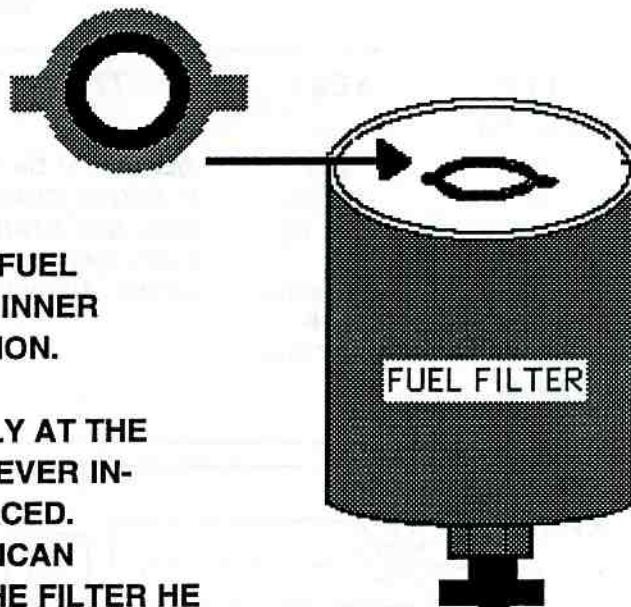
**DIESEL FILTER  
FUEL STARVING  
O-RING MISSING**

27

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FUEL STARVATION CAN OCCUR WHEN A FUEL FILTER HAS NOT BEEN FITTED WITH AN INNER SEAL, THIS ALLOWS FOR FUEL AEREATION.

IT MAY HAVE BEEN LEFT OFF ORIGINALLY AT THE FACTORY AND THEN SUBSEQUENTLY NEVER INSTALLED WHEN THE FILTER WAS REPLACED. PERHAPS SIMPLY BECAUSE THE TECHNICAN WOULD BELIEVE SINCE IT WASN'T ON THE FILTER HE REMOVED, IT WASN'T SUPPOSE TO BE INSTALLED ON THE NEW FILTER. CHECK THIS IF A POOR PERFORMANCE PROBLEM IS EVIDENT.



### DIESEL D-24 VALVE ADJUSTING

\*\*\* VALVE ADJUSTING TOOLS \*\*\*  
VOLVO PART NUMBERS:

VALVE SPRING COMPRESSOR no. 999 5196

VALVE SHIM PLIERS no. 999 5195

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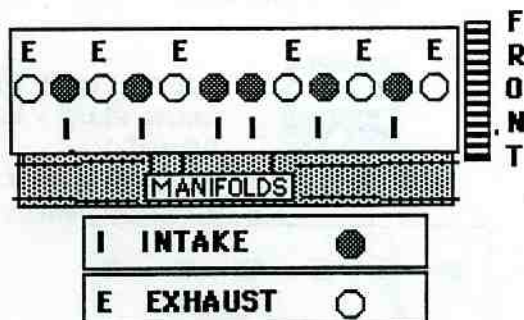
120

\* ALWAYS RETIGHTEN VALVE COVER NUTS AFTER ENGINE HAS WARMED UP !!

FIRING ORDER 1 - 5 - 3 - 6 - 2 - 4

SHIM THICKNESS -  
3.00-to-4.25 mm at steps 0.05mm

.012-to-.167inch at steps .002in



### \*\*\* VALVE ADJUSTMENT SPECS \*\*\*

		mm	inch
INTAKE	COLD	0.20	.008
EXHAUST	COLD	0.40	.016
INTAKE	WARM	0.25	.010
EXHAUST	WARM	0.45	.018
Range (+ or -)		± 0.05	± .002

**DIESEL D-24  
PUMP TIMING  
ADJUSTMENT**

\*\*\* TIMING ADJUSTING TOOLS \*\*\*  
VOLVO PART NUMBERS:  
DIAL INDICATOR HOLDER no. 999 5194

\*\*\* USE TOOLS LISTED BELOW FOR METHOD #2  
TURNING THE CAM'S REAR SPROCKET  
SPROCKET WRENCH no. 999 5199  
SPROCKET NUT WRENCH no. 999 5201

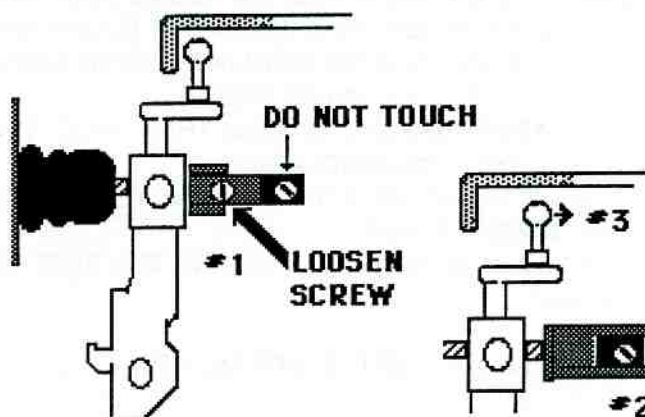
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\*\*\* INJECTION PUMP TIMING \*\*\*  
0.82 - 0.90mm  
0.032 - 0.035in

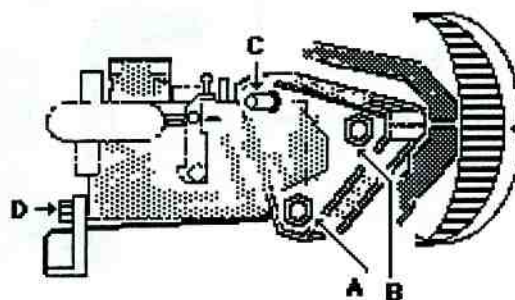
\*\*\* IMPORTANT - IMPORTANT \*\*\*

THE COLD START ENRICHMENT DEVICE MUST NOT BE OPERATING WHEN SETTING THE INJECTION PUMP TIMING. TO ELIMINATE IT, LOOSEN SCREW [#1]. WITH A SCREWDRIVER PRY LEVER TOWARDS THE FRONT OF THE ENGINE TO TAKE THE PRESSURE OF SLEEVE. DISCONNECT ACTIVATING LINK CABLE SLEEVE[#1] AND TURN IT 90° SO IT WILL SLIDE OVER THE CABLE END STOP[#2]. THEN PUSH LEVER TO REAR OF ENG[#3]. SEE DRAWING.



**DIESEL D-24  
PUMP TIMING  
ADJUSTMENT**

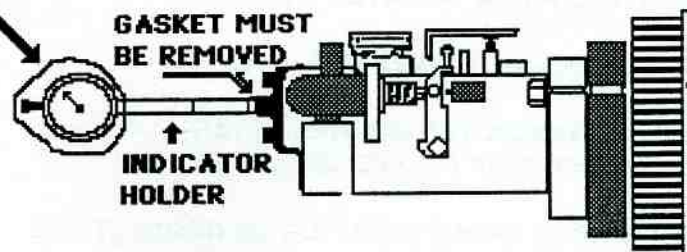
SLACKEN THE BOLTS[A,B,C &D] THAT MOUNT THE INJECTION PUMP TO THE BRACKETS. THEY SHOULD NOT BE LOOSEN EXCESSIVELY, THIS WOULD ALLOW PUMP TO MOVE TOO MUCH, MAKING A CONSISTENT SETTING DIFFICULT.



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RUBBER  
BAND



\*\*\* TO INSURE THAT THE TIMING READING IS ACCURATE, USE A LARGE RUBBER BAND TO MAINTAIN DIRECT PRESSURE ON THE DIAL INDICATOR.

MAKE SURE THE DIAL INDICATOR HOLDER IS TIGHTLY MOUNTED IN THE PUMP. THE CENTER PLUG & ITS' GASKET MUST BE REMOVED.



**DIESEL D-24  
PUMP TIMING  
ADJUSTMENT**

27

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**PUMP TIMING: BRING ENGINE TO TDC, #1 CYL. MARK ON PUMP GEAR WILL BE VERY CLOSE TO MARK ON PUMP MOUNTING BRACKET. NOTE: IF IT IS 180 DEGREES OFF, YOU ARE NOT ON CYL #1.**

**TURN BACK ENGINE WHILE WATCHING DIAL INDICATOR. DIAL WILL DROP ( TURN COUNTER CLOCKWISE). WHEN DIAL INDICATOR STOPS DROPPING, STOP TURNING THE ENGINE BACK. SET DIAL INDICATOR TO ZERO. NOW TURN ENGINE FORWARD TO TDC. THE READING ON THE INDICATOR IS YOUR PUMP TIMING.**

**IF INDICATOR READING IS LESS THAN SPEC, TURN PUMP INWARDS, TIGHTEN 2 PUMP BOLTS, CHECK READING AGAIN.**

**IF INDICATOR READING IS TOO HIGH, PULL PUMP OUTWARDS, TIGHTEN 2 BOLTS, CHECK PUMP TIMING AGAIN.**

**ONCE TIMING IS CORRECT TIGHTEN THE REST OF THE BOLTS SECURING THE PUMP IN THE BRACKET.**

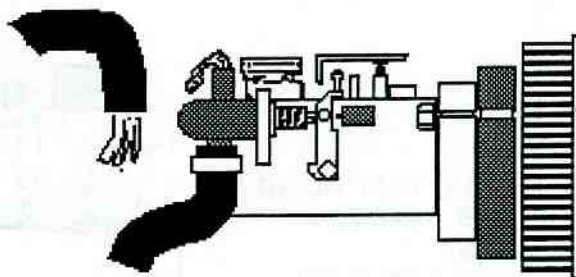
**RE-INSTALL THE COLD START DEVICE.**

**BLEEDING THE  
COOLANT SYSTEM**

**DIESEL ENGINE**

27

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**WHEN BLEEDING THE COOLANT SYSTEM ON A DIESEL ENGINE, IT IS ADVISABLE THAT YOU:**

- 1) FILL THE COOLING SYSTEM SLOWLY BEFORE STARTING ENGINE. TURN HEATER ON TO MAXIMUM HEAT.**
- 2) REMOVE THE HOSE FROM THE UPPER FITTING OF THE COLD START DEVICE. HOLD HOSE JUST BELOW FITTING, USE A PAN TO CATCH OVERFLOW COOLANT.**
- 3) RUN ENGINE, CONTINUE FILLING UNTIL COOLANT COMES OUT BOTH THE HOSE AND THE FITTING.**
- 4) RECONNECT HOSE, RUN ENGINE AN ADDITIONAL TEN MINUTES AFTER NORMAL ENG TEMP HAS BEEN REACHED. KEEP FILLING AS NEEDED.**

**NOTE: IF ENGINE IS COLD IT WILL RUN AT HIGH RPM'S UNTIL YOU RE-CONNECT THE HOSE ON THE COLD START DEVICE. THIS IS NORMAL.**

**CHECKING  
CYLINDER HEAD**

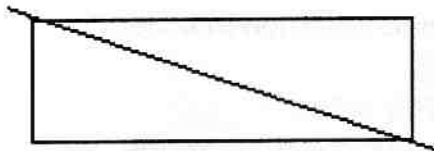
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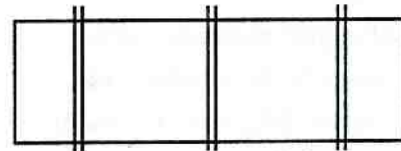
WHENEVER YOU REMOVE A CYLINDER HEAD FROM A DIESEL YOU MUST BE AWARE OF 4 THINGS.

1. HEAD WARPAGE.
2. TYPE OF HEAD BOLTS.
3. HEAD GASKET THICKNESS.
4. TIGHTENING SEQUENCE & RETIGHTENING.

CYLINDER HEAD MAY NOT BE MACHINED. IT MUST BE REPLACED IF WARP EXCEEDS MAXIMUM.



DIAGONALLY = MAX 0.5mm = 0.020 in



CROSSWISE= MAX 0.2mm=.008in

**2 TYPES OF VOLVO DIESEL HEAD BOLTS**

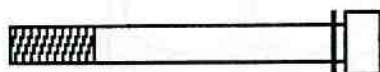
27

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**\*\*\* HEAD BOLTS \*\*\***

THERE ARE 2 DIFFERENT TYPES OF HEAD BOLTS USED ON VOLVO DIESELS. THEY ARE NOT INTERCHANGABLE. THEY MUST BE INSTALLED IN 2 COMPLETELY DIFFERENT WAYS.

ONE HEAD BOLT USES A 10mm ALLEN SOCKET.  
THE OTHER USES A 12 POINT SOCKET.



10mm allen



12 point



10mm allen

**USE NEW WASHERS. CONVEX  
SIDE UPWARDS.**

**TIGHTEN IN FIVE STAGES.**

1. 50 Nm (37 ft lbs)
2. 70 Nm (50 ft lbs)
3. 90 Nm (65 ft lbs)
4. Run engine untill oil temp  
is at least 50° C (122° F)
5. 90 Nm (65 ft lbs)

**RETORQUE**

After 600-1200 miles engine  
should be cold or almost cold.  
Slacken and retighten in order.

1. Slacken bolt 30 degrees
2. Torque to 90Nm (65 ft lbs)

12 point DRIVE

**USE NEW BOLTS. NO NEED TO REPLACE  
WASHERS.**

**TIGHTEN IN SIX STAGES.**

1. 40 Nm (33 ft lbs)
2. 60 Nm (44 ft lbs)
3. 75 Nm (55 ft lbs)
4. Angle-tighten 180 degrees in one  
movement.
5. Run engine untill oil temp is at least  
50° C (122° F)
6. Angle-tighten 90 degrees in one  
movement.

Slacken and retighten in order.

**RETORQUE**

After 600-1200 miles.  
Angle-tighten 90 degrees in one  
movement.

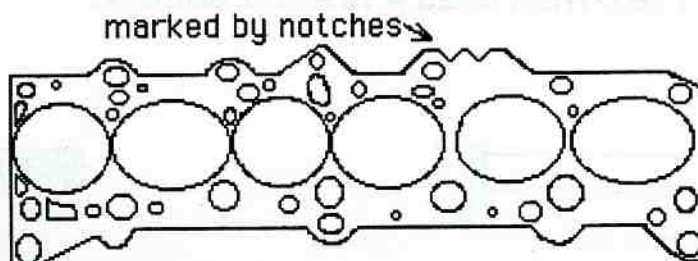
**3 DIFFERENT CYLINDER HEAD GASKETS**

**\*\*\* CYLINDER HEAD GASKET \*\*\***

**THERE ARE THREE DIFFERENT THICKNESS OF VOLVO  
DIESEL HEAD GASKETS.**

**THEY ARE MARKED BY 1, 2, OR 3 NOTCHES.**

**ALWAYS REPLACE GASKET WITH THE SAME GASKET  
THICKNESS AS YOU REMOVE FROM THE ENGINE.**



**TIGHTENING TORQUES**

**TIGHTENING TORQUES APPLY TO OILED BOLTS.**

**REMOVE BOLTS IN REVERSE ORDER WHEN  
REMOVING CYLINDER HEAD.**



FAN

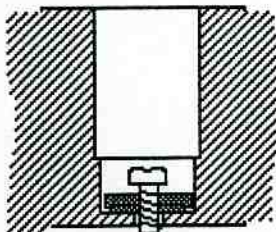
12	10	4	2	6	8	14
13	7	5	1	3	9	11

**REMOVING DIESEL INJECTOR SEALS**

**WHENEVER YOU REPLACE (OR REMOVE TO CLEAN AND TEST) INJECTORS ON DIESEL ENGINES YOU MUST REPLACE THE FLAME SHIELD.**

**MOST OF THE TIME THEY CAN BE REMOVED WITH A MAGNET OR A SNAP-RING PLIERS, BUT OCASSIONALLY THEY GET STUCK AND NO AMOUNT OF SOAKING WITH RUST PENETRANT WILL FREE THEM UP. THE BEST WAY TO OVERCOME THIS IS TO LET THE ENGINES HIGH COMPRESSION REMOVE THE SHIELD.**

**TAKE A SHEET METAL SCREW LARGE ENOUGH TO FIT TIGHTLY INTO THE HOLE IN THE CENTER OF THE FLAME SHIELD. STUFF A RAG INTO THE HOLE AND COVER THE HOLE WITH A PIECE OF WOOD OR SOMETHING SIMILAR. (DON'T JUST CLOSE THE HOOD BECAUSE THE SEAL WILL DEFINITELY PUT A DENT IN THE HOOD.) CRANK THE ENGINE OVER AND PREPARE FOR THE LOUD "POP" WHEN THE SEAL COMES OUT!**



**CAUTION: DO NOT USE A SCREW  
LONGER THAN 1/2 inch LONG.  
OTHERWISE DAMAGE MAY RESULT TO  
THE GLOW PLUG.**

**\*\*\* DON'T FORGET THE BOARD!!! \*\*\***



**HARD' BRAKE  
PEDAL**

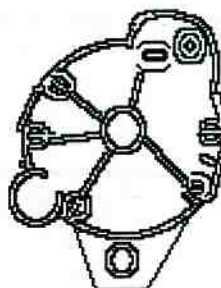
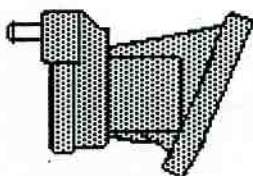
**POOR POWER  
BRAKE ASSIST**

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### DIESEL VACUUM PUMP

IF YOUR DIESEL CUSTOMER EXPERIENCES HARD BRAKES OR NO POWER BRAKES WHEN COLD, IT PROBABLY NEEDS A VACUUM PUMP. A GOOD PUMP WILL HAVE VACUUM AS SOON AS YOU START THE ENGINE. A WORN PUMP WILL NOT HAVE VACUUM UNTIL A FEW MINUTES AFTER THE ENGINE HAS BEEN RUN.



**NOTES**

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## GROUP 28 ELECTRONIC IGNITION SYSTEMS

- 28- 201 BOSCH POINTLESS IGNITION [BPI] SYSTEM COMPONENTS
- 28- 207 BPI THEORY OF OPERATION
- 28- 209 BPI POOR & NO RUN \_\_ CHECK ITEMS
- 28- 221 BPI POOR & NO RUN \_\_ INDUCTION COIL
- 28- 271 BPI \_\_ IGNITION TIMING 'OFF' \_\_ STAR WHEEL SHIFTED
- 28- 501 'MPG' COMPUTER CONTROLLED IGNITION SYSTEM \_\_ AREAS

## TO CHECK

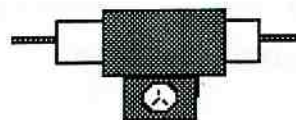
- 28- 511 MPG \_\_ THEORY OF OPERATION \_\_ HALL SWITCH OPERATION
- 28- 521 MPG \_\_ CHECK ITEMS
- 28- 531 MPG \_\_ TERMINAL FUNCTIONS \_\_ CHECK ITEMS
- 28- 537 MPG \_\_ HALL SWITCH CHECKS
- 28- 701 'EZK' BOSCH COMPUTER CONTROLLED IGNITION SYSTEM
- 28- 711 EZK \_\_ THEORY OF OPERATION
- 28- 714 EZK \_\_ LIMP HOME
- 28- 717 EZK \_\_ HALL SWITCH
- 28- 731 EZK \_\_ CHECK POINTS

## GROUP 29 ENGINE SPEED CONTROL SYSTEMS

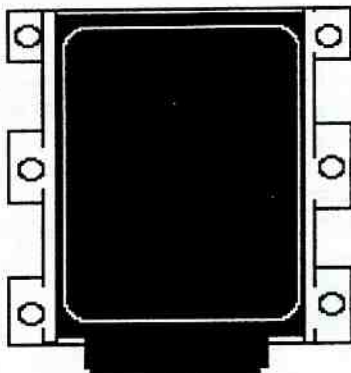
- 29- 001 A/C IDLE INCREASE \_\_ SOLENOIDS \_\_ EARLY VERSIONS
- 29- 104 IDLE CONTROL SYSTEMS \_\_ '81-ON
- 29- 131 A/C IDLE INCREASE \_\_ SOLENOIDS & BYPASS VALVES  
up to '81
- 29- 301 CONSTANT IDLE SYS [CIS] K-JETRONIC SYS  
LH-INJECTION SYS
- 29- 307 CONSTANT IDLE SYS [CIS] THEORY & COMMON FAULTS
- 29- 311 CONSTANT IDLE SYS [CIS] SETTING BASE IDLE
- 29- 321 CIS VALVE PROBLEMS \_\_ STICKING \_\_ CHECK ITEMS
- 29- 329 CIS THROTTLE SWITCH \_\_ THROTTLE ADJUSTMENT
- 29- 354 BASE IDLE ADJUST SCREW PORT CLOGGED
- 29- 361 K-JET WITH CIS



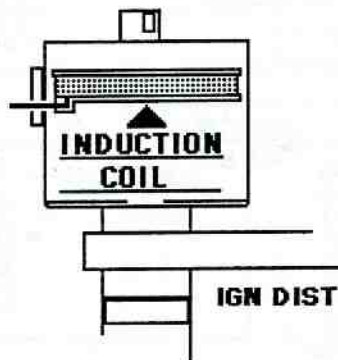
**TO PREVENT DAMAGE, THE KEY MUST BE 'OFF' [KP O], BEFORE REMOVING THE C/U CONNECTOR.**



**RESISTOR**



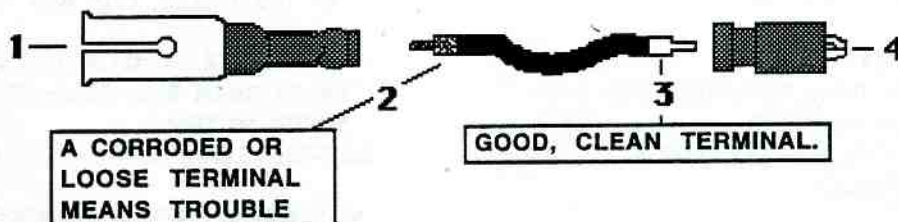
**IGNITION CONTROL UNIT**



**STAR WHEEL**

•• RESISTOR TERMINAL ENDS CAN CORRODE CAUSING MISSING, STALLING, ROUGH IDLE & POOR ACCELERATION PROBLEMS.  
 CHECK #1,2,3,4 & DIST & IGNITION COIL TERMINAL TOWERS. THESE CORROSION PROBLEMS CANNOT BE PROPERLY CLEANED. THEY WILL HAVE TO BE REPLACED.

✓ CHECK FOR HIDDEN IGNITION CABLE FAULTS. THE CABLES UNSCREW FROM RESISTOR ENDS. CHECK FOR CORRODED TERMINALS. REPLACE AS NEEDED.



••• BOSCH POINTLESS IGNITION USED ON •••

1975 B-20, B-30  
 1976 THRU 1981 B-21F  
 1981 THRU 1985 4cyl TURBOs [200 series]  
 1976 THRU 1987 B-27, 28 V6s [200&760 ser]

## BOSCH IGNITION

### THEORY OF OPERATION

THIS IS A 'POINTLESS TYPE' IGNITION SYSTEM.  
THAT MEANS THAT ANY IGNITION TIMING ADVANCING  
IS STILL DONE BY CENTRIFICAL AND VACUUM  
DIAPHRAGM UNITS IN THE DISTRIBUTOR.

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THE BOSCH IGNITION SYSTEM IS A BASIC  
'POINTLESS TYPE'.

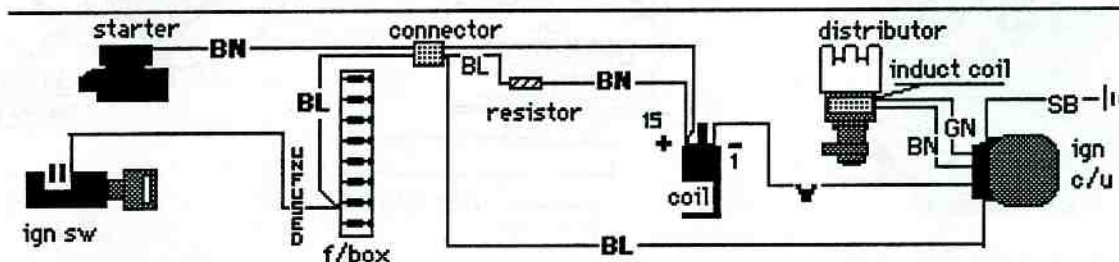
IT USES AN INDUCTION COIL, PERMANENT  
MAGNETIC FIELD AND A ROTATING STAR  
WHEEL IN THE DISTRIBUTOR TO TAKE THE PLACE OF  
THE IGNITION POINTS.

ROTATING THE STAR WHEEL THRU THE MAGNETIC  
FIELD ACTS LIKE THE 'HIGH' POINTS OF A  
'CONVENTIONAL POINT TYPE' DISTRIBUTOR CAM.

THE IGN C/U WILL PROVIDE A LOW VOLTAGE INPUT  
TO THE INDUCTION COIL.

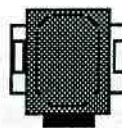
THE C/U THEN MONITORS THE IMPULSES FROM THE  
FIELD BUILD UP & BREAK DOWN THAT OCCURS DUE  
TO THE ROTATION OF THE STAR WHEEL THRU THE  
FIELD. THE C/U WILL AMPLIFY THIS SIGNAL AND  
GROUND[-] OUT [ENERGIZE] THE IGN COIL.

THE C/U PROVIDE A CONSTANT DWELL, FOR A  
PRECISE IGN COIL SATURATION PERIOD. THIS IN  
TURN PROVIDES A GOOD QUALITY SPARK.



## BOSCH POINTLESS

**IGNITION**  
**164s, 240s**  
**V6[with K-JET FI]**



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ENGINE WON'T START - USE THE 'BASIC  
CHECK' TO DETERMINE IF PROBLEM IS IN  
FUEL OR IGNITION SYSTEM.

CHECK DWELL (SHOULD REMAIN STABLE  
AT IDLE & INCREASED RPMs)

#### \*\*\* ENG WON'T START

- ✓ DIST INDUCTION COIL( RESISTANCE &  
FOR GROUNDED CONDITION)
- ✓ IGN RESISTOR (CHK FOR VOLTAGE &  
PROPER RESISTANCE)

#### \*\*\* IGNITION TIMING IS 'OFF'

- ✓ DIST STAR WHEEL LOCK PIN (BROKEN)
- ✓ DIST STAR WHEEL(CHK FOR BENT SPIKES)

#### \*\*\* ENG RUNS POORLY

- ✓ C/U GROUND (-) POINT BY WINDSHIELD  
WASHER BRACKET.

- ✓ ALL CONNECTIONS (IMPORTANT !!!)  
AT DIST, COIL, C/U, IGN RESISTOR.

200 SERIES - CHECK THE CONNECTORS  
RIGHT REAR ENG COMPARTMENT BY  
WIPER MOTOR.

(MUST BE CLEAN, TIGHT, USE DIALETRIC GREASE-

NO VOLTAGE LOSS IS PERMISSIBLE)

TO PREVENT DAMAGE, THE KEY MUST BE  
'OFF' [KP O], BEFORE REMOVING THE C/U  
CONNECTOR.



**BOSCH IGNITION  
UNIT TESTING  
ENG STALLS or  
NO START  
INDUCTION COIL**

THE INDUCTION COIL IS LOCATED IN THE IGN DIST.

**- COMMON FAULT -**

THE HEAT BUILDUP IN THE IGN DIST CAUSES AN EXPANSION BREAK IN THE INDUCTION COIL, ERRATIC RUNNING AND STALLING ARE THE RESULT.

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THE MOST COMMON, BUT NOT THE ONLY SYMPTOM OF A BAD INDUCTION COIL IS A ENGINE THAT WILL START COLD BUT AS IT WARMS UP IT BEGINS TO LOSE IGNITION. FINALLY AS IT HAS BECOME HOTTER THE ENG WILL DIE AS THE IGNITION COMPLETELY BREAKS DOWN. IT MAY RESTART AFTER A PERIOD OF TIME AS THE INDUCTION COILS COOLS DOWN. HOWEVER IT WILL THEN BECOME HOT ONCE AGAIN AND WILL DIE. THIS IS BECAUSE AS THE INDUCTION COIL HEATS UP IT WILL EXPAND AND A BREAK IN THE WINDING WILL OCCUR. THIS BREAK CAUSES THE RESISTANCE TO RISE (HIGH OHMS & POSSIBLY INFINITY).

WHEN CHECKING THE INDUCTION COIL FOR AN OPEN CIRCUIT KEEP IN MIND THE COIL HAS A SPECIFIC RESISTANCE RANGE (4cyl 950-1200 ohms) (6cyl 530-680 ohms).

SO IN THE EVENT THAT YOU GET A OHM READING THAT IS DEFINITELY HIGHER THAN THE SPECS, BUT YET IT IS NOT INFINITY, AN OPEN CIRCUIT, THE IND COIL IS BAD.

JUST BE SURE YOUR OHM METER AND CONNECTIONS ARE GOOD, SO DOUBLE CHECK IT. A HIGHER THAN SPEC BUT DECREASING OHM READING IS COMMON FOR A BAD INDUCTION COIL.

INFINITY  $\infty$  (OPEN) IS OBVIOUSLY BAD.

**✓ CHECK FOR A GROUNDED INDUCTION WIRE.**

TEST EITHER WIRE WITH AN OHM METER TO GROUND[-], IT SHOULD BE 'OPEN [INFINITY].

**BOSCH IGNITION  
UNIT TESTING  
DISTRIBUTOR  
INDUCTION COIL  
TESTING**

**TEST #1 CHECK RESISTANCE AT THE  
INDUCTION COIL CONNECTOR.**

**OHMS MUST BE IN RANGES LISTED**

A faulty coil will be 'open' when hot & BUT MAY slowly 'close' as as coil cools off.

IF ohms start high above specs & come down when cool, coil FAULTY.

**CORRECT RESISTANCES**

**\*\*240 B-21 950-1250 ohm**

1600 ohms NO GOOD

**\*\*260 B-27-28 530-680 ohm**

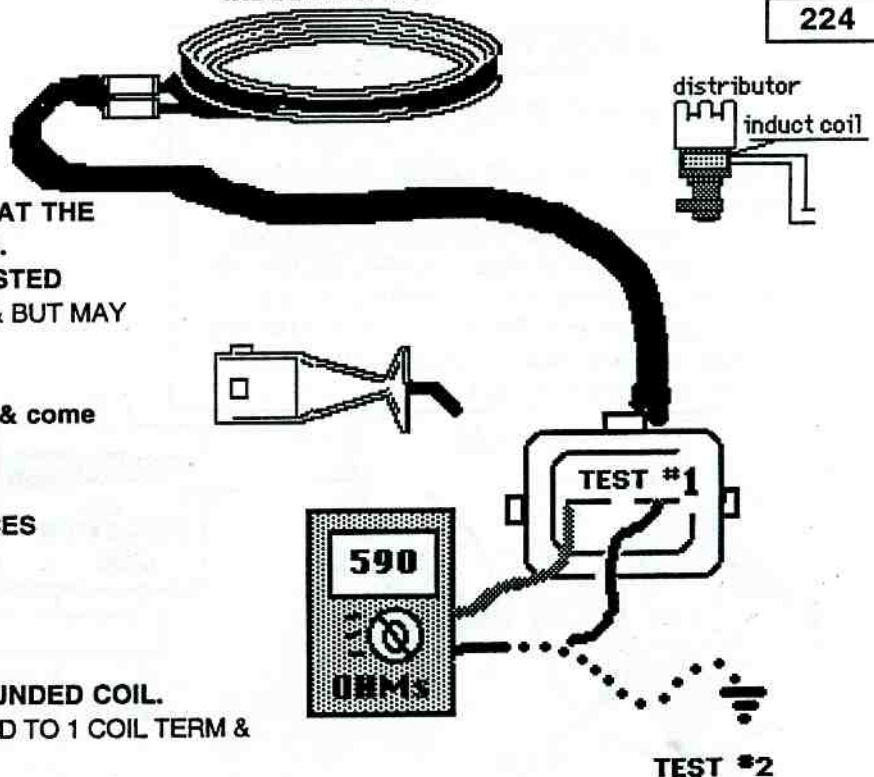
1000 ohms NO GOOD

**TEST #2 ALSO CHK FOR GROUNDED COIL.**

CONNECT ONE OHM METER LEAD TO 1 COIL TERM & OTHER LEAD TO GROUND(-).

MUST BE INFINITY  $\infty$  "OPEN"

INDUCTION COIL



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TEST #2

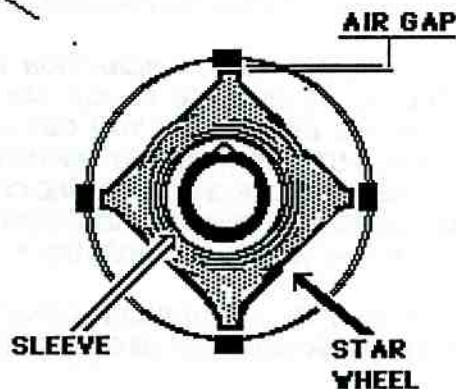
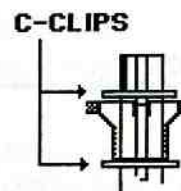
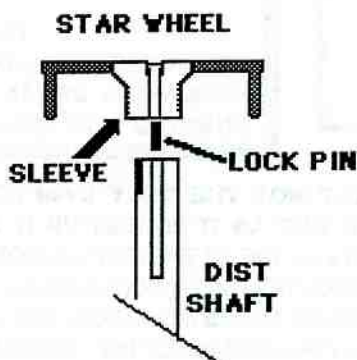
**BOSCH IGNITION  
IGN TIMING 'OFF'  
INDUCTION COIL  
STAR WHEEL  
BROKEN LOCK PIN**

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THE STAR WHEEL LOCK PIN ON THE EARLY MODELS WAS OF A ROLL PIN DESIGN.

THEY WERE FRAGILE & OFTEN WOULD BREAK. THE STAR WHEEL THEN WILL SLIP AROUND THE DIST SHAFT & THE TIMING WILL BE 'OFF'. USE THE LATE STYLE LOCK PIN WHICH IS SOLID AND WON'T BREAK.



**\*\*\*CAUTION\*\*\***

WHEN THE DIST CAP IS OFF & THE CAP CLIPS COULD GET CAUGHT ON THE STAR WHL.

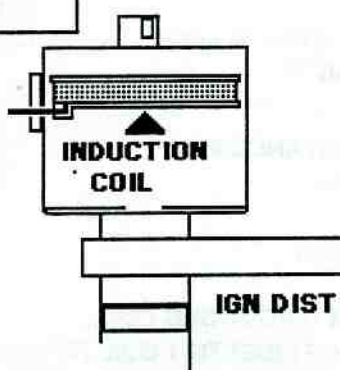
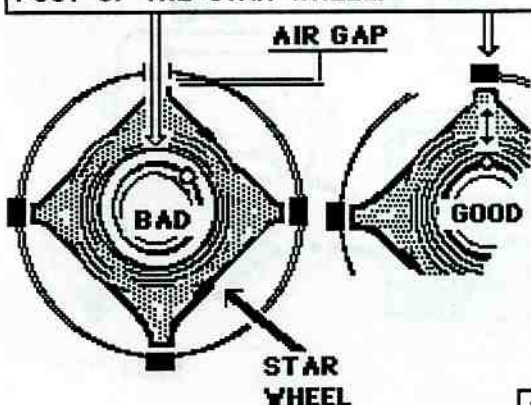
THE STAR WHL POSTS COULD BEND IF THE ENG IS CRANKED OVER. THE AIR GAP MUST BE THE SAME ON ALL POSTS. THEY SHOULD ALL BE ALIGNED IN THE SAME WAY WITH THEIR CLOSEST STATIONARY POST.

**\*\*\*\* IGNITION TIMING 'OFF' \*\*\*\***

**LOOSE SLEEVE IN THE STAR WHEEL**

THE SLEEVE IN THE STAR WHEEL CAN BECOME LOOSE.

WHEN THIS HAPPENS THE 'STAR' WILL SLIP IN A WAY THAT WILL PUT IT 'OUT OF TIME', CAUSING THE COIL TO SPARK AT A TIME WHEN THE ROTOR IS NOT ALIGNED WITH THE DIST CAP ELECTRODES. CHECK THAT THE ROLL PIN HOLE IS ALSO ALIGNED WITH THE POST OF THE STAR WHEEL.

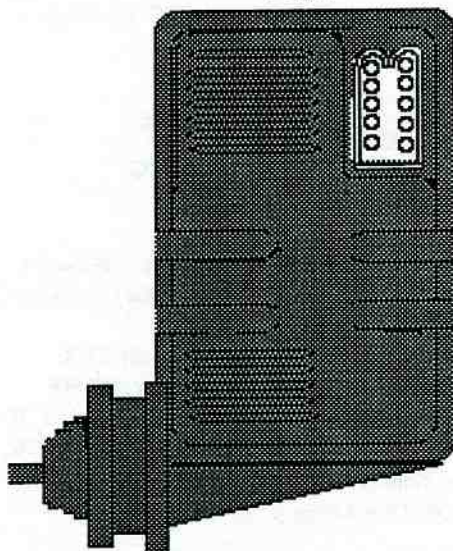


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# MPG IGNITION CONTROL UNIT

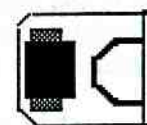
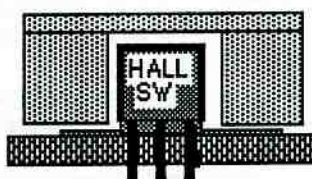


TO PREVENT DAMAGE, THE KEY MUST BE 'OFF' [K P O], BEFORE REMOVING THE C/U OR IGN DIST CONNECTORS.

SOME 1981's [2 DOORS]  
ALL 1982 THRU 1988 [NOT USED ON TURBOs]  
B-21F, 23F & B-230F 240 DL & GL.

GRAY CONTROL UNIT ON RIGHT SIDE NEAR HEADLAMP.

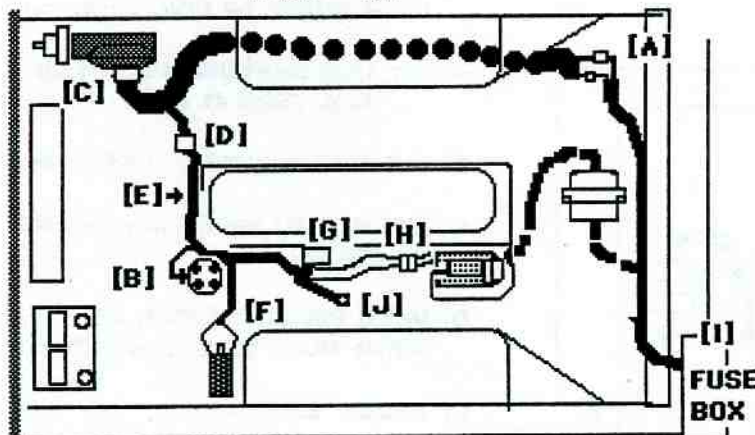
UTILIZES A 'HALL' SWITCH IN THE DIST.  
EARLY VERSIONS HAD CHRYSLER DIST.  
(WHITE DIST CAP)  
LATER VERSION USE BOSCH DIST.  
(ORANGE DIST CAP)



HALL SWITCH

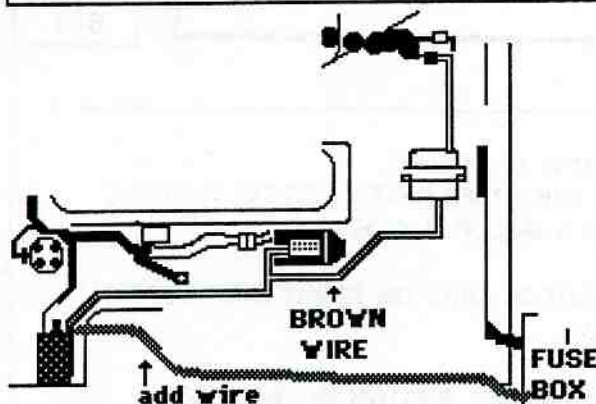
## ENGINE WON'T START IGNITION NOT OPERATING

1981 - 84



### .. CONNECTIONS & AREAS .. ITEMS TO CHECK

- A] POWER SUPPLY & IGN SIGNAL  
THESE ARE CRITICAL CONNECTORS
- B] IGN DIST 3 WIRE CONNECTOR  
PIN TERMS SHOULD HAVE SLEEVES.
- C] MULTI PIN CONNECTOR AT C/U  
TERMS MUST BE CLEAN & TIGHT.
- D] CONNECTOR FOR COIL TERM #1
- E] WORN THRU WIRES UNDER ENG BY CRANK.
- F] WORN THRU INSULATION OF  
LEAD GOING TO COIL TERM #1[-]
- G] KNOCK SENSOR
- H] 1983-84 MICRO SWITCH
- I] FUSE BOX POWER SUPPLY FOR  
IGN SYS [UNFUSED]
- J] SYSTEM GRND[-] INT MANIFOLD  
RED SLEEVE OVER BLACK WIRE.



YOU CAN REPAIR THE CONNECTION THAT IS AT FAULT OR ADD A SEPARATE POWER WIRE.

WE FEEL IT IS BEST TO ADD A WIRE FROM THE UNFUSED SIDE OF THE FUSE BOX TO TERM#15 OF THE COIL. THE FUSE TERM #11[unfused] IS WHERE THE POWER FOR THE BLUE WIRE COMES FROM, SO IT WILL BE THE BEST ONE TO USE.

MAKE SURE THE TERM IS NOT FUSED AND GETS CURRENT ONLY WITH THE KEY IN THE 'ON' POSITION, KP II.

--- 1981 - 82 ---  
--- STARTS & DIES PROBLEM ---  
A STRANGE RUNNING PROBLEM CAN EXIST IN THE '81-82 'MPG' IGNITION SYSTEM. IT CAN BE ANY ONE OR COMBINATION OF THE FOLLOWING: THE ENGINE -

- \* STARTS & DIES.
- \* STARTS & POOR IDLE.
- \* STARTS & POOR ACCELERATION.
- \* STARTS & ENGINE DIES WHEN YOU GO TO ACCELERATE.

THE ENGINE ACTS LIKE IT IS NOT GETTING ENOUGH FUEL!! ACTUALLY THE IGN IS NOT GETTING ENOUGH CURRENT TO TERM #15 OF THE COIL.

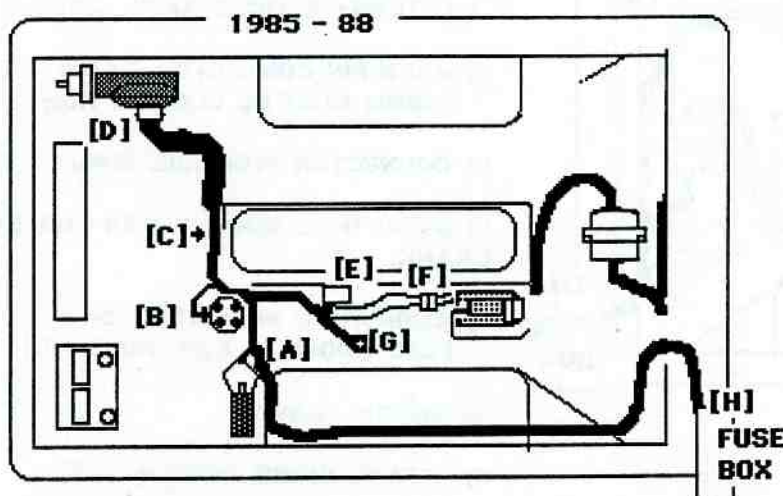
THE WIRE THAT SUPPLIES CURRENT TO TERM #15 OF COIL COMES FROM THE PIGTAIL CONNECTION ON BLUE WIRE BY RIGHT HOOD HINGE, GOES THRU ENG MAIN HARNESS PLUG, TO STARTER IGN BYPASS TERM ON THE SOLENOID, THEN TO COIL. YOU CAN EASILY CHECK THIS BY JUMPING FROM THE BATTERY POS[+] TERM TO THE COIL TERM #15[+].

IF THE ENGINE NOW RUNS NORMALLY THE CONNECTIONS ALONG THE WAY FOR THE BROWN WIRE ARE BAD.

28

507

\*\*\*\* ENGINE WON'T START \*\*\*\*  
IGNITION NOT OPERATING



.. CONNECTIONS & AREAS ..  
ITEMS TO CHECK

A] WORN THRU INSULATION OF LEAD GOING TO COIL TERM #1[-]

NOTE; 1988 HARNESS PLUG FOR COIL TERM #1 & #15

B] IGN DIST 3 WIRE CONNECTOR.

C] WORN THRU WIRES UNDER ENG BY CRANK.

D] MULTI PIN CONNECTOR AT C/U - TERMS MUST BE CLEAN & TIGHT.

E] KNOCK SENSOR

F] HARNESS CONNECTOR FOR IGNITION SIGNAL TO F/INJ C/U.

G] SYSTEM GRND[-] INT MANIFOLD RED SLEEVE OVER BLACK WIRE.

H] FUSE BOX POWER SUPPLY FOR IGN SYS [UNFUSED]

28

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• LIMP HOME MODE •

THIS IGNITION IS A 'POINTLESS' TYPE. IN PLACE OF IGNITION POINTS THE SYSTEM USES A HALL EFFECT SWITCH (HALL/SW), THAT IS LOCATED IN THE DISTRIBUTOR.

THERE IS A **ELECTRONIC CONTROL UNIT (C/U)**, WHICH IS A MICRO PROCESSOR THAT WILL RECEIVE SIGNALS FROM THE HALL/SW, A **KNOCK SENSOR**[83-on], VACUUM FROM INTAKE MANIFOLD (engine load), THROTTLE POSITION FROM **THROTTLE MICRO SWITCH**.

IT WILL USE THESE SIGNALS TO EVALUATE THE ENGINE'S RUNNING MODE AND IT'S VARIOUS 'IGNITION' NEEDS. THEN IT WILL VARY BOTH DWELL & IGNITION TIMING ADVANCE TO MATCH THE ENGINE'S NEEDS.

[1983 and on] **KNOCK SENSOR**. THE KNOCK SENSOR WILL SIGNAL THE C/U ANY NEED FOR IGNITION RETARD DUE TO SPARK KNOCK. FAULTS WITH THE KNOCK SENSOR WILL NOT KEEP ENG FROM RUNNING.

THE LIMP HOME MODE IS A 'FAULT' TRIGGERED RUNNING MODE. THIS MODE WILL PROVIDE THAT IN THE EVENT OF A FAULT IN THE INTERNAL CIRCUITRY OF THE IGNITION C/U, THE C/U WILL AT LEAST LET THE ENGINE RUN. THE IGNITION WILL HAVE A STABLE DWELL, AND WILL NOT HAVE ANY TIMING ADVANCE. THIS MEANS THAT ENGINE PERFORMANCE IS SEVERELY DIMINISHED. SO IT IS SAID "YOU WILL BE ABLE TO LIMP HOME"

... ONE NOTE ON THIS IS THAT WE HAVE SELDOM SEEN THIS HAPPEN. MOST OF THE TIME WHEN THERE IS AN IGN C/U FAILURE THE ENGINE WILL NOT EVEN RUN OR STALL AT STOPS.

• KNOCK SENSOR PROBLEMS WILL NOT KEEP ENGINE FROM RUNNING.

• THROTTLE SWITCH PROBLEMS WILL NOT KEEP ENGINE FROM RUNNING.

---MPG (CHRYSLER) COMPUTER CONTROL IGNITION---

... HALL EFFECT SWITCH ...

THE HALL/SW HAS THREE (3) WIRES THAT COME FROM THE C/U.

WIRE COLOR	VOLT	FUNCTION
A] GREEN	-- 12.0 V	WORKING VOLTAGE
B] YELLOW	-- 5.0 V	CONTROL VOLTAGE
C] BLACK	-- 0.0 V	GROUND CIRCUIT

---voltages are with harness unplugged---

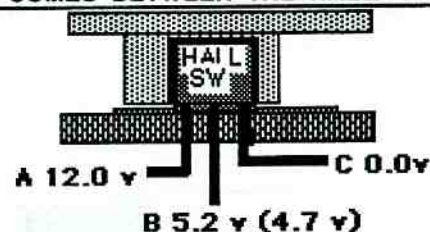
WHEN THE DIST VANES PASS THRU THE HALL/SW THE VOLTAGE IN THE CONTROL CIRCUIT [B] BUILDS UP.

WHEN THE WINDOWS PASS THRU THE HALL/SW THE VOLTAGE IN THE CONTROL CIRCUIT [B] DROPS.

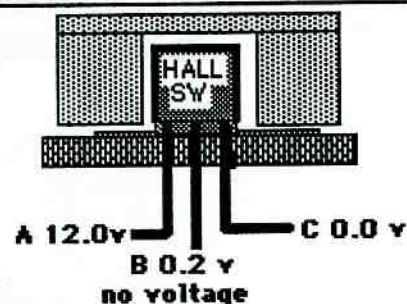
THESE VOLTAGE CHANGES WILL SIGNAL THE C/U TO 'FIRE' IGN COIL.

THE C/U WILL ADJUST THE TIMING ADVANCE SINCE THERE ISN'T ANY MECHANICAL OR VACUUM ADVANCE IN THE DISTRIBUTOR.

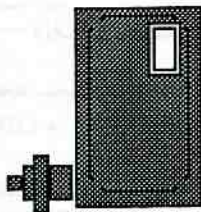
VOLTAGE IS BUILT UP IN 'B CIRCUIT' WHEN VANE COMES BETWEEN THE HALL/ SW



NO VOLTAGE IS IN 'B CIRCUIT' WHEN WINDOW IS BETWEEN THE HALL/ SW



**"MPG" IGNITION  
(CHRYSLER)  
240 DLs & GLs  
POOR OR NO RUN  
✓ CHECK ITEMS**



**ENGINE WON'T START - USE THE  
'BASIC CHECK' TO DETERMINE IF  
PROBLEM IS IN FUEL OR IGNITION  
SYSTEM.**

**28  
521**

**1981 - 82 ENG STARTS & DIES -SEE PROBLEM  
AREAS FRONT OF 'MPG' SECTION**

**CHECK DWELL approx. 39° at Idle  
(SHOULD INCREASE WITH RPMs)**

✓ **VACUUM ADVANCE** (OPERATION & VAC LEAKS AT  
HOSE ENDS, UNDER ENG WHERE IT RUNS WITH IGN  
WIRE HARNESS)

✓ **ALL CONNECTIONS (IMPORTANT !!!)**  
AT DIST, COIL, C/U, ENG HARNESS, RIGHT REAR ENG  
COMPARTMENT BY WIPER MOTOR (MUST BE CLEAN,  
TIGHT, USE DIALECTRIC GREASE-  
**NO VOLTAGE LOSS PERMISSIBLE**)

✓ **KNOCK SENSOR 1983 - on** (OPERATION &  
CONNECTION)

✓ **WIRE HARNESS DAMAGED** - CHK WHERE IT  
RUNS UNDER FRONT OF ENG BY CRANK PULLEY FOR  
GROUNDED WIRES ETC.

✓ **CHECK HALL SWITCH OPERATION**  
SEE UNIT TESTING OF HALL SWITCH IN THIS GROUP.

✓ **GROUND[-] WIRE IS BOLTED TO THE  
INTAKE MANIFOLD.**  
IT WILL USUALLY HAVE A RED SLEEVE ON THE WIRE  
NEAR THE TERMINAL.

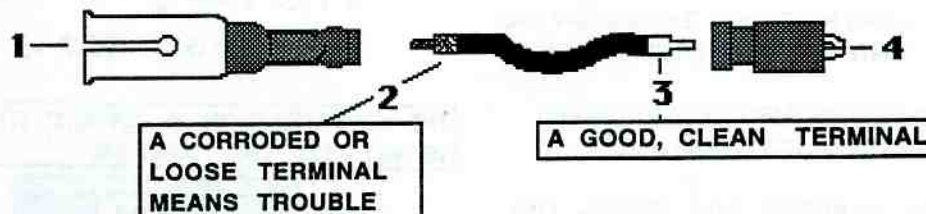
**LOCATION DEPENDS ON WHICH INJECTION  
SYSTEM IS USED.**

- **K-JET** GROUND[-] IS ON COLD START  
INJECTOR BOLT.
- **LH INJ** GROUND[-] IS ON BOLT FOR  
THROTTLE MECHANISM BRACKET

**•• RESISTOR TERMINAL ENDS CAN CORRODE CAUSING MISSING, STALLING, ROUGH  
IDLE & POOR ACCELERATION PROBLEMS.**

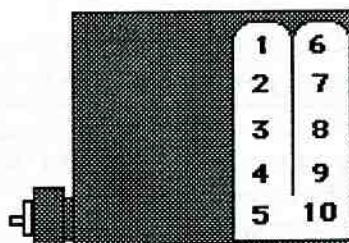
CHECK #1,2,3,4 & DIST & IGNITION COIL TERMINAL TOWERS. THESE CORROSION PROBLEMS CANNOT  
BE PROPERLY CLEANED. THEY WILL HAVE TO BE REPLACED.

✓ **CHECK FOR HIDDEN IGNITION CABLE FAULTS. THE CABLES UNSCREW FROM  
RESISTOR ENDS. CHECK FOR CORRODED TERMINALS, REPLACE AS NEEDED.**





**"MPG" IGNITION  
(CHRYSLER)  
240 DLs & GLs  
CONTROL UNIT  
TERMINALS**



TERMINAL NOS. OF THE  
PINS ON THE IGNITION  
C/U.

28

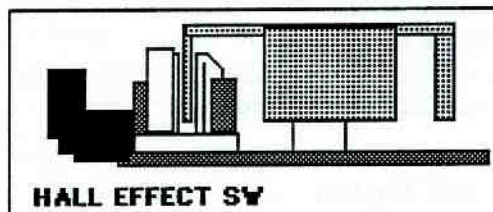
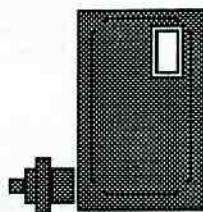
531

- 1 - GROUND IMPULSES TO COIL TERM #1[-]  
[white or grey] KP IIS [IGN ON-STALLED]  
SHOULD BE BAT VOLT
- 2 - FROM UNFUSED TERM OF FUSE BOX  
[blue] KP IIS, KP II[RUNNING] SHOULD  
BE approx BAT VOLT
- 3 - POWER[+] FOR HALL SW [green] 12.0v
- 4 - not used
- 5 - HALL SW CONTROL VOLTAGE [IMPULSE]  
EARLY [yel] LATE  
4.7v - KP II eng stalled -- 5.0v  
[if vane is between hall/sw or H/SW unplug]  
  
2.4v cranking & run 3.6v  
  
0.0v -[if hall/sw space open] - 0.0v  
[the WINDOW space]

- 6 - '83- on KNOCK SENSOR LOCATED  
BETWEEN CYL 2&3, PULSATING  
GROUND[-] FROM K/SENSOR ACTS ON  
2.0 VOLTAGE FROM THE IGN C/U.  
[brown]
- 7 - THROTTLE SWITCH [orange]  
0.1v idle 4.9v accel
- 8 - '85 - on IGN SIGNAL TO F-INJ C/U  
[grey]
- 9 - GROUND[-] FOR HALL SW [black]
- 10 - GROUND[-] CONTROL UNIT [black]

TO PREVENT DAMAGE, THE KEY MUST BE  
'OFF' [KP O], BEFORE REMOVING THE C/U  
OR IGN DIST CONNECTORS.

**"MPG" IGNITION  
ENG WONT START  
HALL SWITCH**



HALL EFFECT SW

28

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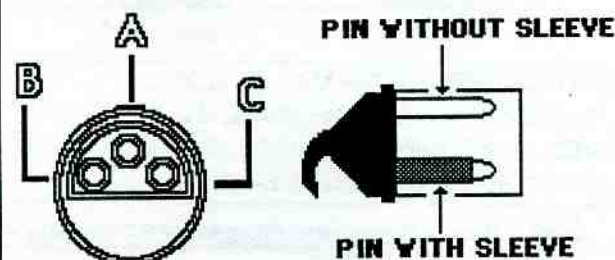
—DO NOT DISCONNECT TERMINALS WITH KEY IN 'ON' POSITION—  
POOR CONNECTIONS ARE OFTEN THE CAUSE OF MANY PROBLEMS.

HALL SWITCH TERMS ARE ESPECIALLY VULNERABLE. THE CHRYSLER & EARLY BOSCH PIN TYPE TERMS SHOULD HAVE SLEEVES OVER ALL THREE[3] TERMS TO INSURE A GOOD CONTACT. SEE DRAWING.

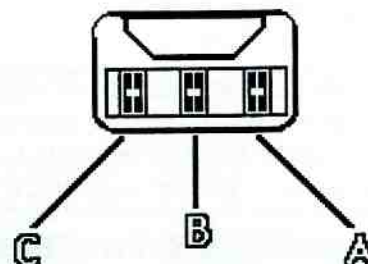
• TIGHT-CLEAN-CORROSION RESISTANT TERMS ARE A MUST, USE DIALECTRIC GREASE •

**DISTRIBUTOR TERMINALS**

**CHRYSLER & EARLY BOSCH**



**LATE BOSCH**

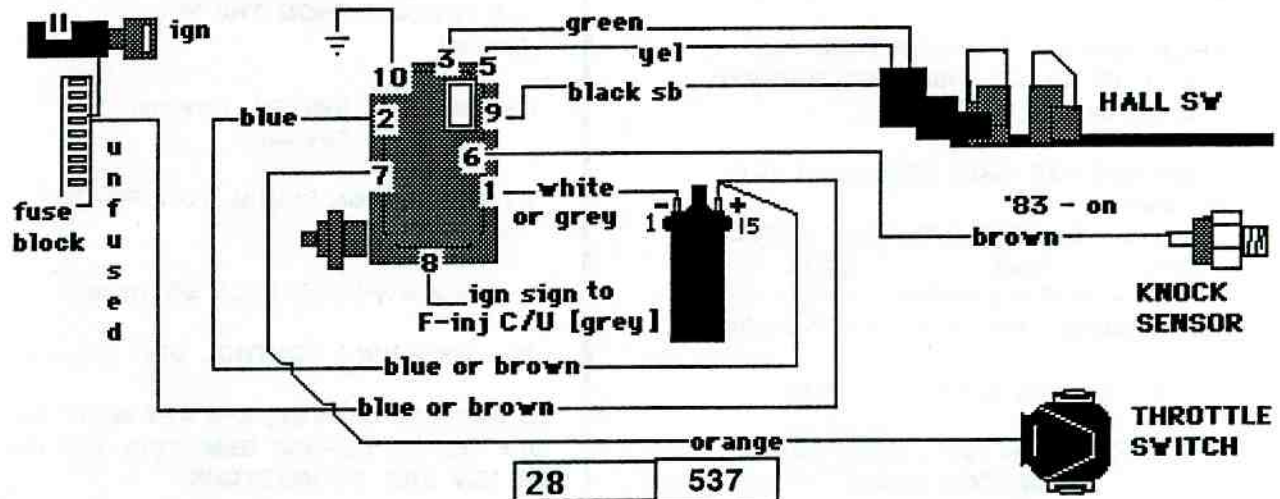


A--BAT VOLT-----12.7v TEST LAMP LITES ONLY DIMLY  
 B--CONTROL VOLT---5.0v TEST LAMP WON'T LITE [not enough amperage]  
 C--GROUND-----0.1-0.3 ohms USE QUALITY OHM METER

\*\*\* ENGINE WON'T START --- IGNITION NOT OPERATING \*\*\*

WITH IGN 'OFF'..... DISCONNECT THE DIST TERM ..... TURN IGN TO 'RUN'[KP II]

1. JUMP TERMS 'B' TO 'C' FOR 1 or 2 SECONDS.....
2. IGN COIL SHOULD FIRE[when jumper wire IS removed], ALSO INJ F/PUMP SHOULD MOMENTARILY RUN.....  
 IF THIS HAPPENS IT IS LIKELY THE IGN C/U IS OK, BUT THERE IS STILL A CHANCE THAT BY JUMPING TERMS 'B' TO 'C' THE IGN C/U HAS BEEN 'SHOCKED' INTO OPERATING.
3. PLUG THE DIST TERM BACK IN & IF ENG NOW WILL START, THE C/U IS PROBABLY BAD???



## CHECKING HALL SWITCH ✓ check for proper voltages at

\*\*\* CHECK HALL SWITCH \*\*\*

1. REMOVE DIST CAP 2. TURN IGN 'ON' KP II
- HARNESS CONNECTED •

3. LINE UP DIST VANE 'WINDOW' IN BETWEEN HALL SWITCH.

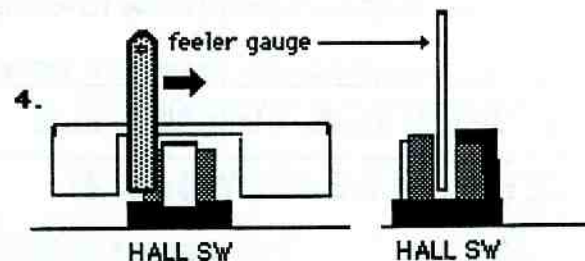
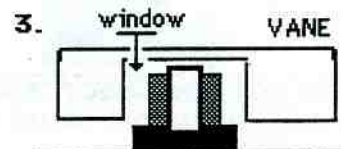
4. USE A FEELER GAUGE AS A 'VANE'. PASS IT THRU THE 'WINDOW' OPENING OF THE HALL SWITCH.

• IF EVERYTHING IS WORKING OK, THE COIL WILL 'SPARK' & THE FUEL PUMP WILL RUN FOR A SECOND.

IF THIS DOESN'T HAPPEN, THEN .....

✓ CHECK FOR THE PROPER VOLTAGES AT TERMS ...A ...B ...C

IF THE CORRECT VOLTAGES ARE PRESENT, HALL SWITCH IS BAD.

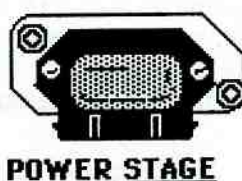
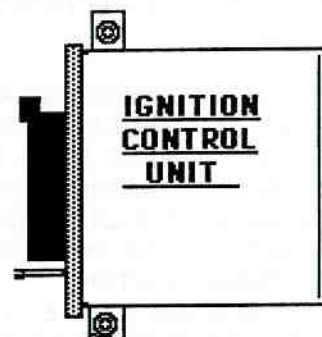
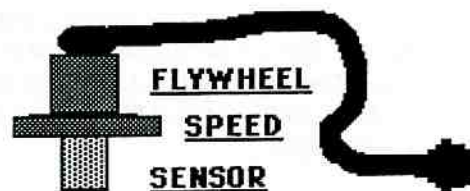
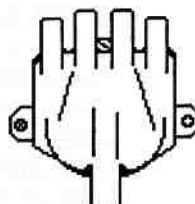
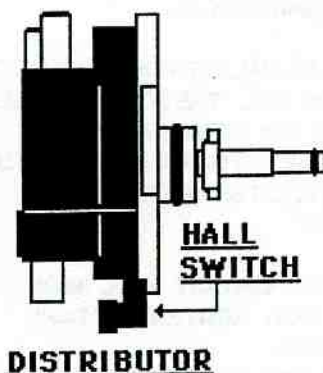


• CHECKING HALL SWITCH •

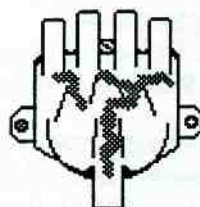
IF THIS TEST IS FAILED ✓ CHECK FOR THE PROPER VOLTAGES AT TERMS ...A ...B ...C

• IF THE VOLTAGES ARE NOT CORRECT THE HALL SWITCH CANNOT FUNCTION, BE SURE YOU DON'T BLAME THE HALL SW IF IT DOESN'T EVEN HAVE THE VOLTAGES NECESSARY TO OPERATE. IF THE CORRECT VOLTAGES ARE PRESENT, HALL SWITCH IS BAD.

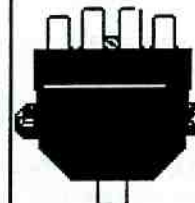




TO PREVENT DAMAGE, THE KEY MUST BE 'OFF' [KP O], BEFORE REMOVING THE C/U OR POWER STAGE CONNECTORS.



WE HAVE FOUND THAT IF THE BLACK 2 PIECE HEAT SHIELD IS LEFT ON THE DIST CAP, SPARKS WILL ARC BETWEEN SHIELD & CAP. CARBON TRACKS AND POOR IGNITION PERFORMANCE WILL RESULT. WHEN INSTALLING A NEW DIST CAP, REMOVE SHIELD & LEAVE IT OFF. THE 'BARE' DIST CAP WILL BE FINE.



700 [1984]  
 B-23 cyl TURBO  
 EZK 102 with HALL SWITCH

700 [1985-88]  
 B-230 4 cyl  
 EZK 117 with HALL SWITCH

700 [1985-on]  
 B-230 4 cyl TURBO  
 EZK 117 with HALL SWITCH

700 [1987-on]  
 B-280 V6  
 EZK 115 with FLYWHEEL SPEED SENSOR

200 [1989-on]  
 B-230 4 cyl  
 EZK 116 with FLYWHEEL SPEED SENSOR

700 [1989-on]  
 B-230 4 cyl  
 EZK 116 with FLYWHEEL SPEED SENSOR

**CAUTION**

ALL ENGINES WITH THE FLYWHEEL SPEED SENSOR, THE FLYWHEEL MUST BE PUT IN THE SAME POSITION IF IT HAS BEEN REMOVED. THIS MEANS IF THE REAR CRANK SEAL IS TO BE REPLACED, BE SURE TO MARK THE FLYWHEEL AND CRANK BEFORE REMOVAL. IF PUT IN WRONG POSITION, A NO START OR ERRATIC RUNNING WILL RESULT.

\*\*\*\*\* THEORY OF OPERATION \*\*\*\*\*

• EZK 102, 117 .... IN PLACE OF IGNITION POINTS THE SYSTEM USES A HALL EFFECT SWITCH (HALL/SW), THAT IS LOCATED IN THE IGNITION DISTRIBUTOR.

• EZK 115, 116 USE A FLYWHEEL SPEED SENSOR ON TOP OF THE FLYWHEEL BELLHOUSING.

• THERE IS A ELECTRONIC CONTROL UNIT (C/U), WHICH IS A MICRO PROCESSOR THAT WILL RECEIVE SIGNALS FROM THE HALL/SW, or SPEED SENSOR, A KNOCK SENSOR, LOAD SIGNAL FROM LH INJ C/U [utilizes A.M.M. signal] AND THROTTLE POSITION FROM THROTTLE MICRO SWITCH.

IT WILL USE THESE SIGNALS TO EVALUATE THE ENGINE'S RUNNING MODE AND IT'S VARIOUS 'IGNITION' NEEDS. THEN IT WILL VARY BOTH DWELL & IGNITION TIMING ADVANCE TO MATCH THE ENGINE'S NEEDS.

• THE POWER STAGE IS AN 'OFF - ON' SWITCH THAT IS ACTIVATED BY THE IGNITION C/U.

THE IGNITION C/U WILL SIGNAL THE POWER STAGE TO GROUND[-] THE IGNITION COIL. THE POWER STAGE IS USED TO HELP PROVIDE THE OPTIMUM COIL SATURATION, AMPLIFYING THE CURRENT GOING TO THE IGN COIL. A GOOD SOLID SPARK IS THE END RESULT.

• THE KNOCK SENSOR CIRCUIT WILL SIGNAL THE C/U ANY NEED FOR IGNITION RETARD DUE TO SPARK KNOCK.

IT IS MOUNTED ON THE CYLINDER BLOCK WHERE IT CAN PICK UP CERTAIN TYPE OF VIBRATIONS CAUSED BY SPARK KNOCK. THESE WILL CAUSE THE KNOCK SENSOR TO VIBRATE AN ELECTRICAL PULSE TO THE IGN C/U. THE C/U WILL RETARD THE TIMING ON THE INDIVIDUAL CYLINDER CAUSING THE KNOCK, IT WILL LEAVE THE TIMING ALONE ON THE OTHER CYLINDERS.

**EZK THEORY \*\*\* LIMP HOME \*\*\***

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• LIMP HOME MODE •

THE LIMP HOME MODE IS A ' FAULT ' TRIGGERED RUNNING MODE.

THIS MODE WILL PROVIDE THAT IN THE EVENT THAT THE INTERNAL CIRCUITRY OF THE IGNITION C/U OCCURS, THE C/U WILL AT LEAST LET THE ENGINE RUN. THE IGNITION WILL HAVE A STABLE DWELL, AND WILL NOT HAVE ANY TIMING ADVANCE.

THIS MEANS THAT ENGINE PERFORMANCE IS SEVERELY DIMINISHED. SO IT IS SAID "YOU WILL BE ABLE TO LIMP HOME".

• ONE NOTE ON THIS IS THAT WE HAVE SELDOM SEEN THIS HAPPEN.

MOST OF THE TIME WHEN THERE IS AN IGN C/U FAILURE THE ENGINE WILL JUST DIE AT TIMES OR NOT EVEN RUN. THOUGH A IGN C/U FAILURE IS VERY RARE.

\*\*\* KNOCK SENSOR \*\*\*

'LIMP HOME' MODE WILL OCCUR IF THERE IS A FAULT IN THE KNOCK SENSOR CIRCUIT.

IGN RETARDS [LIMP HOME] WHEN IT IS UNPLUGGED, OR IF WIRES TO IT ARE NOT MAKING GOOD CONTACT. THIS CONDITION WILL NOT ALLOW THE IGNITION TO ADVANCE PROPERLY AND ENGINE PERFORMANCE WILL SUFFER.

\* CAR WILL BE VERY 'FLAT' WHEN IT IS ACCELERATED.

JUST HOOKING IT BACK UP WILL NOT DO ANY GOOD. THE C/U WILL BE STUCK IN THE RETARD MODE IF THE ENGINE IS NOT TURNED 'OFF' AND THEN BACK 'ON' TO RESET THE IGNITION SYSTEM.

**TO PREVENT DAMAGE, THE KEY MUST BE 'OFF' [KP O], BEFORE REMOVING THE C/U OR POWER STAGE CONNECTORS.**



\*\* THE HALL/SW HAS THREE (3) WIRES FROM THE C/U.

THESE WIRES ARE .....

WIRE COLOR	VOLT	FUNCTION
1] BLACK	0.0 V	GROUND CIRCUIT
2] GREEN	5.0 V	CONTROL VOLTAGE
3] RED	11.0 V	WORKING VOLTAGE

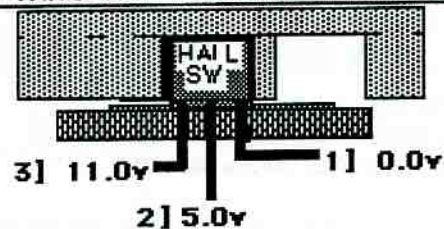
---voltages are with harness unplugged---

WHEN THE DIST VANES PASS THRU THE HALL/SW THE VOLTAGE IN THE CONTROL CIRCUIT [2] BUILDS UP.

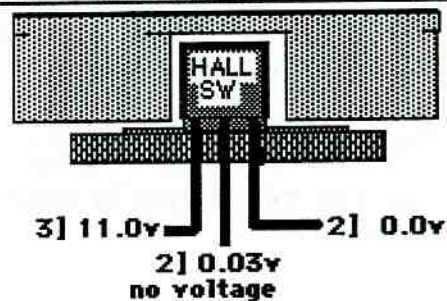
WHEN THE WINDOWS PASS THRU THE HALL/SW THE VOLTAGE IN THE CONTROL CIRCUIT [2] DROPS.

THESE VOLTAGE CHANGES WILL SIGNAL THE C/U TO 'FIRE' IGN COIL. THE C/U WILL ADJUST THE TIMING ADVANCE SINCE THERE ISN'T ANY MECHANICAL OR VACUUM ADVANCE IN THE DISTRIBUTOR.

VOLTAGE IS BUILT UP IN '[2] CIRCUIT' WHEN VANE COMES BETWEEN THE HALL/ SW

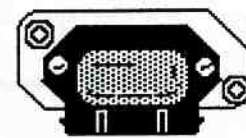


NO VOLTAGE IS IN '[2] CIRCUIT' WHEN WINDOW IS BETWEEN THE HALL/ SW

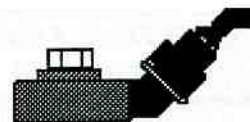


\*NOTES\*

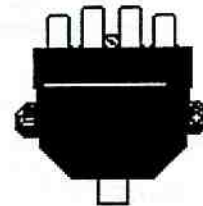
**EZK IGNITION**  
**700 4 cyl ['84-on]**  
**& 6 cyl ['87- on]**  
**200 [1989-on]**  
**✓ CHECK ITEMS**



**POWER STAGE**



**KNOCK SENSOR**



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**ENGINE WON'T START - USE THE 'BASIC CHECK' TO DETERMINE IF PROBLEM IS IN FUEL OR IGNITION SYSTEM.**

CHECK DWELL AT COIL TERM #1  
 (SHOULD BE approx. 25 - 28° AT IDLE &  
 INCREASE AS THE RPMs GO UP)

✓ POWER STAGE[MOST COMMON PROBLEM IS P/STAGE GROUNDED OUT, CAUSING IGN COIL TO OVERHEAT. A TEST LITE AT COIL TERM #1 WILL BE VERY 'DIM' OR 'OFF' WHEN IGN KEY 'ON' KP II ]

✓ HALL SWITCH OR SPEED SENSOR.

✓ SPARK PLUG & IGN COIL WIRES

✓ CHECK DIST FOR OIL LEAKING IN THRU DIST SHAFT SEAL.

✓ CHECK DIST CAP FOR ARCING INSIDE & OUTSIDE[BLACK COVER SHOULD BE REMOVED AND DISCARDED BECAUSE OF ARCING UNDER IT]

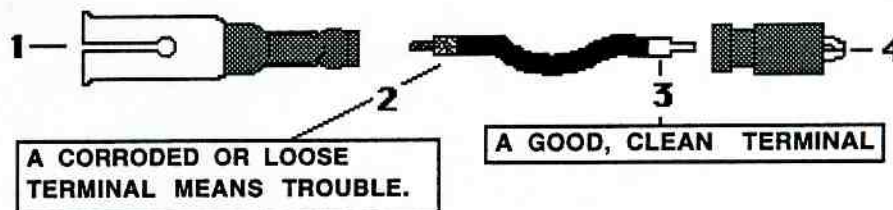
ALL CONNECTIONS (IMPORTANT !!!)  
 AT DIST, COIL, C/U, USE DIALETRIC GREASE-  
 [NO VOLTAGE LOSS PERMISSIBLE]

**IGNITION CABLE PROBLEMS CAN CAUSE ALL KINDS OF STRANGE RUNNING SYMPTOMS!**  
**JUST ONE BAD CABLE CAN CAUSE THE ENG RPMs TO GO UP AND DOWN WILDLY, or CAUSE THE ENGINE TO STALL AND/OR HAVE SEVERE BUCKING UPON ACCELERATION.**

•• RESISTOR TERMINAL ENDS CAN CORRODE CAUSING MISSING, STALLING, ROUGH IDLE & POOR ACCELERATION PROBLEMS.

CHECK #1,2,3,4 & DIST & IGNITION COIL TERMINAL TOWERS. THESE CORROSION PROBLEMS CANNOT BE PROPERLY CLEANED. THEY WILL HAVE TO BE REPLACED.

✓ CHECK FOR HIDDEN IGNITION CABLE FAULTS. THE CABLES UNSCREW FROM RESISTOR ENDS. CHECK FOR CORRODED TERMINALS, REPLACE AS NEEDED.



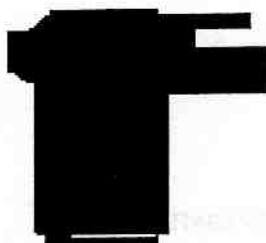
**TO PREVENT DAMAGE, THE KEY MUST BE 'OFF' [KP O], BEFORE REMOVING THE C/U CONNECTOR.**

**NEW STYLE 'RESISTOR' TYPE IGNITION WIRE. ONE PIECE DESIGN. CAN STILL HAVE CORROSION AT BOTH ENDS AND HAVE A LOOSE FIT ON THE SPARK PLUG.**

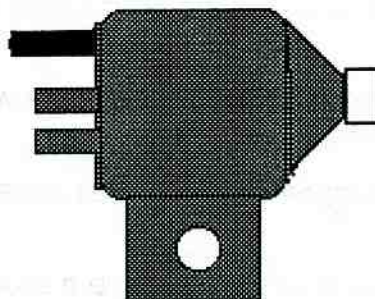
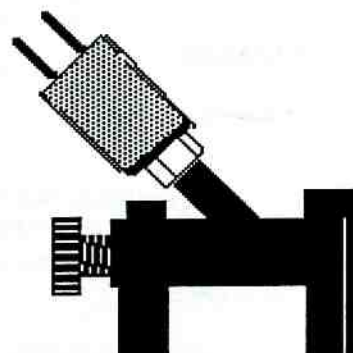
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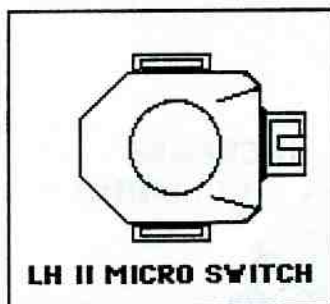
**AIR VALVE**



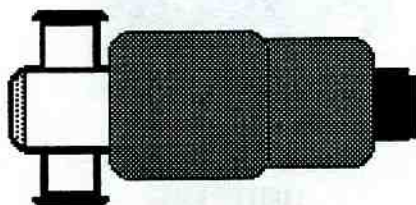
**SOLENOID VALVE**

## 1981-ON

### LH FUEL INJECTION

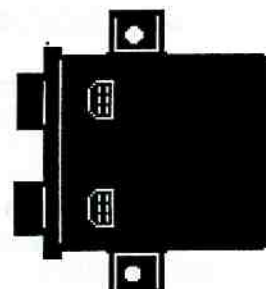


**LH II MICRO SWITCH**



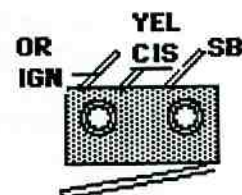
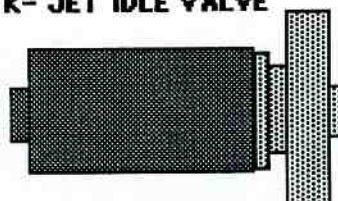
### K-JETRONIC

TO PREVENT DAMAGE, THE  
KEY MUST BE 'OFF' [KP O],  
BEFORE REMOVING THE C/U  
CONNECTOR.



**CONTROL UNIT**

### K- JET IDLE VALVE



**K-JET MICRO SW**

**A/C IDLE  
INCREASE VALVES  
&  
SOLENOIDS**

EARLY ---- SOLENOID AIR VALVE  
LATE ---- SOLENOID VACUUM VALVE &  
BYPASS VALVE

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**\*\*\*\*\* THEORY OF OPERATION \*\*\*\*\***

THE ENGINES PRIOR TO CONSTANT IDLE SYSTEM (C.I.S.)  
UTILIZED A COUPLE OF DIFFERENT METHODS OF INCREASING THE IDLE WHEN  
THE A/C IS ON. ALL USE AN AIR BLEED PAST THROTTLE PLATE TO INCREASE IDLE  
SPEED.

THERE IS THE EARLY VERSION USING A SOLENOID AIR VALVE.

THE LATER VERSION USES BOTH A SOLENOID VACUUM VALVE AND A SEPARATE  
AIR BYPASS VALVE.

THESE SYSTEMS MUST BE KEPT OPERATING OR THE IDLE WILL BE TOO LOW &  
ENGINE MAY DIE WITH A/C ON.

THE IDLE INCREASE FUNCTION SHOULD BE CHECKED AFTER SETTING UP THE  
ENG.

TURN THE A/C ON & MAKE NOTE OF THE IDLE SPEED, IT SHOULD NOT BE  
DRAGGED DOWN BY THE A/C COMPRESSOR, IT SHOULD PICK UP APPROX 100  
RPMs.

**A/C IDLE  
INCREASE VALVES  
&  
SOLENOIDS**

**\*\* USED MAINLY ON THE B-20 , B-30 (INLINE 6)  
AND THE EARLY B-21**

**\*\* LISTEN AND FEEL THE SOLENOID WHEN A/C  
COMES ON, A CLICK SHOULD BE HEARD AS  
WELL AS FELT**

29

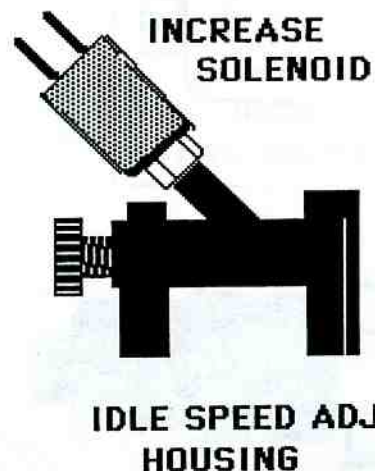
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**\*\*\* THIS SOLENOID AIR VALVE SCREWS DIRECTLY  
INTO THE IDLE ADJUSTING AIR VALVE HOUSING. THE  
SOLENOID WILL CAUSE AN AIR BLEED BETWEEN THE INTAKE  
MANIFOLD CIRCUIT AND THE AIR FILTER CIRCUIT. THIS BLEED  
ACTION WILL SPEED THE IDLE UP JUST AS IF YOU WERE TO  
USE THE IDLE ADJUST SCREW AND TURN IT OUT SOME.**

THE CURRENT IS SUPPLIED WHEN THE A/C COMP  
IS FED CURRENT.

MAKE SURE THE SOLENOID AIR VALVE IS CLEAN OF ANY DIRT  
AS WELL AS THE IDLE ADJUSTING HOUSING.

EGR Valves when used with this housing will plug the channels,  
making idle adjusting and idle increasing difficult.

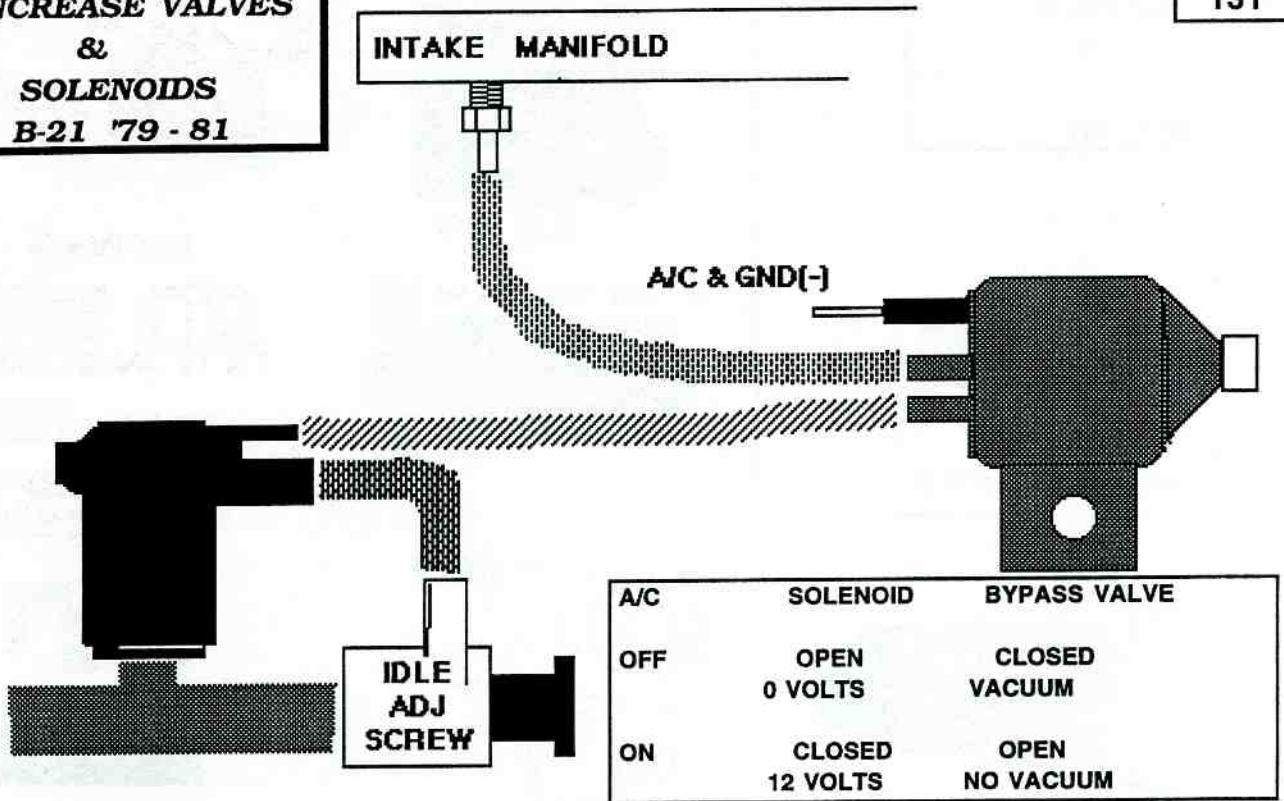




**A/C IDLE  
INCREASE VALVES  
&  
SOLENOIDS  
B-21 '79 - 81**

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**A/C IDLE  
INCREASE VALVES  
&  
SOLENOIDS**

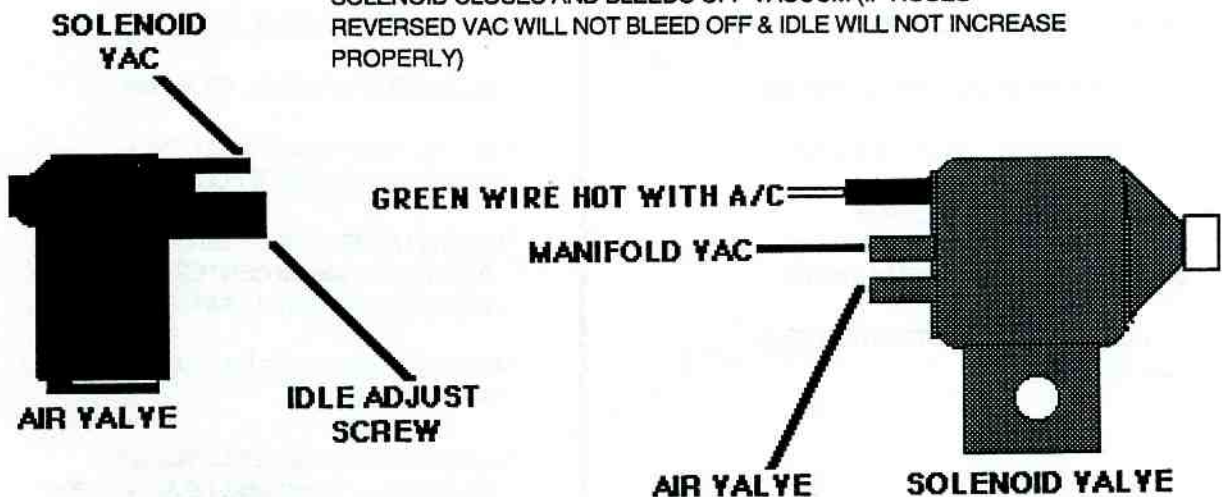
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A/C OFF > NO CURRENT > SOLENOID OPEN > VAC TO AIR VALVE > AIR VALVE CLOSES > NORMAL IDLE SPEED

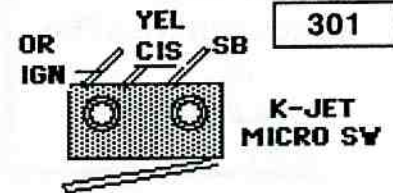
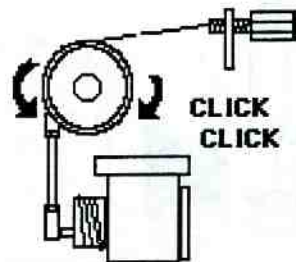
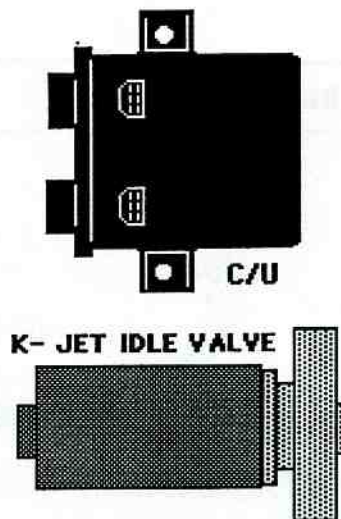
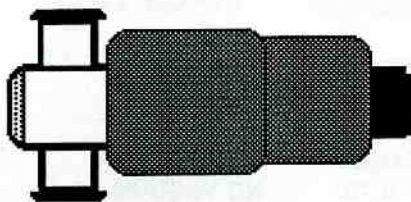
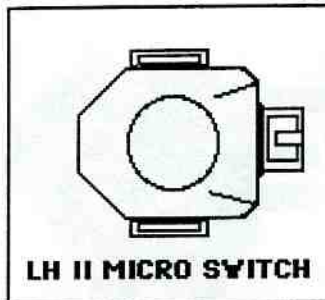
A/C COMP ON > CURRENT AT GREEN WIRE > SOLENOID CLOSES, vacuum bleeds off AIR VALVE > AIR VALVE OPENS > RPMs go UP

**NOTE**—AIR VALVE OPENS WHICH INCREASES RPMs WHEN THE SOLENOID CLOSES AND BLEEDS OFF VACUUM (IF HOSES REVERSED VAC WILL NOT BLEED OFF & IDLE WILL NOT INCREASE PROPERLY)

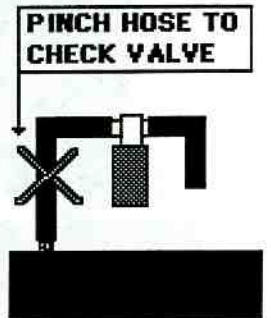
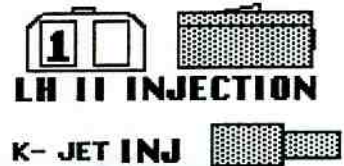


**CONSTANT IDLE  
SYSTEM  
CIS**

**1981- ON**



**TEST POINTS**



**29**

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**CONSTANT IDLE  
SYSTEM  
CIS  
THEORY OF  
OPERATION**

**CIS IS NEEDED TO:**

- PROVIDE FAST IDLE DURING ENGINE WARMUP.
- COMPENSATE FOR ENG LOAD WHEN IN GEAR.
- COMPENSATE FOR A/C LOAD.
- MAINTAIN PROPER IDLE RPMs FOR EMISSIONS.

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**\*\*\* K-JETRONIC \*\*\***

- \* SEPARATE CONTROL UNIT [C/U]
- \* RECEIVES RPM SIGNAL FROM IGN COIL
- \* LEVER OPERATED THROTTLE SWITCH
- \* SEPARATE ENG TEMP SENSOR  
B-21 located LEFT FRONT cyl head  
B-28 located WATER PUMP HOUSING
- \* BASE IDLE ADJUSTED WITH THROTTLE STOP SCREW.

**\*\*\* LH INJECTION \*\*\***

- \* USES LH INJ CONTROL UNIT [C/U]
- \* RECEIVES RPM SIGNAL FROM IGN C/U
- \* SEALED THROTTLE SWITCH, TWO POSITIONS [CLOSED & FULL THROTTLE]
- \* USES LH INJ ENG TEMP SENSOR  
B-23, 230 located left CENTER cyl head  
B-280 located WATER PUMP HOUSING
- \* BASE IDLE ADJUSTED WITH A PLASTIC THUMB SCREW.
- \* THROTTLE STOP IS SET 1/4 TURN IN PAST SCREW TOUCHING LEVER AT REST.



### \*\*\* THEORY OF IDLE VALVE OPERATION \*\*\*

THE IDLE VALVE USED FOR BOTH THE K-JETRONIC AND LH INJECTION SYSTEMS IS A VIBRATING ARMATURE TYPE. THIS MEANS THAT IT CONTINUES TO VIBRATE IN BOTH DIRECTIONS, 'OPEN' AND 'CLOSE'.

- THE MORE IT VIBRATES TO THE 'OPEN' SIDE, THE HIGHER THE IDLE WILL BE.
- THE MORE IT VIBRATES TO THE 'CLOSE' SIDE, THE LOWER THE IDLE WILL BE.

THIS VIBRATING IS CONTROLLED BY THE CONTROL UNIT. THERE ARE THREE[3] WIRES GOING TO THE IDLE VALVE.

- ONE WIRE IS ALWAYS HOT WHEN THE ENG IS RUNNING. [MIDDLE TERM -BAT VOLT]
- ONE WIRE IS FOR 'OPEN', HIGH IDLE [C/U GROUNDS THIS MORE FOR HIGHER IDLE]
- ONE WIRE IS FOR 'CLOSE', LOW IDLE [C/U GROUNDS THIS MORE FOR LOWER IDLE]

BY VARYING THE GROUND[-] TO THOSE TWO [2] WIRES, THE C/U WILL CAUSE THE IDLE VALVE TO EITHER 'OPEN' OR 'CLOSE'.

THE MORE 'GROUNDING' CYCLE OR DURATION IT GIVES TO ONE OF THE WIRES, THE MORE THE IDLE VALVE WILL MOVE IN THAT DIRECTION.

SO THE CYCLE OR DURATION IS DICTATED BY THE C/U, WHICH DETERMINES THE NEEDS OF THE ENG BY VARIOUS INPUTS IT RECEIVES FROM THE TEMP SENSOR, A/C SWITCH, AND OF COURSE THE RPM SIGNAL FROM THE IGNITION.

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### COMMON FAULTS

#### THROTTLE ROD OUT OF ADJUSTMENT

#### CLOGGED BASE IDLE ADJUSTING PORT & SCREW ON LH INJECTION SYSTEMS

**STICKING IDLE VALVES** ... THE BRUSHES DIG RIDGES INTO THE VIBRATING COMMUTATOR, CAUSING THE COMMUTATOR TO STICK IN SPOTS, TAPPING ON IDLE VALVE WILL SHOW THIS UP NORMALLY BECAUSE IT 'FREES UP' ARMATURE, **ONLY TEMPORARILY.** SEE 'QUICK CHECK IDLE VALVE'

#### THROTTLE SWITCH OUT OF ADJUSTMENT

#### A/C MICRO SWITCH NOT BEING PUSHED IN WHEN A/C IS 'OFF'

#### DISCONNECTED TERMINALS ..... CHECK TEMPERATURE SENDER ON CYL HEAD

#### GROUNDING / SHORTED WIRING ..... CHECK LOOM AT REAR OF CYL HEAD & LONG FIREWALL

**CONTROL UNIT** [K-JET INJECTION which is a separate C/U] ..... VERY, VERY FEW FAILURES .... will provide no idle increase at all THE USUAL SYMPTOM.

**TO PREVENT DAMAGE, THE KEY MUST BE 'OFF' [KP O], BEFORE REMOVING THE C/U CONNECTOR.**

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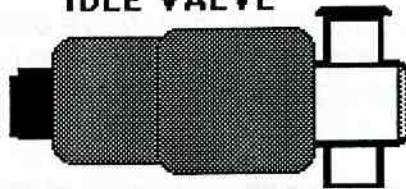
309

## CONSTANT IDLE SYSTEM

### SETTING BASE

- \* WARM ENG TO OPERATING TEMP
- \* SET C/O (FUEL MIXTURE) AND IGNITION TIMING
- \* MAKE SURE THE THROTTLE MICRO SWITCH IS SET PROPERLY. CHECK WITH ENGINE 'OFF' THAT THERE IS A 'CLICK - CLICK' WHEN MOVING THROTTLE 1/4 OF AN INCH. THROTTLE ROD OUT OF ADJUSTMENT IS A COMMON PROBLEM.
- \* TURN A/C 'OFF' [CHECK THAT A/C MICRO SWITCH IS 'OFF']
- \* GROUND TEST POINT [THIS WILL DISABLE-TURN OFF-CIS] IF UNABLE TO LOWER IDLE SEE 'QUICK CHECK IDLE VALVE'
- \*\* TO ADJUST THE ENGINE IDLE SPEED YOU WILL ADJUST;
  - THROTTLE STOP SCREW (B-21F,FT & B-23 F,FT .... ALL K-JET)
  - THROTTLE STOP SCREW (B-28 ..... ALL K-JET SYSTEMS)
 AFTER ADJUSTING THROTTLE STOP SCREW CHECK T/SW 'CLICK - CLICK'
  - IDLE SPEED THUMB SCREW (B-23, 230 .... ALL LH II INJ)
  - IDLE SPEED THUMB SCREW (B-28 .... ALL LH II INJ SYSTEMS)

## IDLE VALVE



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### --- IDLE SPEED ---

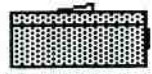
B-21,23 F 720rpm  
B-230 F,FT 750rpm

B-28 800-920rpm

B-21 FTurbo 850rpm

SEE 'TEST POINTS' IN  
GROUP 20 FOR T-Ps  
LOCATION

### TEST POINTS

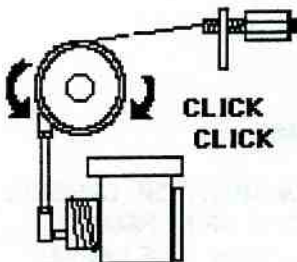


LH II INJECTION

K- JET INJ



## QUICK CHECK IDLE VALVE



1. MOVE THE THROTTLE LEVER BACK & FORTH A 1/4 TURN A 'CLICK' SHOULD BE HEARD FROM THROTTLE SW ON ACCEL AND ANOTHER 'CLICK' JUST BEFORE RETURNING TO THE THROTTLE STOP. IF IT DOESN'T 'CLICK', THE THROTTLE ROD MAY BE OUT OF ADJUSTMENT. IF NOT, ADJUST T/SW SO IT WILL 'CLICK - CLICK'.



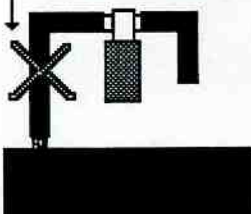
LH II INJECTION

K- JET INJ



2. GROUND[-] TEST POINT[#1] TO DISABLE[close] IDLE VALVE.

### PINCH HOSE TO CHECK VALVE



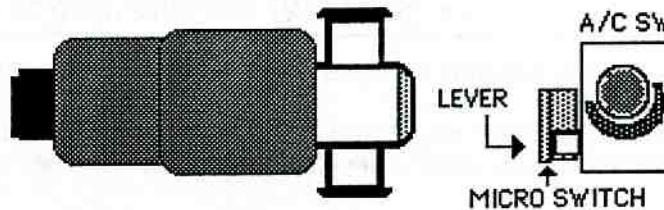
3. ✓ IDLE SPEED CHECK THAT VALVE IS NOT STUCK OPEN. PINCH COMPLETELY CLOSE THE LARGE HOSE THAT IS CONNECTED TO IDLE VALVE. THE IDLE SHOULD NOT GO DOWN MORE THAN approx 50 RPM OR ELSE VALVE IS STICKING. You can also try tapping on the IDLE VALVE as to 'free it up', the idle should NOT GO DOWN. IF ALL CONNECTIONS IN SYSTEM ARE GOOD & TIGHT, SPRAY WD-40 INTO STICKING IDLE VALVE TO CLEAN IT. REPEAT TEST. IF CLEANING DOESN'T HELP, REPLACE STICKING IDLE VALVE. THEN SET BASE IDLE TO PROPER RPM.

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**C.I.S. PROBLEMS  
& CHECKS  
STICKING AIR  
VALVE**



\*\*\* STICKING IDLE VALVE \*\*\*

**SYMPTOMS**

- **HIGH IDLE (ALL THE TIME OR ERRATICALLY) STICKING IDLE MOTOR > TAP ON IDLE VALVE ..... IDLE GOES DOWN, IDLE VALVE IS BAD**
- **COLD ENG -START & DIES.** COMPLAINTS OF HARD COLD START MAY REALLY BE A CONDITION OF ENG STARTS QUICKLY, BUT JUST WON'T KEEP RUNNING, OR JUST RUNS POORLY AFTER STARTING COLD. THIS WOULD NOT BE A COLD START PROBLEM, BUT RATHER A GOOD COLD START, POOR COLD RUNNING DUE TO LOW FAST IDLE.
- **ENG STALLS AT STOPS - LOW IDLE** [STICKING IDLE MOTOR > TAP ON IDLE VALVE ..... IDLE GOES UP, IDLE VALVE IS BAD .
- **SURGING, HUNTING, UP AND DOWN IDLE or ERRATIC IDLE, PERIODS OF VERY FAST OR VERY LOW IDLE.**

✓✓ ALSO DOUBLE CHECK THAT VALVE IS NOT STUCK OPEN. **GROUND[-] TEST POINT TO DISABLE IDLE VALVE.** PINCH COMPLETELY CLOSE THE LARGE HOSE THAT IS CONNECTED TO IDLE VALVE. THE IDLE SHOULD NOT GO DOWN MORE THAN approx 50 RPM OR ELSE VALVE IS STICKING. IF **ALL CONNECTIONS IN SYSTEM ARE GOOD & TIGHT, USE WD-40 TO CLEAN STICKING IDLE VALVE. IF CLEANING DOESN'T HELP REPLACE STICKING IDLE VALVE.**

✓✓ **ADDITIONAL CHECK LIST** ✓✓

- ✓ **THROTTLE ROD NOT ADJUSTED.** THE LOCKING NUTS ARE OFTEN FOUND TO HAVE VIBRATED LOOSE. WHEN THIS HAPPENS THE THROTTLE SW WILL NOT GO INTO THE IDLE 'MODE'. THE CONSTANT IDLE SYSTEM WILL NOT FUNCTION PROPERLY. A HIGH OR LOW IDLE PROBLEM WILL RESULT.
- ✓ **THROTTLE MICRO SWITCH NOT ADJUSTED** [HEAR THE 2 CLICKS ON THROTTLE ACTION]
- ✓ **A/C MICRO SWITCH [200 SERIES] NOT BEING ACTIVATED.**  
TURN A/C TEMP SWITCH ALL THE WAY COUNTER CLOCKWISE.  
[POP THE SMALL PLASTIC PANEL OFF TO THE LEFT OF THE A/C SWITCH]  
PUSH IN THE LITTLE MICRO SWITCH, IF A 'CLICK' IS HEARD, THE A/C MICRO SW IS NOT OPERATING CORRECTLY. THIS WILL CAUSE THE IDLE SPEED TO BE TOO HIGH EVEN WHEN THE A/C IS SWITCHED 'OFF', BECAUSE MICRO SW IS NOT BEING ACTIVATED.
- ✓ **UNABLE TO INCREASE IDLE HIGH ENOUGH WITH THUMB SCREW ON LH INJ SYS.**  
IDLE SCREW ADJUSTING PORT IS CLOGGED UP.  
REMOVE THUMB SCREW & CLEAN OUT THE OPENINGS INSIDE THROTTLE HOUSING WITH A CARB CLEANER & BLOW OUT WITH COMPRESSED AIR. CLEAN THROTTLE HOUSING & THROTTLE PLATE.  
(CHK FLAME ARRESTOR, MAY BE CAUSE OF PORT CLOGGING)
- ✓ **CHECK WIRE HARNESS CONNECTIONS FOR GOOD CONTACT & CHK FOR GROUNDING OF THE IDLE VALVE WIRES** (AT ENG & ALONG FIREWALL BY MOUNTING CLIPS THAT CUT WIRE INSULATION)
- ✓ **ENGINE TEMP SENSOR HOOK UP FOR GOOD, TIGHT CONNECTIONS.**

## •• CHECKING THROTTLE SWITCH ••

MOVE THE THROTTLE LEVER BACK & FORTH A 1/4 OF AN INCH.

A 'CLICK' SHOULD BE HEARD FROM THROTTLE SW ON ACCEL AND ANOTHER CLICK JUST BEFORE RETURNING TO THE THROTTLE STOP.

IF IT DOESN'T 'CLICK', THE THROTTLE ROD MAY BE OUT OF ADJUSTMENT. IF NOT ADJUST T/SW.

## IDLE VALVE WIRING FUNCTION

IDLE VALVE		WIRING FUNCTION
WIRE NO.	COLOR	FUNCTION
3-BN/W (W early)		LOW rpm
[if grounded will close valve, LOW IDLE]		
4-BN		12 VOLT
WIRE NO.	COLOR	FUNCTION
5-GN/R (GN early)		HIGH rpm
[if grounded will open valve, HIGH IDLE]		

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### BASIC THROTTLE ADJUSTMENT 1976-81 W/OUT C.I.S. '83-88 WITH C.I.S

IDLE RPM  
ADJUSTMENT  
USE THE IDLE AIR  
BLEED SCREW FOR  
SETTING IDLE RPM

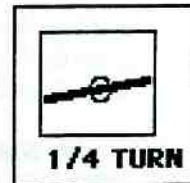
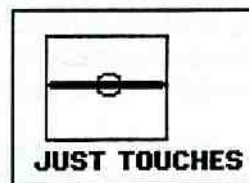
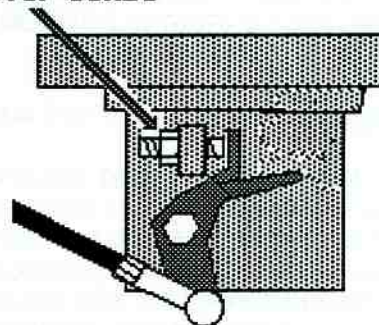
----- B-21 '76 - 81 -----  
--- B-23, B-230 '83 - 88 ---

- 1- DISCONNECT THROTTLE ROD. [AN IMPROPERLY ADJUSTED T/ROD IS COMMON PROBLEM]
- 2- LOOSEN NUT, BACK OUT THROTTLE STOP SCREW UNTIL IT DOESN'T HIT THROTTLE LEVER.
- 3- TURN IN SCREW CLOCKWISE UNTIL IT STARTS TO HIT THROTTLE LEVER.

4- TURN THE THROTTLE STOP SCREW IN 1/4 TURN AFTER IT HITS THROTTLE LEVER. TIGHTEN NUT. WITH THROTTLE CABLE ADJUSTED SO BELL CRANK IS AT ITS' STOP. INSTALL & ADJUST THROTTLE ROD[LOOSEN NUTS TO ADJUST] TO FIT FREELY WITHOUT IT MOVING THROTTLE LEVER. TIGHTEN LOCKING NUTS.

ON '83-88 ADJUST THROTTLE SWITCH. A 'CLICK' SHOULD BE HEARD FROM THROTTLE SW ON ACCEL AND ANOTHER CLICK JUST BEFORE RETURNING TO THE THROTTLE STOP.

THROTTLE  
STOP SCREW

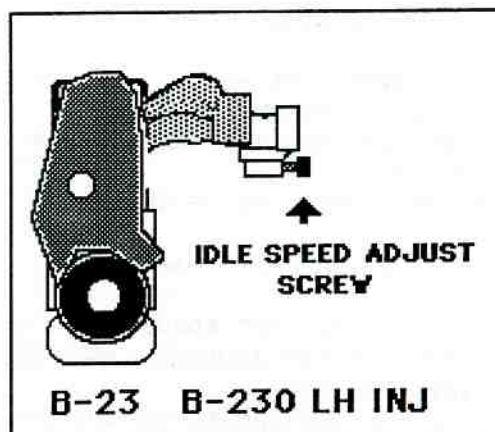
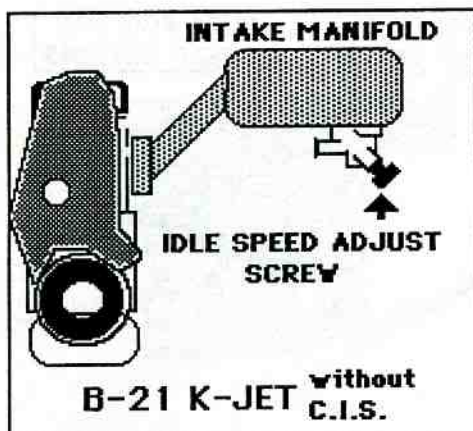


• THROTTLE SCREW  
1/4 TURN PAST  
TOUCHING LEVER.

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IDLE RPMs ARE ADJUSTED WITH THE BLACK PLASTIC THUMB SCREW.  
 B-280 ['87-ON V6] THUMB SCREW IS LOCATED AT THE THROTTLE VALVE ASSEMBLY.[REAR SECTION OF INTAKE MANIFOLD]

**--- COMMON PROBLEM ---**

THE THUMB SCREW ORIFICE CAN BECOME PLUGGED WITH CARBON AND DIRT. WHEN THIS HAPPENS, IT IS NOT POSSIBLE TO GET THE IDLE UP HIGH ENOUGH TO PROPER IDLE SPEED. REMOVE THE SCREW AND CLEAN OUT THE ORIFICE WITH A CARB CLEANER, THEN BLOW ORIFICE OUT WITH AIR. IF NEEDED CLEAN THROTTLE HOUSING & THROTTLE PLATE.

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**CONSTANT IDLE  
SYSTEM  
K-JETRONIC INJ**

**• 200 SERIES •**  
 '81 - 82 B-21 4CYL  
 '81 - 85 B-21 4CYL Turbo

**B-28 V6**

—— K- JETRONIC CIS ——

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SINCE THE K-JETRONIC INJ SYSTEM IS A MECHANICAL INJECTION SYSTEM IT NEEDS A SEPARATE CONTROL UNIT FOR THE CONSTANT IDLE SYSTEM[CIS].

• 200 SERIES - THIS CONTROL UNIT IS A SMALL, BLACK, PLASTIC BOX LOCATED ON THE RIGHT SIDE KICK PANEL, JUST IN FRONT OF THE FRONT DOOR.

700 SERIES - THIS CONTROL UNIT IS A SMALL, BLACK, PLASTIC BOX LOCATED ON THE [DRIVER'S SIDE] LEFT SIDE KICK PANEL

THE C/U WILL RECEIVE ENG TEMP INFORMATION FROM THE TEMP SENSOR.

- B-21 - THE SENSOR IS LOCATED ON THE LEFT FRONT OF THE CYL HEAD[WIRES - RED, BLUE].
- B-28 THE SENSOR IS LOCATED ON WATER PUMP HOUSING. [2 WIRES, A BLUE AND A RED]

THE C/U WILL ALSO RECEIVE ENG SPEED INFO FROM IGNITION SYSTEM AND A SIGNAL FROM THE A/C T-STAT FOR IDLE SPEED INCREASE WHEN A/C IS ON.

----- K- JETRONIC CIS -----

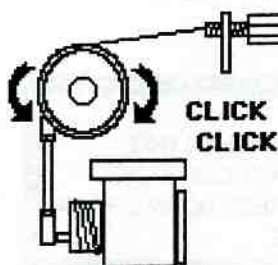
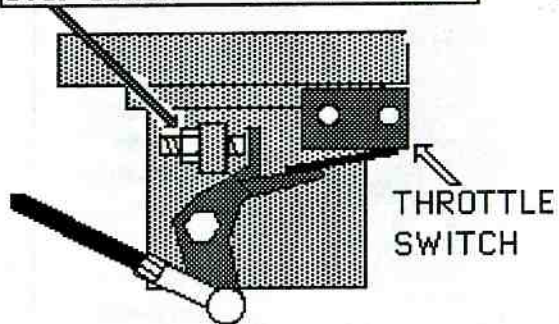
----- SYMPTOMS -----

- ENG STALLS AT STOPS.
- POOR COLD ENG RUNNING DUE TO LOW FAST IDLE.
- ERRATIC IDLE, PERIODS OF VERY FAST IDLE.

----- PROBLEMS -----

- ✓ THROTTLE SWITCH NOT ADJUSTED
- ✓ THROTTLE ROD NOT ADJUSTED PROPERLY
- ✓ IDLE VALVE STICKING
- ✓ TEMP SENSOR UNPLUGGED OR SHORTED
- ✓ WIRING SHORTED TO GROUND AT REAR OF ENGINE OR ALONG FIREWALL.

THROTTLE STOP SCREW USED FOR IDLE SPEED SETTING

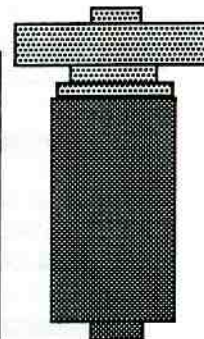


ADJUST MICRO/SW BY LOOSENING MOUNTING SCREWS, ADJUST MICRO/SW SO A CLICK IS HEARD WHEN THROTTLE LEVER IS (0.5mm) AWAY FROM STOP SCREW. AFTER & DURING ADJ IDLE SPEED RE-CHECK M/SW ADJUSTMENT SINCE THROTTLE IS BEING ADJUSTED TO GAIN PROPER IDLE SPEED---  
✓✓AFTER IDLE SPEED IS SET, ENG 'OFF' CHECK THERE IS A CLICK ON ACCEL & ON THROTTLE RETURN.

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K- JET IDLE VALVE



\*NOTES\*

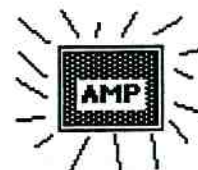
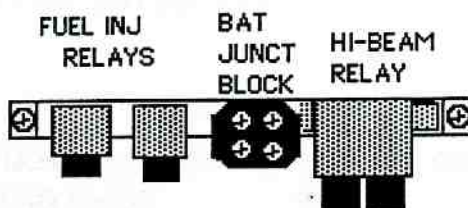
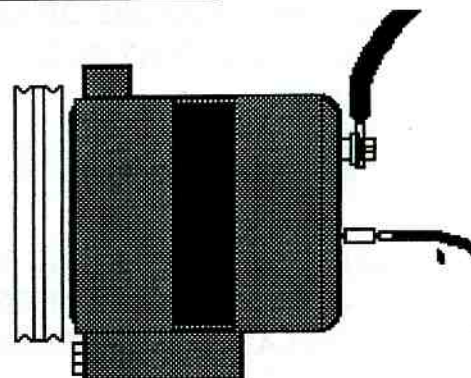
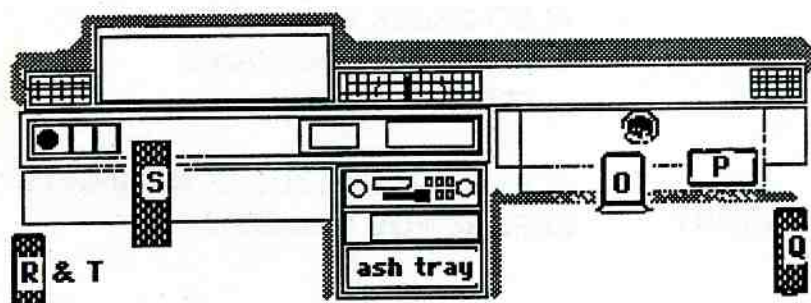
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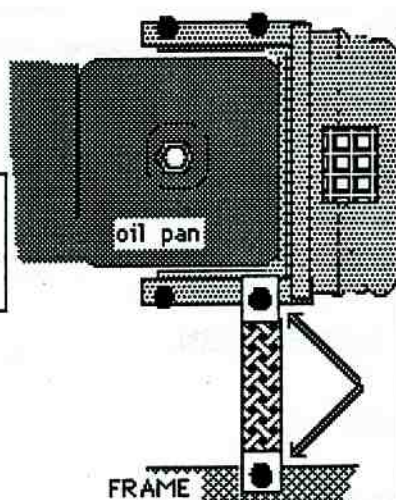
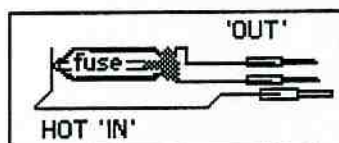
**GROUP 30 ELECTRICAL SYSTEM**

- 31- 001 ELECTRICAL SYSTEM \_\_ SLOW ENG CRANKING 140, 160 TIP
- 31- 007 TEST LITEs \_\_ 700 & 900 SERIES GROUNDs[-]
- 31- 011 PROPER & SAFE JUMPING, CHARGING PROCEDURES
- 31- 311 BATTERY DRAIN \_\_ BAT LOOSEs CHARGE OVER TIME
- 32- 111 ALTERNATOR NOT CHARGING \_\_ AMP WARNING LITE 'OFF'
- 32- 121 ALTERNATOR \_\_ NOT CHARGING\_\_ BEST FIX &  
CHECK ITEMS
- 33- 031 SLOW CRANK \_ NO CRANK \_\_ TESTING & REPAIR
- 33- 311 NEUTRAL SAFETY SWITCH \_\_ PROBLEMS \_\_ REPAIRS
- 36- 101 245 TAILGATE ACCESSORY PROBLEMS \_\_ REPAIRS
- 37- 011 RELAY & COMPONENT LOCATIONS \_\_ '73-80 200 SERIES
- 37- 021 RELAY & COMPONENT LOCATIONS \_\_ '81-ON 200 SERIES
- 37- 031 RELAY & COMPONENT LOCATIONS \_\_ '83-ON 700 SERIES
- 37- 041 RELAY & COMPONENT LOCATIONS \_\_ '88-ON 760 SERIES
- 37- 101 RELAYS & THINGS \_\_ HINTS \_ OPERATIONS
- 37- 107 BULB WARNING SYSTEM [LAMP OUT] \_ OPERATION
- 37- 111 BULB WARNING LAMP PROBLEMS \_\_ TIPS & REPAIRS
- 37- 117 BACK-UP LAMP PROBLEMS
- 37- 201 ERRATIC ELECTRICAL OPERATION \_\_ FUSE PROBLEMS
- 38- 131 ERRATIC TEMP & FUEL GAUGE OPERATION  
LOW READINGS
- 38- 134 ERRATIC TEMP & FUEL GAUGE OPERATION  
HIGH READINGS
- 38- 137 ERRATIC OIL LAMP OPERATION \_\_ BLINKING LAMP



**POWER SUPPLY WIRE  
FOR MOST SYSTEMS  
[F-INJ, I6N, accessories]**

**POS[+]**



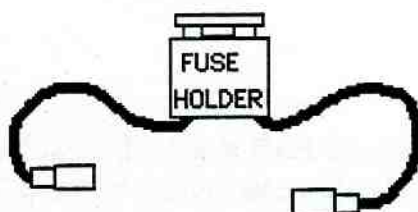
..... SLOW CRANKING .....  
140, 160 SERIES

A SLOW CRANKING CONDITION MAY  
MEAN A POOR GROUND[-] STRAP  
CONNECTION AT THE BODY FRAME.

CLEAN THE FRAME DOWN TO THE METAL WHERE  
THE STRAP BOLTS ON TO IT, THIS WILL HELP  
INSURE A GOOD CONNECTION. BE SURE THE  
GROUND[-] STRAP ENDS ARE CLEAN, COAT WITH  
GREASE WHERE IT MEETS THE FRAME.

USE A NEW BOLT AND WASHER.

### JUMPER WIRE



.... STOP SMOKING CAMPAIGN ....

USE JUMPER WIRES THAT HAVE A FUSE  
INSTALLED IN THEM TO PREVENT ANY  
CIRCUIT DAMAGE.

YOU CAN MAKE SOME UP FOR YOURSELF VERY  
EASILY BY PUTTING THE 'GM' BLADE TYPE  
FUSE HOLDERS IN THE JUMPER WIRES YOU  
ALREADY HAVE.



**BEFORE JUMPING OR CHARGING****CHECK BATTERY FOR:**

- ✓ LEAKS
- ✓ CRACKS
- ✓ BULGES.

**ANY OF THESE MEANS THE BATTERY IS JUNK. DO NOT CHARGE!!**

- REPLACE THE BATTERY •

**ALSO CHECK FOR:**

- ✓ LOOSE OR CORRODED TERMINALS

**CLEAN & TIGHTEN THE TERMINALS BEFORE YOU PROCEED.**

**USE BAKING SODA & WATER TO CLEAN THE BATTERY FIRST.**

**BAT WATER LEVEL & CONDITION:**

- ✓ TOO LOW
- ✓ FROZEN
- DON'T ATTEMPT TO CHARGE, FILL OR THAW BATTERY FIRST •

**— CHARGING —**

**TURN CHARGER OFF,  
CONNECT CABLES TO THE  
RIGHT POSTS. THAT MEANS;  
NEG[-] TO NEG[-]  
POS[+] TO POS[+]**

**PROPER JUMPING PROCEDURE**

**1-CARS SHOULD NOT BE TOUCHING.**

**2-IGNITION & ALL ACCESSORIES MUST BE OFF.**

**3-FLUID LEVEL IN ALL CELLS OK, NOT FROZEN.**

**4-TERMS MUST BE CLEAN & TIGHT.**

**5-CONNECT RED POS[+]CABLE TO POS[+] POST OF EACH BAT.**

**6-CONNECT BLACK NEG[-]CABLE TO GOOD [BOOSTING] BATTERY NEG[-] POST.**

**7-USE CAUTION- CONNECT NEG[-] CABLE TO ENGINE, AS FAR AWAY FROM THE DEAD BATTERY AS POSSIBLE TO AVOID SPARKS FROM IGNITING HYDROGEN GAS PRESENT AROUND BATTERY.**

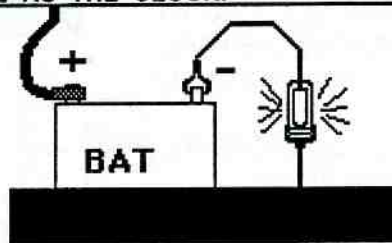
**\*ONE OF THE MOST OVERLOOKED REASON FOR A DEAD BATTERY IS A CURRENT DRAIN\***

IF IT ISN'T REPAIRED THE NEW OR RECHARGED BATTERY WILL JUST GO DEAD AGAIN, AND YOUR CUSTOMER WILL ONCE AGAIN BE STRANDED, ALSO PROBABLY PRETTY UPSET.

YOU CAN PREVENT THIS FROM HAPPENING VERY SIMPLY BY QUICKLY CHECKING FOR A CURRENT DRAIN. AFTER YOU HAVE CHARGED OR REPLACED THE BATTERY, JUST MAKE SURE ALL ACCESSORIES, LIGHTS ARE TURNED 'OFF', ALL DOORS CLOSED AND IGNITION KEY OUT OF LOCK. THEN WITH THE NEGATIVE(-) BAT CABLE REMOVED FROM THE BATTERY, HOOK A TEST LITE FROM THE NEG(-) BAT TERM TO A CHASSIS GROUND POINT, MAKE SURE GOOD CONTACT IS MADE. IF THE TEST LITE IS 'LIT', JUST TOUCH THE NEG(-) CABLE TO THE NEG(-) BAT TERM FOR TWO (2) SECONDS TO WIND CLOCK. IF THE TEST LITE IS STILL 'LIT' AFTER TOUCHING CABLE TO BAT TERM, THERE IS A CURRENT DRAIN, I REPEAT, THERE IS A CURRENT DRAIN. NOW HERE IS THE QUICKEST WAY TO FIND THE DRAIN.

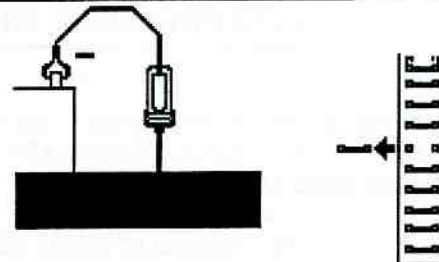
TO ELIMINATE THE CLOCK DRAWING CURRENT DURING TEST, REMOVE FUSE. IF THEN NO DRAIN IS FOUND RE-INSTALL FUSE AND RE-CHECK TO DETERMINE IF THE DRAIN IS SOME OTHER COMPONENT ON THE SAME FUSE AS THE CLOCK.

**USE CAUTION  
BATTERY  
CAN  
EXPLODE  
\*\*\*\*\***

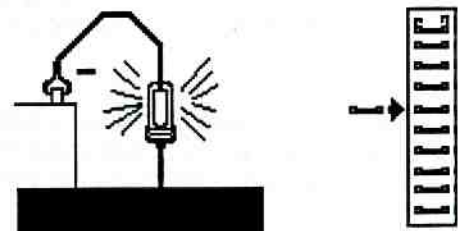


**USE CAUTION  
BATTERY  
CAN  
EXPLODE  
\*\*\*\*\***

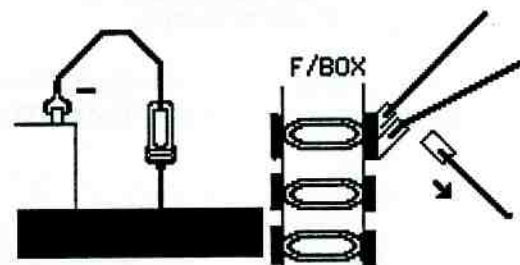
LOCATE THE CIRCUIT CAUSING THE DRAIN BY PULLING OUT ONE FUSE AT A TIME UNTIL THE LITE GOES OUT. WHEN YOU PULL A FUSE & THE LITE GOES OUT YOU HAVE TO SEE WHICH COMPONENTS ON THE FUSE IS CAUSING THE DRAIN.



NOW PUT THE FUSE BACK IN. THE TEST LITE SHOULD BE LIT. IF THERE ARE 3 DIFFERENT COMPONENTS ON THE FUSE CAUSING THE DRAIN, YOU CAN ISOLATE THE ONE THAT IS THE PROBLEM BY REMOVING EACH OF THE WIRES ON THE OUTPUT SIDE OF THAT FUSE. REMOVE ONE WIRE AT A TIME, UNTIL THE TEST LITE GOES OUT.



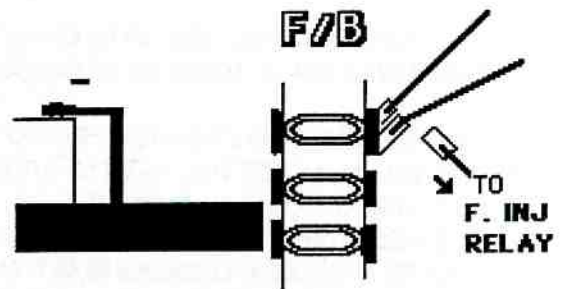
THE WIRE THAT MAKES THE TEST LITE GO OUT IS THE COMPONENT (OR GROUNDED WIRING) THAT IS CAUSING THE DRAIN. BECAUSE MOST FUSES IN THE CAR POWER MORE THAN ONE COMPONENT, WE HAVE TO LOCATE WHICH ONE IS THE DEFECTIVE.





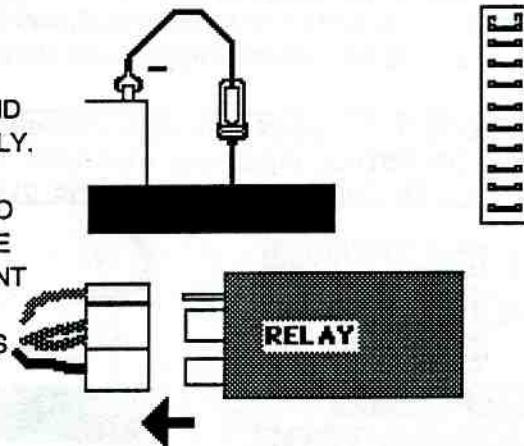
TO LOCATE THE THE COMPONENT THAT CAUSING THE DRAIN, RECONNECT THE OTHER WIRES BACK ON THE FUSE. DO NOT CONNECT THE WIRE THAT IS CAUSING THE DRAIN, LEAVE IT OFF.

RECONNECT THE NEG(-) CABLE TO THE BATTERY. NOW TRY ALL THE ITEMS LISTED ON THE FUSE BOX COVER FOR THAT FUSE. THE ITEM THAT DOESN'T WORK SHOULD BE THE ONE CAUSING THE DRAIN.



TAKE OFF THE NEG(-) BAT CABLE FROM THE BAT AND HOOK UP THE TEST LITE AS DESCRIBED PREVIOUSLY. RECONNECT THE SUSPECTED WIRE BACK TO THE FUSE. TEST LITE SHOULD ONCE AGAIN BE LIT. GO TO THE COMPONENT SUSPECTED & REMOVE THE WIRE CONNECTOR FROM IT. IF LITE GOES OFF COMPONENT IS BAD.

IF LITE STAYS ON CHECK FOR OTHER COMPONENTS ON FUSE. IF THERE ARE NONE, CHECK FOR A 'GROUNDED' WIRE HARNESS FROM FUSE TO SUSPECTED COMPONENT.



### • ADDITIONAL BATTERY DRAIN TESTING • LATE PRODUCTS WITH ELECTRONIC CONTROL

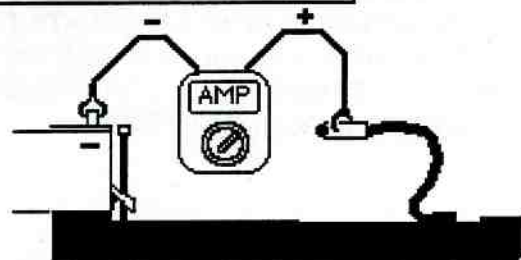
WITH THE USE OF MORE SOPHISTICATED ELECTRICAL CIRCUITRY, THE NEED FOR MORE SOPHISTICATED TESTING TECHNIQUES BECOMES NECESSARY.

THE CONTROL UNITS AND OTHER ELECTRICAL CONSUMERS THAT HAVE MEMORY STORING CAPABILITIES REQUIRE A SMALL AMOUNT OF CURRENT DURING ENGINE SHUT DOWN. THIS CURRENT IS NEEDED TO MAINTAIN THE MEMORY PROGRAMS.

SO WE RECOMMEND THE USE OF A DIGITAL AMMETER, WITH MILLI-AMPS CAPABILITIES. THIS AMMETER WILL BE USED IN PLACE OF THE TEST LITE SHOWN IN THE PRECEDING TEST.

YOU WILL CONNECT THE AMMETER NEGATIVE[-] LEAD TO THE NEGATIVE[-] BATTERY TERMINAL.

YOU WILL CONNECT THE AMMETER POSITIVE[+] LEAD TO THE DISCONNECTED NEGATIVE[-] BATTERY CABLE.



THE PROPER AMP DRAW IS APPROX.  
10-20 Milli Amps [0.01 -0.02 AMPS]

• WHEN YOU HAVE AN AMP DRAW OF 100 Milli Amps, THAT MEANS YOU HAVE AN AMP DRAW OF 0.1 AMPS. 100 Milli Amps IS TOO HIGH, IT WILL DRAIN THE BATTERY.

EXAMPLES TO HELP YOU UNDERSTAND

MILLI AMP -TO- AMP RATIOS.

400 Milli Amps = 0.4 AMPS

**BOSCH  
ALTERNATOR  
AMP LITE IS 'OFF'  
NOT CHARGING  
MAY BE ERRATIC**

IF ALT DOES NOT "CHARGE" & AMP LAMP DOES NOT LITE,  
THE PROBLEM MAY NOT CALL FOR THE ALTERNATOR TO BE  
REPLACED, ONLY THE BRUSH SET. YOU SHOULD USE  
BRUSH SET WITH AN "INTERNAL VOLTAGE REG" THUS  
ELIMINATING THE EXTERNAL VOLT REG AND IT'S WIRING.  
\*\* AMP lite is grounded thru the ALT BY THE BRUSHES \*\*

32

111

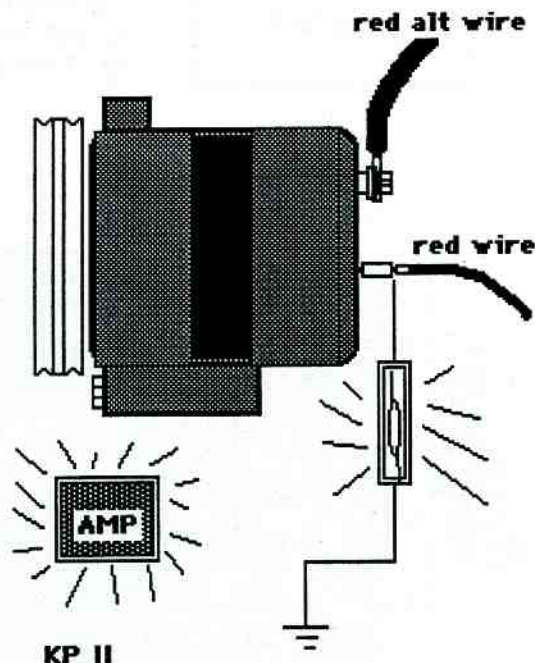
- AMP, BRAKE WARNING, PARKING BRAKE, and the BULB INTEGRITY LAMPS ARE NOT LIT with the Ign "ON" (RUN MODE)
- OIL light ON, TEMP and FUEL gauges OPERATING  
CHECK THAT THE GROUND WIRE FOR THE ALTERNATOR IS INTACT AND MAKING A GOOD CONNECTION if OK go to #1

#1 DISCONNECT SMALL "RED" LEAD FROM ALT AND HOOKUP A TEST LAMP BETWEEN THE WIRE AND GROUND, the test lamp should lite DIMLY and the WARNING LAMPS ON DASH should LITE if they do go to #2 (IF NOT CHK WIRING, CONNECTIONS BACK TO INSTRUMENT BOARD-BE SURE TO CHK ENG HARNESS PLUG)

#2 REPLACE THE BRUSH SET WITH AN INTERNAL VOLTAGE REGULATOR WHICH COMES WITH BRUSHES & VOLT REG (ELIMINATING THE EXTERNAL VOLTAGE REG & WIRING)

TRY REPLACING JUST THE BRUSH SET WITH AN INTERNAL VOLTAGE REGULATOR INSTEAD OF REPLACING THE WHOLE ALTERNATOR. YOUR CUSTOMER WILL BE OVERJOYED.

- \*\* WIRING CHECK \*\***
- 1 - CONNECT TEST LITE TO SMALL RED WIRE AT ALTERNATOR
  - 2 - TURN IGN TO 'ON' [KP II]
  - 3 - AMP LITE SHOULD GLOW T/LITE SHOULD BE DIM
  - 4 - IF LAMPS DON'T LITE, CHECK WIRING CIRCUIT TO DASH [ENG HARNESS CONNECTOR AT F/WALL]



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**BOSCH  
ALTERNATOR  
USE OF INTERNAL  
VOLTAGE  
REGULATOR**

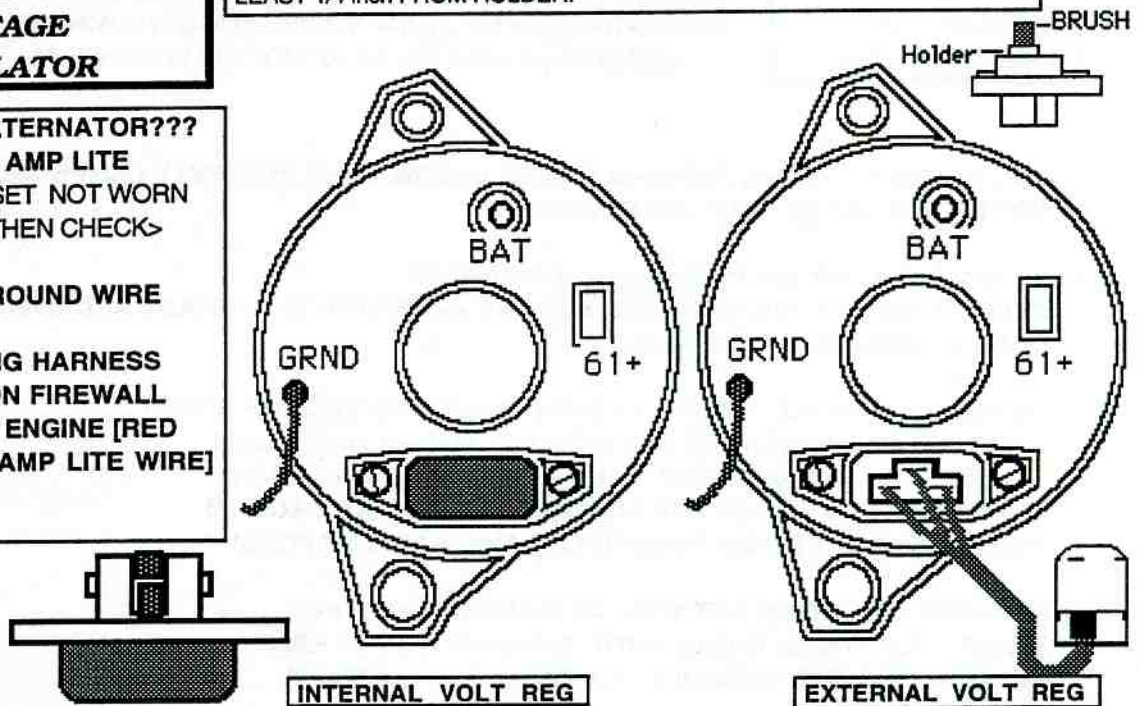
**BAD ALTERNATOR???**  
NO AMP LITE  
BRUSH SET NOT WORN  
OUT, THEN CHECK>

- \* CHK GROUND WIRE
- \* CHK ENG HARNESS  
PLUG ON FIREWALL  
BEHIND ENGINE [RED  
WIRE IS AMP LITE WIRE]

**\*\* MAY NOT REALLY NEED A NEW ALT. THE BRUSH SET MAY  
JUST BE WORN OUT. REMOVE THE BRUSH SET & CHK.  
REPL IF THE BRUSHES ARE LOW. BRUSHES SHOULD STICK OUT AT  
LEAST 1/4 inch FROM HOLDER.**

32

121



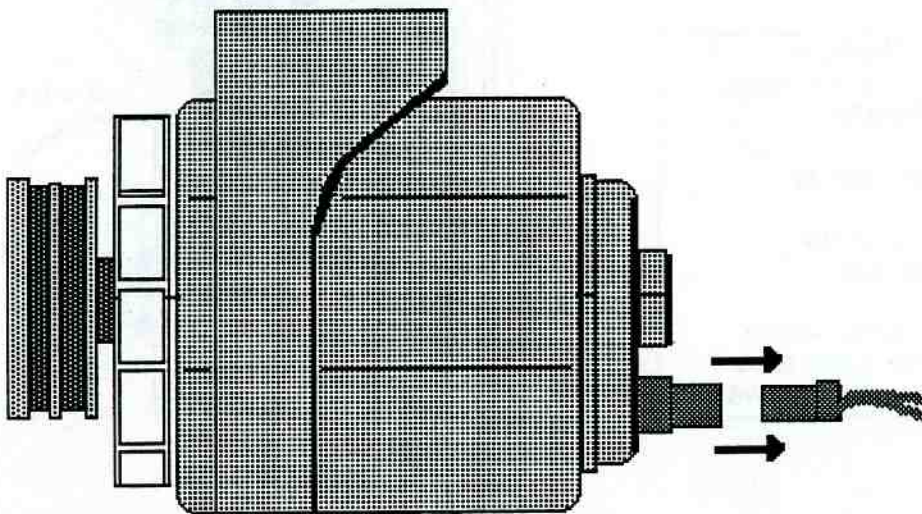
**OVERCHARGING**

**ALT TEMP  
COMPENSATION**

THIS TERMINAL IS FOR CHARGING RATE  
COMPENSATION DUE TO BATTERY TEMPERATURE.  
HOWEVER IT HAS BEEN SHOWN THAT IT WILL ALLOW  
AN OVERCHARGING CONDITION TO OCCUR. THIS WILL  
CAUSE THE BATTERY TO BOIL OUT BATTERY ACID AND  
IN TURN DAMAGE THE BATTERY.

32

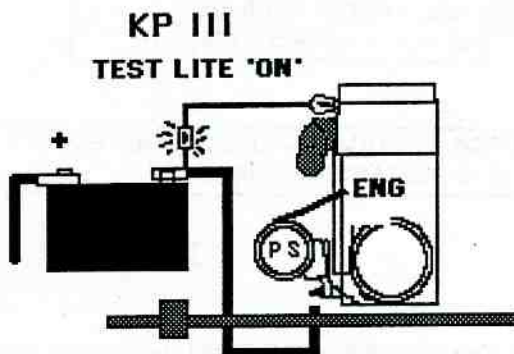
124



THIS TERMINAL SHOULD BE  
UNPLUGGED.  
IT SHOULD BE TAPED AND  
THEN LOCATED IN A SAFE  
PLACE WHERE IT WILL NOT  
BE IN THE WAY.

**700 SERIES  
ENG WON'T CRANK**

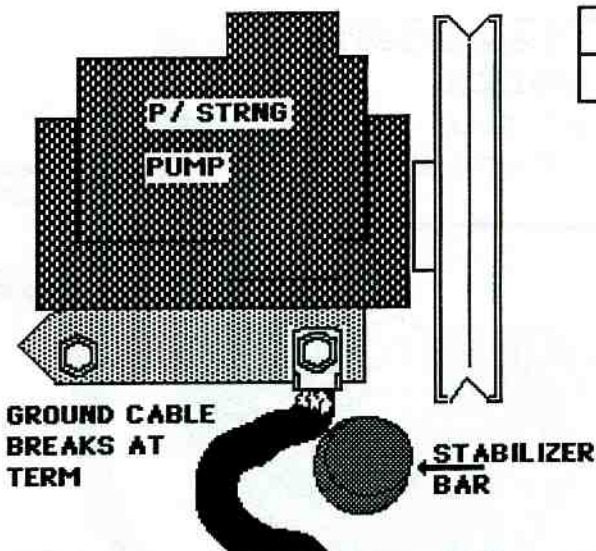
**BROKEN GROUND  
CABLE END AT ENG**



**•TEST LAMP TEST•**  
USE A TEST LITE CONNECTED TO THE NEG[-]BAT TERM. CONNECT OTHER END TO THE ENG.

**CRANK ENG [KP III], WATCH TO SEE IF THE LIGHT GLOWS.**

**A GLOWING T-LITE INDICATES A POOR GROUND CIRCUIT.**



**GROUND CABLE  
BREAKS AT  
TERM**

**STABILIZER  
BAR**

**• VOLTAGE DROP TEST •  
[DIGITAL VOLT METER]**

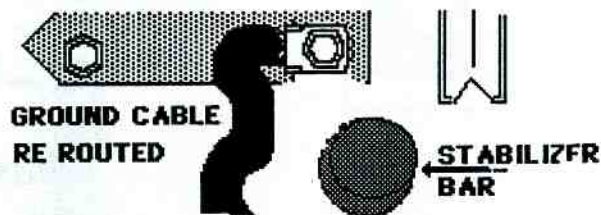
1. VOLT METER NEG[-] TERM CONNECTED TO THE NEG[-] BAT TERM.
2. CONNECT VOLT METER POS[+] TERM TO A GOOD ENGINE GROUND[-].
3. CRANK ENG [KP III], WATCH THE METER. A VOLTAGE DROP READING OF MORE THAN 0.3v INDICATES A POOR GROUND CIRCUIT.

**A POOR GROUND [-] CABLE WILL ACT LIKE A NEAR DEAD BATTERY.**  
WHEN ENG IS CRANKED [KP III], THE STARTER WON'T OPERATE.  
THE OTHER ACCESSORIES SHOULD STILL OPERATE BECAUSE THE CHASSIS/BODY GROUND STRAP IS STILL GOOD.  
THE STARTER HOWEVER WILL BE UNABLE TO DRAW ENOUGH AMPS TO RUN.

IF CABLE IS NOT TOTALLY BROKEN, THE STARTER MAY TURN, BUT VERY SLOWLY WITH A VERY LOW AMP DRAW.

**ROUTE CABLE IN A WAY THAT ALLOWS IT TO FLEX ALONG WHEN THE ENG MOVES.**  
THIS WAY THERE WON'T BE ANY STRAIN ON THE WIRE STRANS AT THE TERM END. YOU MAY HAVE TO RELOCATE THE TERMINAL TO A DIFFERENT BOLT ON THE P/STRNG BRACKET.

**• A VOLTAGE DROP TEST IS THE MOST ACCURATE METHOD FOR CHECKING FOR A POOR GROUND[-]. OR USE A TEST LITE IF A DIGITAL VOLT METER IS NOT READILY AVAILABLE.**



**GROUND CABLE  
RE ROUTED**

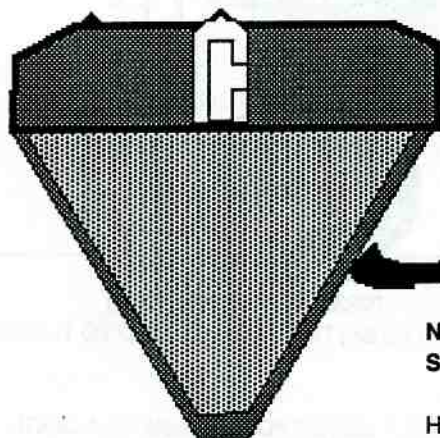
**STABILIZER  
BAR**



**NEUTRAL SAFETY  
SWITCH  
1976 & ON  
BACK UP LAMPS**

33

311



• STARTER •  
BLUE - FROM IGN SW & T/P  
BL,[BL/Y] - TO STARTER  
SOLENOID

• BACK-UP •  
YEL - FROM FUSE BOX  
BLACK - TO B/U LITES

\* THE SWITCH IS LOCATED UNDER THE SHIFT  
LEVER QUADRANT HOUSING.

\*\*\* 200 SERIES \*\*\*

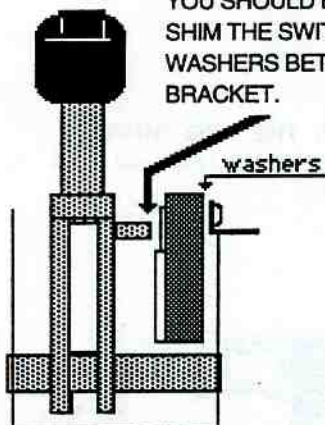
NOTE: THE WIRE FOR THE N/SAFETY SW THAT GOES TO THE  
STARTER SOLENOID IS BLUE AT THE SWITCH.

HOWEVER IT IS ACTUALLY CONNECTED TO BLUE/YELLOW WIRE AT THE  
CONNECTION THAT IS UNDER THE CARPET ON LEFT SIDE OF CENTER DASH  
CONSOLE.

THE BLUE WIRE FROM IGN SW, ALSO COMES FROM THE TES/POINT  
[JUMP START TERM UNDER THE HOOD - SEE 'T/P LOCATE']

\*\* LEVER PIN NOT IN ARM \*\*

SOMETIMES THE ARM WILL BE BENT AWAY  
FROM THE SWITCH BECAUSE THE DRIVER  
HAS PULLED IT EXCESSIVELY TO THE LEFT.  
YOU SHOULD BE ABLE TO JUST BEND IT BACK OR  
SHIM THE SWITCH CLOSER TO THE LEVER WITH  
WASHERS BETWEEN SWITCH & THE MOUNTING  
BRACKET.

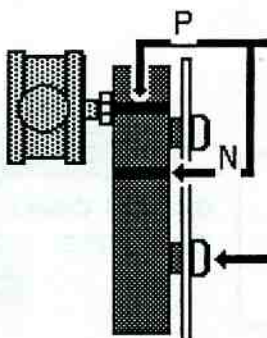


◇ ◇ CAUTION ◇ ◇  
ALWAYS SET EMERGENCY  
BRAKE & STEP ON  
SERVICE BRAKE WHEN  
CHECKING AND SETTING  
NEUT/SAFETY SWITCH

\*\* REPLACEMENT OR ADJUSTING \*\*

1. PUT THE SHIFT LEVER IN 'PARK'.
2. LOOSEN MOUNTING SCREWS.
3. ALIGN THE POINTER ON THE TOP OF THE PLASTIC ARM  
WITH THE RIDGE [PARK] ON THE N/S SWITCH HOUSING.
4. TIGHTEN THE SCREWS AND CHECK TO SEE WHEN THE  
LEVER IS MOVED BACK & FORTH IT STILL LINES UP WITH  
BOTH THE 'PARK' & 'NEUTRAL' RIDGE MARKS.  
WITH BRAKES APPLIED. CHECK THAT ENGINE  
ONLY STARTS IN 'PARK' & 'NEUTRAL'.

✓ MISALIGNMENT OF N/S SW MAY MEAN THE MOTOR & TRANS  
MOUNTS ARE WORN.  
ALSO WORN OR LOOSE LINKAGE NUTS OR BUSHINGS.

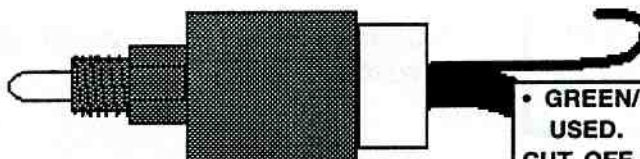


33

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**NEUTRAL SAFETY  
SWITCH  
1968 TO 1975**

33  
317



• GREEN/RED WIRE IS NOT USED.  
CUT OFF WIRE CLOSE TO SWITCH, TAPE UP THE END.

REPLACING 4 WIRE NEUTRAL/SAFETY SWITCH WITH A SIX [6] WIRE NEUTRAL/SAFETY SW.

NEW SWITCH	HARNESS	• FUNCTION •
wire color — hook to — wire color		
BLUE — to — BLUE		STARTER
BLUE — to — BLUE		
BLUE/YEL — to — BLUE/YEL		BACK-UP
RED — to — RED or BLACK		BACK-UP

IF THE 'OLD' SWITCH HAD FIVE [5] WIRES, THEN CUT AND SPLICE AS NECESSARY TO THE SAME COLORED WIRES.

**\*NOTES\***



**245 WAGON  
T/GATE  
ACCESSORIES NOT  
WORKING**

- LEFT HINGE - WINDOW DEFOGGER, LICENSE PLATE LAMPS, 3rd BRAKE LITE['86 - on]
- RIGHT HINGE - T/GATE WIPER, CENTRAL LOCK MOTOR

36  
101

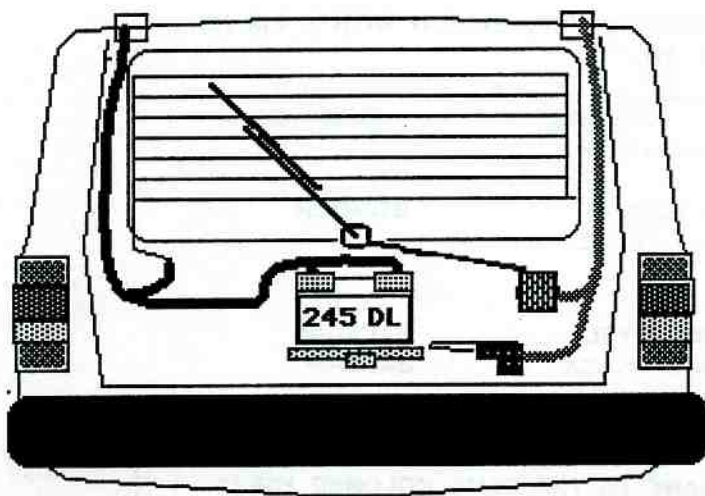
\*\*\* SYMPTOMS \*\*\*

**BLOWN FUSES OR ACCESSORIES NOT WORKING.**

THE HINGE IS WHERE THE WIRE LOOM RUNS FOR THE ACCESSORIES IN THE T/GATE. THE CONSTANT FLEXING IT IS SUBJECTED TO WILL EVENTUALLY CAUSE IT TO BREAK.

OPERATION OF THE ACCESSORIES MAYBE ERRATIC DUE TO THE FACT THE THE WIRES AT TIMES CAN MAKE CONTACT AT THEIR BROKEN ENDS. THEY MAY ALSO CONTACT A GROUND[-], SHORTING OUT & BLOW THE FUSE.

NOTE... WHEN T/GATE IS BEING MOVED AROUND, THE ACCESSORIES MAY WORK ERRATICALLY DUE TO CONTACT AT BROKEN ENDS.



PEEL THE EDGE OF HEADLINER [NEAR THE HINGE THAT IS TO BE REMOVED] BACK OFF THE BODY PANEL.



- REMOVE ONLY ONE HINGE AT A TIME.

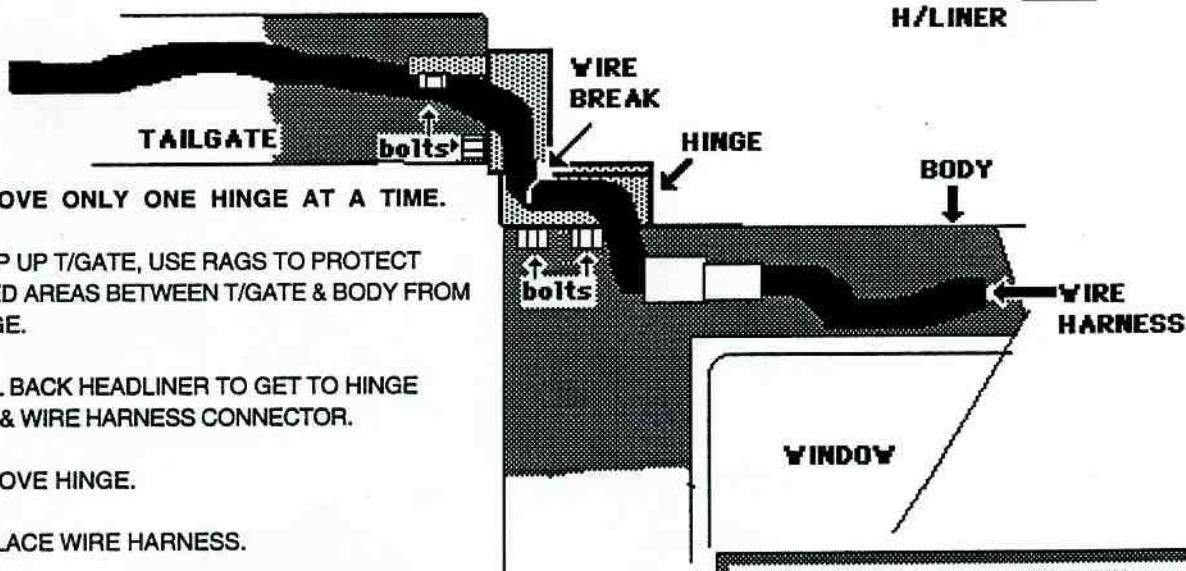
1. PROP UP T/GATE, USE RAGS TO PROTECT PAINTED AREAS BETWEEN T/GATE & BODY FROM DAMAGE.

2. PEEL BACK HEADLINER TO GET TO HINGE BOLTS & WIRE HARNESS CONNECTOR.

3. REMOVE HINGE.

4. REPLACE WIRE HARNESS.

5. MAKE SURE THE BOLT & WIRE HARNESS HOLES ARE PROPERLY CAULKED.



- CHECK HINGE & PIVOT PIN • IT MAY BE OUT OF POSITION OR HINGE IS WORN OUT CAUSING THE HARNESS TO BREAK.

36

104

# RELAY LOCATIONS

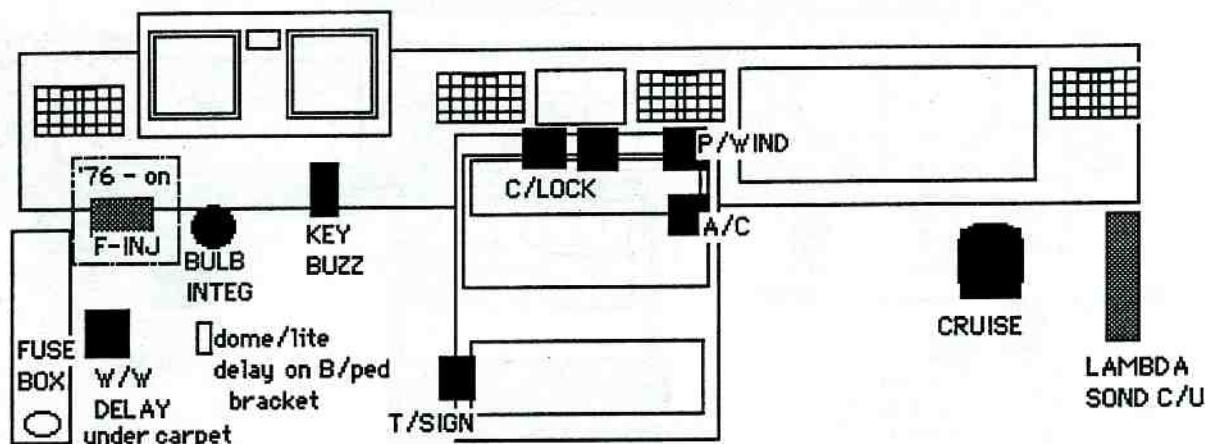
'73 TO '80

140 & 160

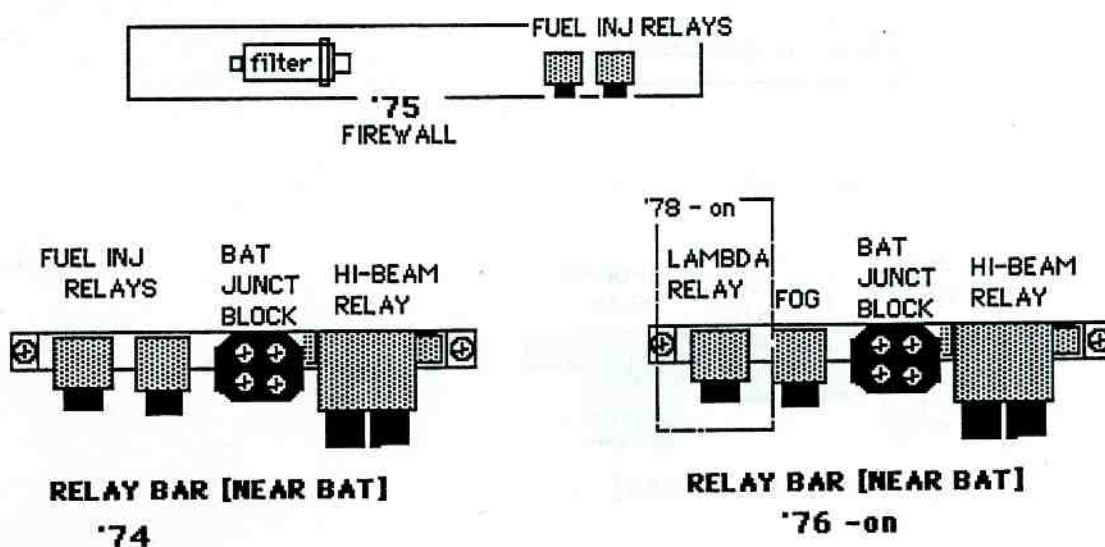
200 SERIES

37

011



• RELAY LOCATIONS NOTES; THERE ARE A FEW VARIATIONS OF THE LOCATION OF THE RELAYS UNDER THE HOOD. IF YOU ARE NOT SURE, TRY TO DETERMINE THE RELAY FUNCTION BY ITS' WIRES' COLORS. COMPARE WIRE COLORS AT RELAYS TO THE WIRE COLORS AT THE COMPONENTS.



37

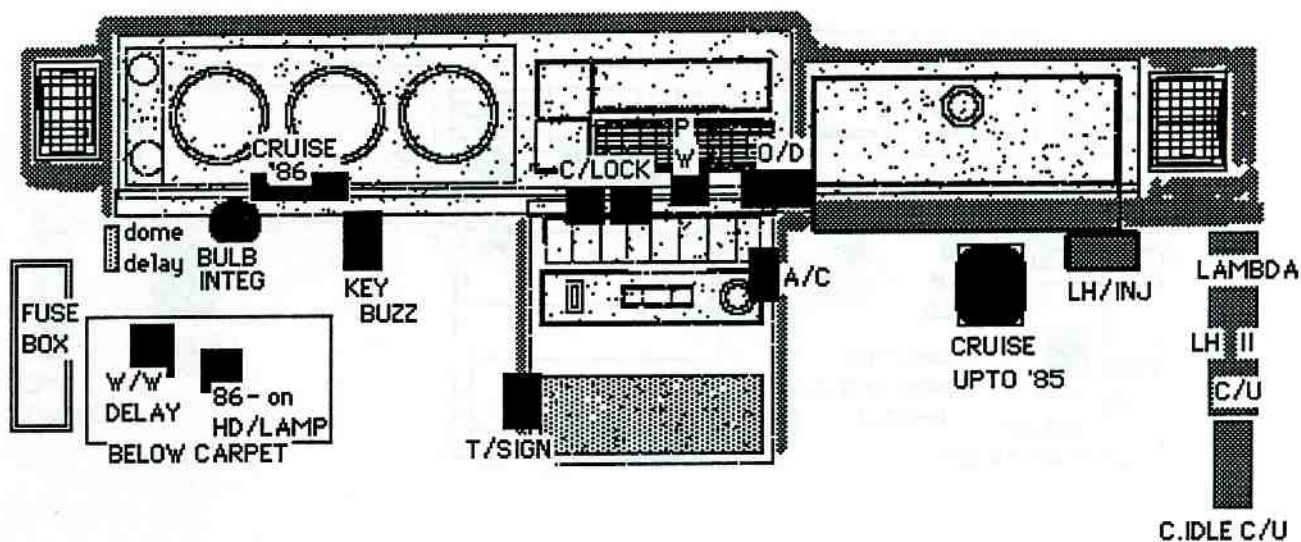
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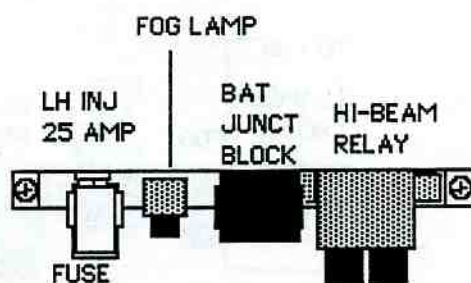
**RELAY &  
COMPONENTS  
LOCATION  
200 SERIES  
'81 & ON**

37

021



**RELAY LOCATIONS**

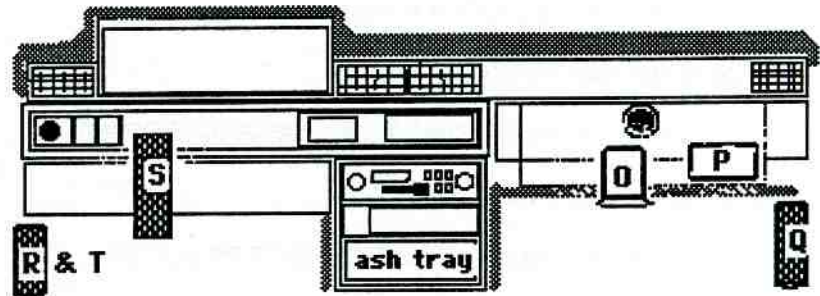
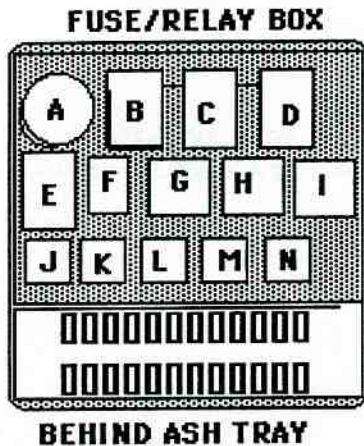


**RELAY BAR [NEAR BAT]**

37

024

# **RELAY & COMPONENTS LOCATION**



## • RELAY LOCATIONS

THESE ARE THE MOST COMMON LOCATION FOR THE RELAYS. THERE CAN BE SOME VARIATIONS SO THAT IDENTIFICATION BY CHECKING WIRE COLORS IS ADVISED. CHECK THE WIRE COLORS AT A COMPONENT BEING FED BY RELAY IN THE SYSTEM IN QUESTION.

A - BULB INTEGRITY SENSOR

B - SEAT BELT BUZZER

C - WINDSHIELD WIPER DELAY

D - TAILGATE WIPER DELAY

E - FUEL INJ RELAY

F -

G - TURN SIGNAL/ HAZARD FLASHER

H -

I - OVERDRIVE

J - POWER WINDOWS & ELECT COOL FAN

K - HEADLAMP STEP [HIGH BEAMS]

L - CENTRAL LOCK

M - AUXILIARY [FOG] LAMPS

N -

O - A/C COMPRESSOR DELAY

P - CLIMATE UNIT FAN

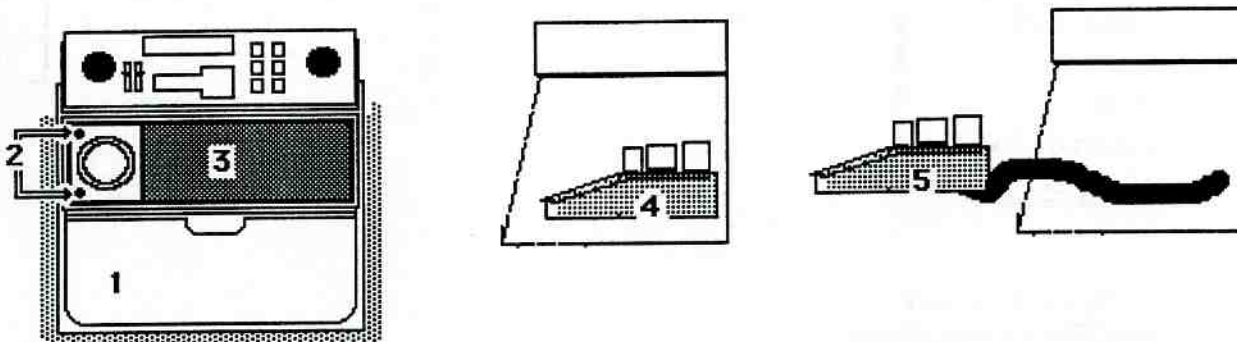
Q - LH INJ C/U OR V6 K-JET LAMBDA C/U

R - CRUISE CONTROL C/U

S - EZK IGN C/U

T - C.I.S. CONTROL UNIT [V6 K-JET]





== ACCESS TO FUSES AND RELAYS ==

THE FUSE/RELAY BOX [#4] IS LOCATED BEHIND THE ASH TRAY [#1]. WHEN THE ASH TRAY AND CIGAR LITER/STORAGE BOX [#3] ARE REMOVED, YOU CAN PULL THE F/R BOX OUT FOR EASY ACCESS TO THE RELAYS AND UNDERSIDE CONNECTORS & WIRES.

1. REMOVE THE ASH TRAY [#1] ASSEMBLY.
2. REMOVE THE TWO SCREWS [#2], BEHIND CIGAR/LITER COVER.
3. REMOVE THE STORAGE BOX [#3].
4. UNHOOK THE RETAINING CLIP IN LEFT SIDE OF F/R BOX [#4].
5. CAREFULLY PULL THE F/R BOX STRAIGHT OUT [#5] . WATCH FOR WIRE HARNESS SNAGGING.

37

037

**\*NOTES\***

37

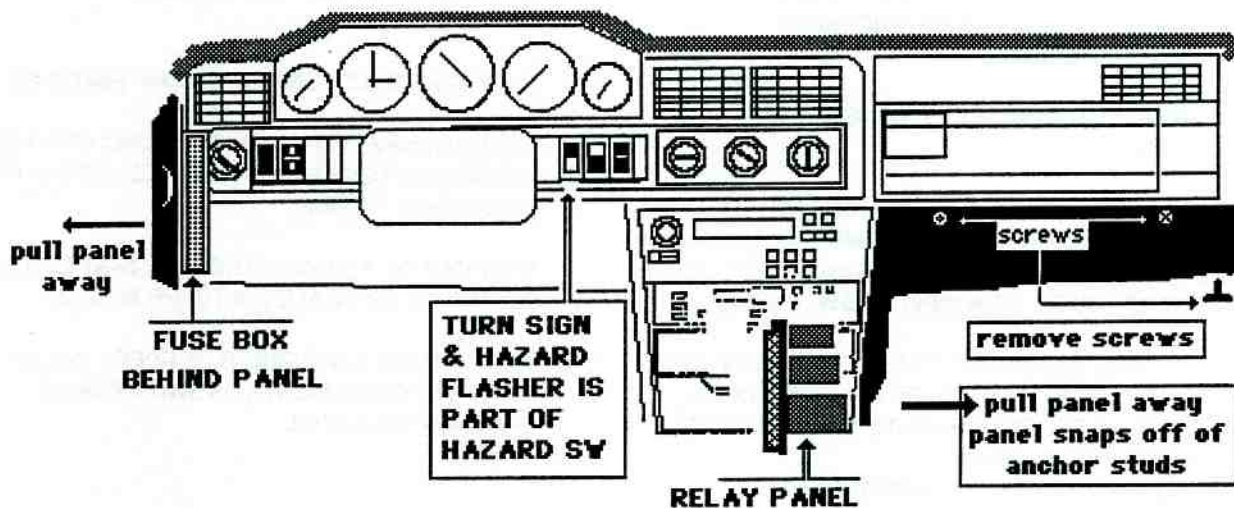
039

# **FUSE AND RELAY PANEL LOCATIONS**

**1988 & on  
760 SERIES**

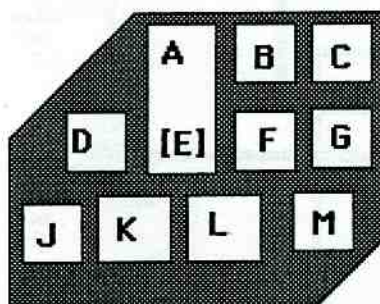
37

041



## • RELAY LOCATIONS

THESE ARE THE MOST COMMON LOCATION FOR THE RELAYS. THERE CAN BE SOME VARIATIONS SO THAT IDENTIFICATION BY CHECKING WIRE COLORS IS ADVISED. CHECK THE WIRE COLORS AT A COMPONENT BEING FED BY RELAY IN THE SYSTEM IN QUESTION.



**A & E HEADLAMP RELAY**

**B - LH INJECTION RELAY**

**C - CENTRAL LOCKING RELAY**

**D - FOGLIGHT RELAY**

**E - \* BULB INTEGRITY RELAY, FRONT LAMPS**

**F -**

**G - OVERDRIVE RELAY**

**J - POWER RELAY**

**K - REAR INTERMITTENT WIPER RELAY**

**L - FRONT INTERMITTENT WIPER RELAY**

**M - SEAT BELT REMINDER/ KEY BUZZER**

37

044



**RELAYS**  
**WHAT THEY ARE**  
**& HOW THEY**  
**WORK.**

RELAYS CAN SWITCH 'ON & OFF' CURRENT MUCH MORE EFFICIENTLY AND QUICKER THAN A SIMPLE SWITCH.

37

051

THEY ARE ALSO EASIER TO CONTROL IF CERTAIN CONDITIONS HAVE TO BE MET IN ORDER FOR THE RELAY TO SWITCH 'ON'.

A RELAY IS SIMPLY AN ELECTRICAL SWITCH. THAT IS, A SWITCH THAT IS NOT OPERATED BY 'HAND' BUT BY ELECTRICAL CURRENT.

THE RELAY HAS BASICALLY TWO SEPARATE CIRCUITS.

ONE IS THE 'ACTIVATING' OR 'ON-OFF' CIRCUIT. THIS IS THE 'CONTROL' PART. THIS 'CONTROL' CIRCUIT DOESN'T CONSUME MUCH CURRENT [LOW AMPS].

THE OTHER IS THE CIRCUIT THAT IS TURNED 'ON' OR 'OFF'. THIS CIRCUIT WILL CARRY THE 'WORKING CURRENT' TO THE COMPONENTS THAT ARE TO BE OPERATED BY THE RELAY. THIS IS THE HIGH AMP CIRCUIT.

RELAYS CAN BE ONE OF A NUMBER OF DIFFERENT TYPES OR COMBINATION OF TYPES.

THEY CAN BE JUST SIMPLE 'ON-OFF' SWITCHES.

THEY CAN HAVE VERY INTRICATE CIRCUITRY FOR SENSING IMPULSES, OR VARYING LOADS THAT WILL TURN RELAY 'ON-OFF'.

THEY CAN BE COMPOUND RELAYS. THAT IS, HAVE A COUPLE OF SEPARATE 'SWITCHES' IN THEM.

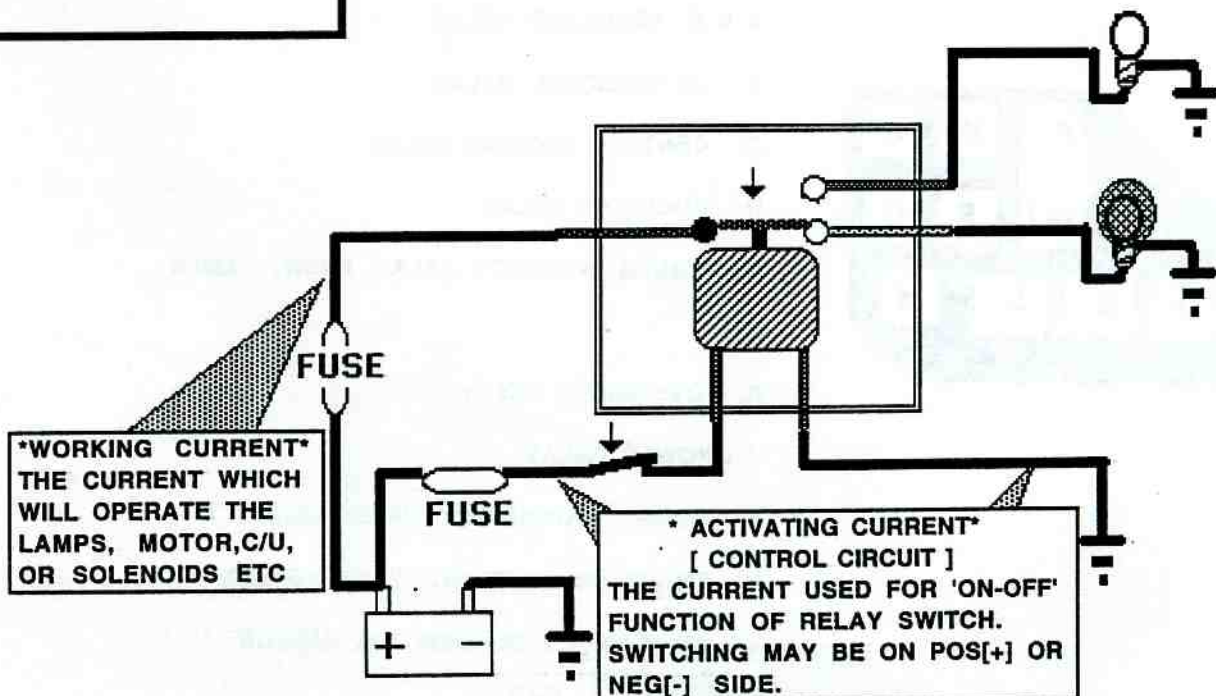
THEY CAN SWITCH CURRENT BETWEEN TWO[2] DIFFERENT COMPONENTS OR SWITCH FROM GROUND[-] TO HOT [+].

**RELAYS**  
**BASIC FUNCTION**

**RELAY "ON"**

37

054

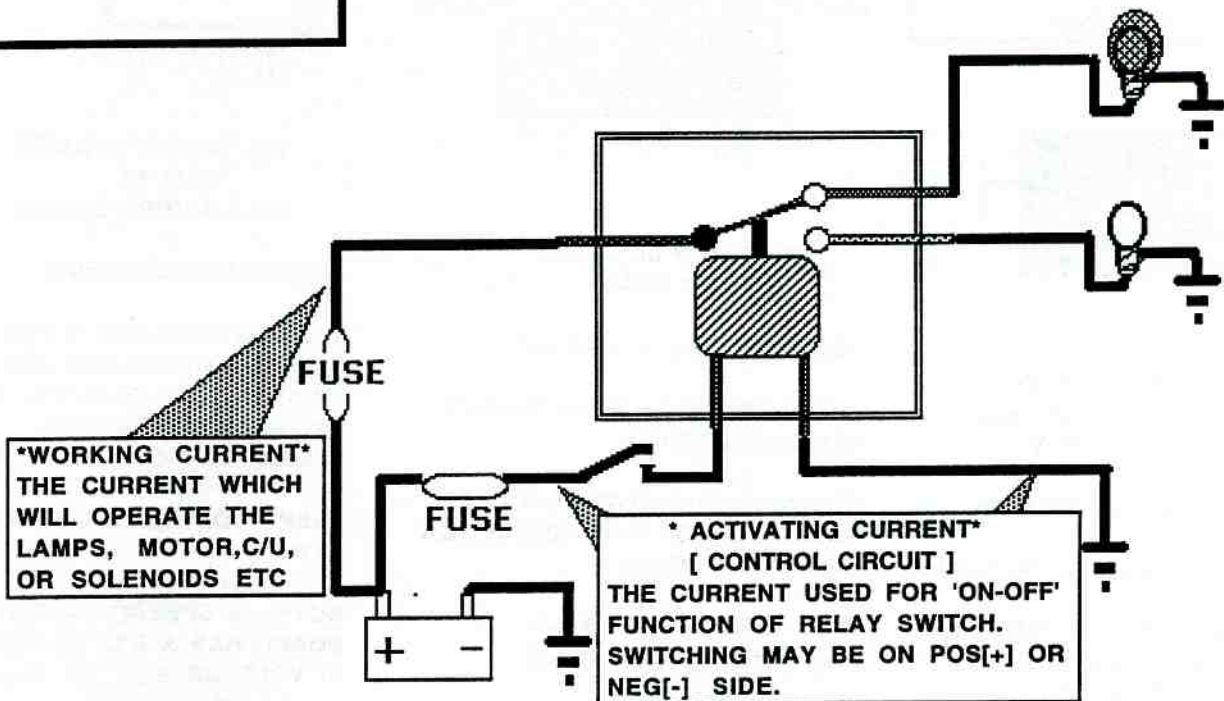


**RELAYS**  
**BASIC FUNCTION**

**RELAY "OFF"**

37

057



**\*NOTES\***

37

059



## ELECTRICAL HINTS

### RELAYS & THINGS 140,164, 240,260 MODELS

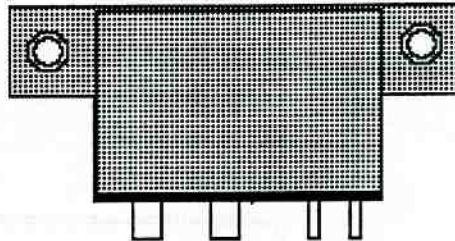


**FLASHER RELAY**  
73 & ON UP 140, 164,  
240, 260 MODELS

LEFT SIDE, CENTER DASH.

TURN SIGNAL, HAZARD flashers

**MOST COMMON FAULT IS  
T-SIGN LAMPS LITE BUT  
WILL NOT FLASH.**



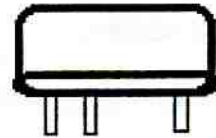
**HEADLAMP DIP RELAY  
(HI/LOW BEAM)**

RELAY LEFT FENDER NEAR BAT.

WILL FLASH HI/BEAM HDLAMPS WHEN  
HEADLAMPS ARE OFF.

GROUNDING BROWN WIRE SWITCHES  
RELAY TO ONE OF TWO MODES, EITHER  
HIGH OR LOW BEAMS.

BLUE WIRE -- LOW BEAM  
RED WIRE -- HIGH BEAM



**VOLTAGE STABILIZER**  
up to '80  
FUEL & TEMP GAUGES

BEHIND SPEEDO ASSEMBLY.

THE VOLT STABILIZER IS USED TO  
CUT THE VOLTAGE DOWN AND  
MAINTAIN IT AT A LEVEL THAT THE  
GAUGES CAN OPERATE AT  
WITHOUT DAMAGE.

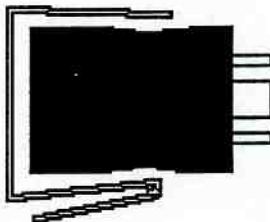
**KEEPS VOLTAGE AT APPROX  
10.0v**

**NOTE; IF SPEEDO CIRCUIT  
BOARD HAS A BAD GROUND  
[-] VOLTAGE WILL BE TOO  
HIGH [well over 10.0 v].**

#### --- ERRATIC RELAY OPERATION ---

AVOID GETTING 'CLIPPED', THESE RELAY HOLDER CLIPS CAN CAUSE SOME REAL ERRATIC PROBLEMS. WHEN YOU ARE FACED WITH AN ERRATIC [INTERMITTENT] PROBLEM, DO NOT OVERLOOK THESE CLIPS AS THE CAUSE.

**RELAY HOLDER CLIP**



**SOME OF THE RELAYS THAT USE  
THESE CLIPS ....**

T/SIGNAL, A/C RELAY, O/D RELAY,  
FUEL INJECTION RELAYS.

• AFTER REMOVAL OF THE CLIP USE SOME  
WEATHER STRIPPING CAULK ETC TO HOLD  
RELAY TO ITS' MOUNTING AREA.

**NOTE: MANY 'BAD' RELAYS MAY HAVE  
GOTTEN THAT WAY BY HAVING THESE  
RELAY HOLDER CLIPS ON THEM.**

THESE CLIPS TENDED TO PINCH AND PUT TOO  
MUCH PRESSURE ON THE INTERNAL CIRCUIT  
BOARD. THE BOARD MAY EITHER CRACK OR  
TWIST, CAUSING A CIRCUIT BREAK. OVERHEATING  
OF THE RELAY IS ALSO POSSIBLE.

REMOVAL OF THE CLIPS MAY BE ALL THAT IS  
NEEDED FOR THE RELAY TO OPERATE PROPERLY,  
OTHERWISE THE RELAY WILL HAVE TO BE  
REPLACED.

**• IF RELAYS THAT ARE GOOD ARE FOUND  
TO HAVE THESE CLIPS ON THEM, FUTURE  
FAILURES CAN BE PREVENTED BY THEIR  
REMOVAL.**

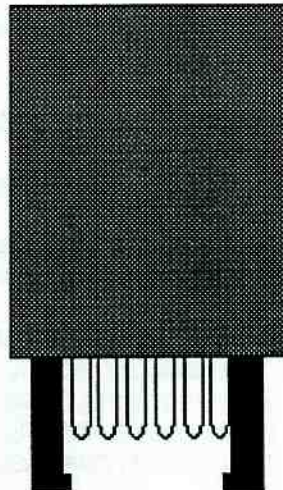
**BULB OUT  
LAMP & RELAY****AMBER BULB  
INTEGRITY LAMP****\*\*\* BULB INTEGRITY RELAY OPERATION \*\*\***

OPERATES ON THE PRINCIPAL OF COMPARING AMPERAGE DRAW BETWEEN TWO CIRCUITS. THIS IS HOW IT WORKS, IF WE TAKE THE BRAKE LAMP CIRCUIT, THERE ARE 2 BULBS. WHEN BOTH BULBS ARE WORKING, THE INTEGRITY CIRCUIT IS IN A NEUTRAL POSITION, THE AMPERAGE DRAW [LOAD] IS THE SAME ON BOTH SIDES OF THE CIRCUIT. WHEN 1 OF THE BULBS IS OUT, THE AMPERAGE DRAW [LOAD] IS HIGH ON 1 SIDE OF THE CIRCUIT, AND NO DRAW ON THE OTHER SIDE. THIS DIFFERENCE OF LOAD WILL CAUSE THE INTEGRITY LIGHT TO GO 'ON' AND STAY 'ON'.

**\*\* WHEN 1 OF THE BULBS IS OF THE WRONG TYPE [example #1156 on Left side & #1141 on Right side] OR A 'POOR' CONTACT AT BULB SOCKET OR CIRCUIT BOARD.**

THE AMPERAGE DRAW [LOAD] IS HIGH ON 1 SIDE OF THE CIRCUIT, AND A LOW DRAW ON THE OTHER SIDE. THIS DIFFERENCE OF LOAD WILL CAUSE THE INTEGRITY LIGHT TO 'FLASH', or GO 'ON' AND THEN 'OFF'.

- ALSO CHECK GROUND[-] WIRES & CONNECTIONS AT BOTH LAMPS.

**\*\*\* BULB INTEGRITY CIRCUITS 1974 - ON \*\*\*  
TAIL LAMPS - PARK LAMPS - BRAKE LAMPS - LOW BEAM HDLAMPS****BULB INTEGRITY RELAY****\*\* REPAIR THE FAULTY SYSTEM \*\***

OFTEN THE INTEGRITY LAMP FLASHES ON 'BRAKING', DUE TO VARIOUS PROBLEMS.  
[SEE BLINKING BULB WARNING LAMP]

THE OWNER THEN THINKS THAT HE HAS A BRAKE PROBLEM. SO CHECK FOR THIS WHEN HE TELLS YOU THE 'BRAKE WARNING LITE' FLASHES 'ON' WHEN 'BRAKING'.

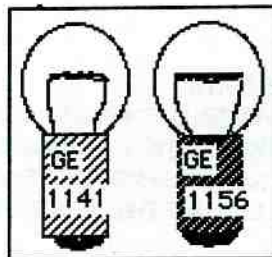
ASK THE DRIVER IF THE LITE WAS ....  
RED [brake warning]  
OR  
AMBER [bulb integrity]



**BLINKING BULB  
WARNING LIGHT  
240 & 700 SERIES**

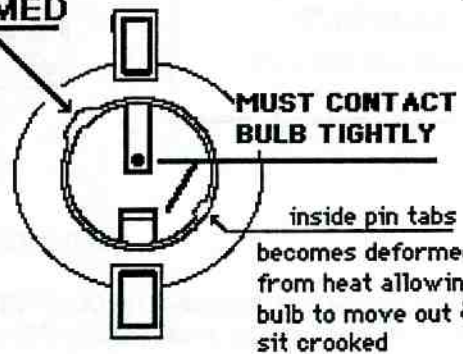
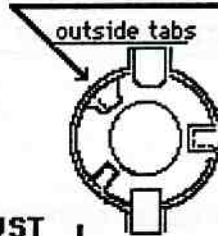
**REASONS FOR THE WARNING BULB TO FLASH 'ON'.  
LITES MAY EITHER BE LIT BUT DIM, OR NOT LITE AT ALL.**

**37  
111**



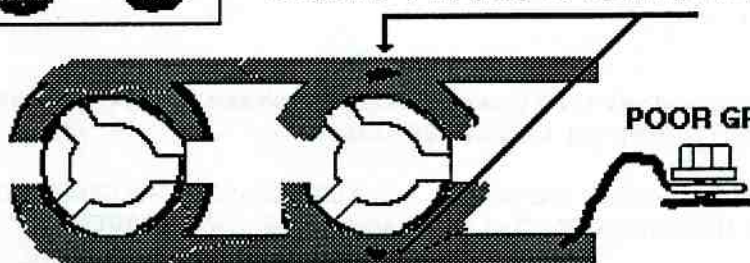
**BULBS MUST  
BE THE SAME**  
**USE THE SAME TYPE OF  
BULB. WATTAGE SHOULD  
BE THE SAME**

**HEAT DEFORMED**

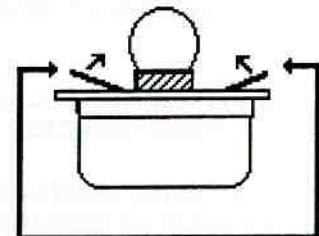


**inside pin tabs  
becomes deformed  
from heat allowing  
bulb to move out &  
sit crooked**

**CLEAN PITTED & CORRODED**



**TAIL LAMP ASSEMBLY CIRCUIT BOARD**



**BEND CONTACTS UP**

**BULB WARNING  
LITE  
LITE STAYS ON  
OR BLINKS**

**NOTE-700 SER WITH #1157 BULBS BRK & T-LMP  
-BLACK SOCKET LEFT WHITE SOCKET RIGHT-**

**37  
114**

**START ENG---SO BULB WARNING LITE WILL  
SHOW IF THERE IS A BULB PROBLEM**

**WITH LITE SWITCH TURNED 'ON' OR BRAKE  
PEDAL ACTIVATED (put long bar or screwdriver between  
seat & brake pedal)**

**SLOWLY TURN THE BULB SOCKET THAT IS NOT  
LIT OR IS ONLY DIMLY LIT BACK & FORTH AND  
WHILE TAKING NOTE IF BULB COMES ON, OR  
GETS BRIGHTER.**

**IF SO, THE CIRCUIT BOARD OF THE LAMP HOUSING MAY  
BE CORRODED. YOU MUST ENSURE THE SOCKET TERMS  
MAKE A GOOD CONNECTION WITH CIRCUIT BOARD AND  
WON'T VIBRATE LOOSE.**

**IF THE BULB DOESN'T LITE OR LITE PROPERLY  
- GO TO CHECK LIST.**

**• 1986 -on DON'T FORGET 3rd BRAKE LITE.**

**-----CHECK LIST-----**

- 1-CHECK BULBS ARE THE SAME (BOTH  
# 1157, 89, 1156 ETC)**
- 2-CHECK CIRCUIT BOARD ASSEMBLY OF  
LAMP FOR PITTING OR CORROSION.**
- 3-CHECK CIRCUIT BOARD HAS A GOOD  
GROUND[-]  
NOT LOOSE OR HOOKED UP ON THE BOLT STUDS  
  
THAT HOLD LAMP ASSEMBLY ON, THESE DO NOT  
PROVIDE A GOOD GROUND[-].**
- 4-CHECK FOR HEAT DISTORTION OF BOTH  
THE CIRCUIT BOARD SOCKET RETAINERS  
& THE SOCKETS (INSIDE TABS FOR BULB  
PINS & TABS OUTSIDE SOCKET THAT HOLD  
SOCKET TO LAMP ASSEMBLY).**
- 5-CHECK SOCKET BULB CONTACTS FOR  
TIGHT, CLEAN CONTACT WITH BULB  
& SOCKET CONTACTS FOR TIGHT**

## **BACK- UP LAMPS**

### **DON'T ALWAYS LITE**

37

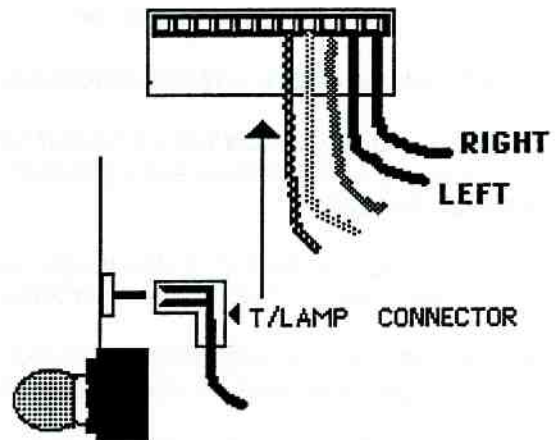
117

**\*\*\* BACK-UP LAMPS WON'T LITE \*\*\*  
& FUSE IS NOT AT FAULT**

BACK-UP LAMPS HAVE THEIR WIRES GO FIRST TO THE LEFT TAIL LAMP ASSEMBLY, FROM THERE THE WIRE GOES TO THE RIGHT T/LAMP ASSEMBLY.

THE WIRES ARE BOTH BLACK AND THEY ARE NEXT TO EACH OTHER. THE WIRES HAVE TO HAVE A GOOD CONNECTION AT THE TERMINAL PLUG OR THE RIGHT SIDE OR EVEN BOTH WILL NOT WORK.

- ✓ CHECK THE TERMINALS ARE TIGHT, THAT THEY ARE NOT SPREAD TOO FAR APART.
- ✓ CHECK THE CIRCUIT BOARD IS NOT CORRODED.



**\*NOTES\***

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**ERRATIC  
ELECTRICAL SYS  
OPERATION  
CORRODED FUSES  
AND TERMS**

37

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•• LOOSE FUSES ARE ALSO A REASON FOR THE FUSES TO HAVE AN ERRATIC CONTACT.

•• ON MAINTENANCE SERVICES IT IS A GOOD IDEA TO SERVICE THE FUEL INJ FUSES TO PREVENT ANY FUTURE PROBLEMS

•• CORRODED FUSES ••

**CORRODED FUSES ARE A LARGER PROBLEM THAN BLOWN FUSES.**

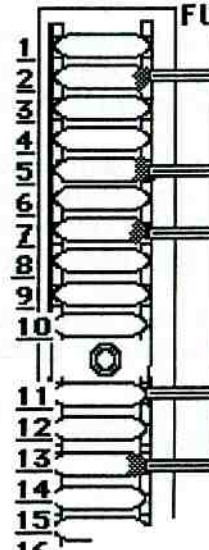
A BLOWN FUSE WILL NOT ALLOW THE EQUIPMENT ON IT TO WORK AT ALL AND BLOWN FUSES ARE EASIER TO SPOT [UNLESS THEY JUST HAVE A LITTLE CRACK IN THEM].

A CORRODED FUSE IS DIFFERENT, IT MAY ALLOW THE EQUIPMENT ON IT TO WORK AT TIMES AND NOT WORK AT OTHER TIMES.

CORRODED FUSES ARE THE MAIN CAUSE OF 'ERRATIC' COMPONENT OPERATION. THOSE ANNOYING 'ON AGAIN' - 'OFF AGAIN' SYMPTOMS.

\* SOMETIMES THE PROBLEM OCCURS BECAUSE AN EXCESS OF MOISTURE IS PRESENT IN THE CAR. ON 200 SERIES CARS, THE HOODLOCK HANDLE MAY BE LETTING WATER LEAK DOWN ON THE FUSE BOX.

**CORRODED FUSES**

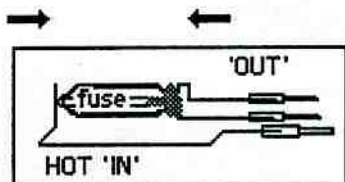


•• CORRODED FUSES ••

THE FUSE WILL NORMALLY BE CORRODED AT THE 'OUT' END OF THE FUSE.

CLEAN AND LUBE BOTH ENDS OF THE FUSE HOLDER.

**PINCH HOLDER**



•• SERVICE FUSE BOX ••

1. REMOVE THE CORRODED FUSE.
2. CLEAN ALL THE CORROSION FROM THE FUSE HOLDER ENDS.
3. 'PINCH' THE FOLDER ENDS IN SO THE FUSE WILL BE HELD IN VERY TIGHTLY.
4. USE DIALECTRIC GREASE TO HELP PREVENT CORROSION IN THE FUTURE.
5. INSTALL A BRAND NEW FUSE OF THE CORRECT AMPERAGE.

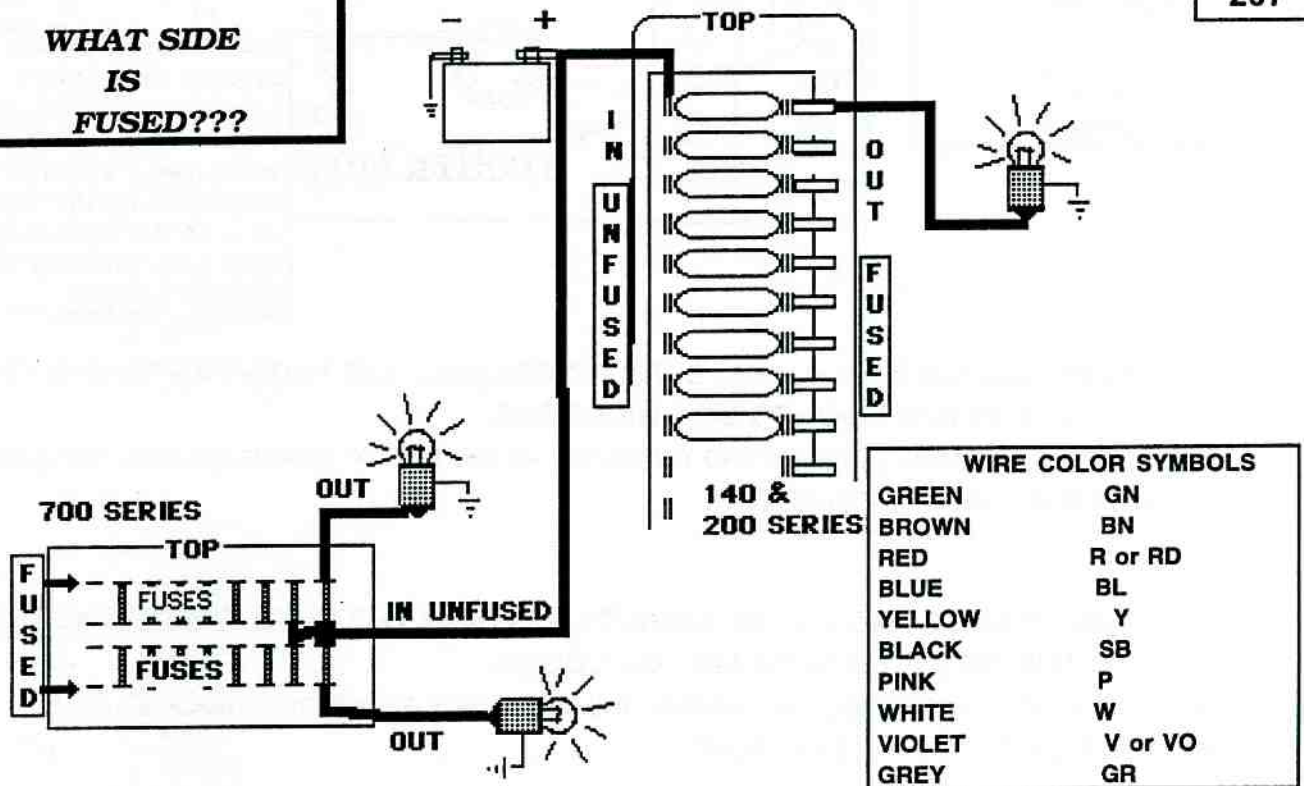
• IF MORE THAN ONE OR TWO FUSES ARE CORRODED, IT IS ADVISABLE TO REPLACE ALL THE FUSES AND ALSO SERVICE ALL THE HOLDERS.

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# FUSE BOXES

WHAT SIDE  
IS  
FUSED???

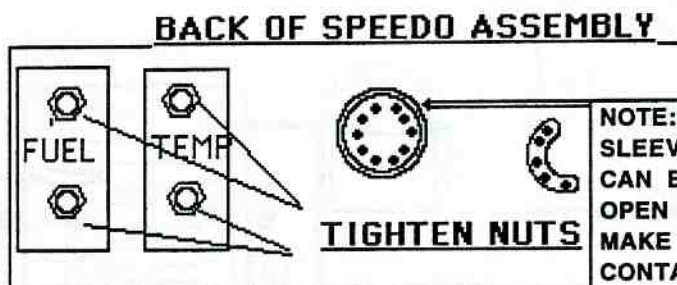


\*NOTES\*



**ERRATIC FUEL  
& TEMP GAUGES**

**USUALLY LOW  
READINGS**



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NOTE: THESE ROUND SLEEVE TERMINALS CAN BECOME SPREAD OPEN TOO FAR & WILL MAKE ONLY ERRATIC CONTACT. CLOSE THEM UP & MAKE SURE THE PINS ARE TIGHT IN THE CIRCUIT BOARD.

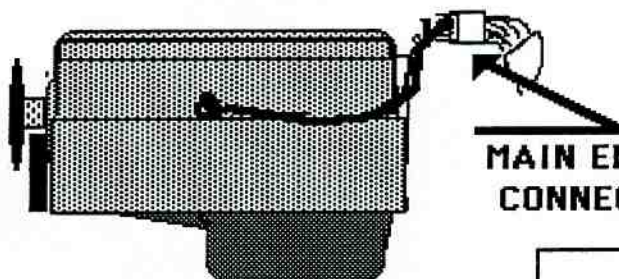
**\*IF THE TEMP GAUGE HAS A LOW, ERRATIC READING THE NUTS FASTENING THE GAUGE TO THE CIRCUIT BOARD MAY BE LOOSE.**

BE SURE THE T-STAT, WIRING, SENSOR AND TERMINALS AT THE CIRCUIT BOARD, ENGINE HARNESS AND SENSOR ARE GOOD IF NUTS ARE TIGHT.

**\*IF THE FUEL GAUGE HAS A LOW, ERRATIC READING THE NUTS FASTENING THE GAUGE TO THE CIRCUIT BOARD MAY BE LOOSE.**

BE SURE THE FUEL TANK SENDING UNIT, WIRING, AND TERMINALS AT THE CIRCUIT BOARD, AND SENDING UNIT ARE GOOD IF NUTS ARE TIGHT.

**B-21,23,B-230  
HIGH TEMP  
GAUGE READING  
ERRATIC &  
FALSE**



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**MAIN ENG HARNESS  
CONNECTOR**

WHEN A HIGH ENG TEMP READING AT THE GAUGE IS FOUND TO BE FALSE (present even when eng is dead cold or at normal operating temp).

THE READING AT THE GAUGE MAYBE ERRATIC : 'LOW', 'NORMAL' OR 'HIGH' AT DIFFERENT TIMES.

THE FAULT MAY LIKELY BE A SHORTING TO GROUND SENSOR WIRE(yellow).

THE WIRE COMES FROM THE TEMP SENSOR ON LEFT SIDE OF ENG, IT TENDS TO BECOME FRAYED FROM HEAT & WEAR, GROUNDING OUT AGAINST THE BLOCK AT TIMES.

REPLACING THE WIRE (from the sensor to the eng harness plug located on firewall behind eng)WITH A WELL INSULATED WIRE WILL REMEDY THE PROBLEM.

TEMP SENDER OHMs  
APPROXIMATE  
COLD —  
60°F---- 1200 Ω  
190°F --- 90-110Ω  
HOT ----

VOLTAGE FROM  
GAUGE [wire unplug  
from temp sender]  
1973 THRU 1985  
approx 10.0v

1986 ON  
approx 1.7v

**OIL PRESSURE  
LAMP**

**ERRATIC  
BLINKING**

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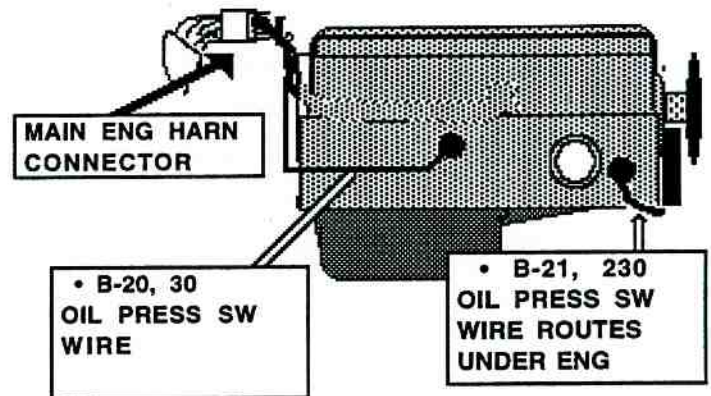
\*\*\* YOU MUST BE ABSOLUTELY SURE ANY  
BLINKING OF THE OIL PRESSURE LAMP IS NOT A  
PROBLEM OF THE OIL DELIVERY SYSTEM.  
\*\*\* SEVERE ENG DAMAGE MAY RESULT IF OIL  
DELIVERY SYSTEM IS OVERLOOKED.

**\*\* OIL PRESSURE LAMP BLINKING \*\*  
OR STAYS 'ON'**

AFTER YOU HAVE ELIMINATED AN OIL  
DELIVERY SYSTEM PROBLEM, CHECK  
FOR A BROKEN WIRE TO THE OIL  
PRESSURE SWITCH ON THE RIGHT  
SIDE OF THE ENGINE.

THE INSULATION FOR THE WIRE MAYBE WORN  
AND CRACKED OFF DUE TO THE HEAT IT IS  
SUBJECTED TO.

REPLACE THE WIRE FROM THE O/P SW TO THE  
MAIN ENG WIRE HARNESS CONNECTOR  
BEHIND ENGINE.



**NOTES**



**GROUP 40 TRANS & DRIVETRAIN**

- 40- 011 O/D LAMP STAYS 'ON' & OVERDRIVE PROBLEMS  
'81-ON OVERDRIVE  
PROBLEMS [MANUAL] \_\_ '81-ON \_\_ TESTING
- 43- 101 AUTO TRANS LEAKS
- 45- 101 DRIVESHAFT ALIGNMENT, VIBRATION, CENTER SUPPORT

**GROUP 50 BRAKE SYSTEM**

- 52- 321 BRAKE WARNING LAMP 'ON' \_\_ LEAKING
- 52- 331 BLEEDING BRAKES
- 52- 341 MASTER CYLINDER PROBLEMS
- 54- 211 NO POWER BRAKE ASSIST \_\_ VACUUM PUMP

**GROUP 60 SUSPENSION & STEERING**

- 60- 001 STEERING & SUSPENSION CHECKS \_\_ TIPS
- 60- 211 KNOCKS & RATTLES \_\_ FRONT END
- 62- 101 FRONT AXLE SEAL INSTALLATION
- 63- 111 STEERING & SUSPENSION CHECKS \_\_ TIPS
- 63- 121 FRONT SHOCKS
- 65- 611 KNOCKS & RATTLES \_\_ REAR SUSPENSION

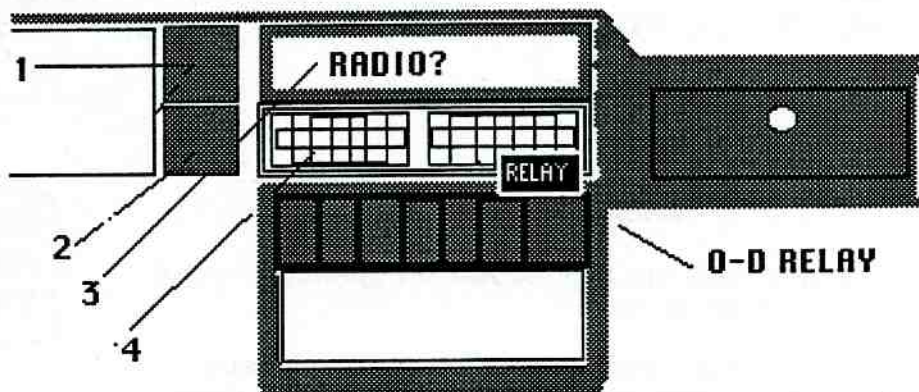
**O-DRIVE INOP  
O-D LITE COMES ON  
BY ITSELF ?  
WONT TURN OFF?**

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011

240-260 DASH

REMOVE GLOVEBOX  
TO GET TO RELAY or  
ALTERNATE METHOD  
REMOVE 1,2,3\*,4



If the O-D is not responding to operating switch, unable to turn lite on or off, relay is defective. Sometimes the steel clip holding relay to dash frame is distorting it, and by just removing & DISCARDING the clip the relay can function properly. If not replace relay, fasten it to dash frame with caulk. Relay is located under air vent, behind center dash. Remove the seven screws behind the glovebox door & remove glovebox.

RELAY (blue-early manual trans) (orange-early auto trans), (white-late models)  
FUSE #12 IS FOR OVERDRIVE

**\*NOTES\***

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014



**OVERDRIVE INOP  
&  
O.D. LITE or 5th  
SPEED LITE WON'T  
LITE**

**\*\* MULTI- WIRE HARNESS CONNECTOR \*\***

LOCATED BEHIND RIGHT SIDE CENTER CONSOLE PANEL UNDER CARPET. YOU CAN CHK FOR BROKEN WIRES FROM O/D SW AT THIS POINT BY CHECKING FOR 12v at BLUE WIRE WITH KEY ON.

**12v at BROWN WIRE WITH O/D SW OPERATED**

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-----CHECK LIST-----  
===== USE A TEST LITE =====

- 1. CHK FUSE #12 (FOR BLOWN OR CORRODED ENDS)  
IF OK GO TO #2**
- 2. CAREFULLY POP O/D SW OUT OF SHIFT KNOB  
BE CAREFUL TO NOTE IF WIRES MAY HAVE BEEN  
PULLED OFF (wires need slack, pull them up if needed, move  
shift lever thru all gears, be sure they don't go back down )  
IF OK GO TO #3**
- 3. CHK FOR 12v at BLUE wire WITH KEY ON, NO  
CURRENT THEN> CHK O/D RELAY or WIRING TO  
RELAY, MAINLY UNDER THE SHIFT BOOT.  
IF 12v THEN> CHK THAT SWITCH WORKS-  
PRESS BUTTON & CHK 12v at BROWN wire.**

WIRE TERM  
PULLED OFF  
SWITCH

WIRES OFTEN BREAK  
UNDER THE SHIFT BOOT.  
IF BREAK IS SUSPECTED  
R&R BOOT > CHK WIRES

## \*\*\*\*\* OVERDRIVE FAULT TRACING GUIDE \*\*\*\*\*

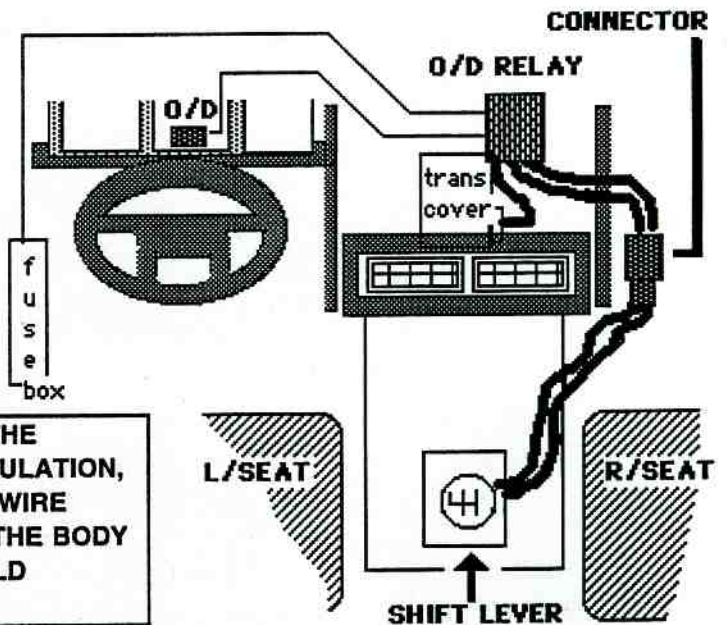
## COMMON PROBLEMS

- \* BROKEN WIRE AT BOTTOM OF SHIFT LEVER, OR NEAR SHIFT BOOT.
- \* RELAY BAD[BEHIND CENTER DASH AIR VENTS].
- \* WIRES PULLED OFF OF O/D SW.
- \* 4th GEAR SW ON TRANS[R SIDE,TOP COVER] IS NOT OPERATING, IT SHOULD GROUND[-] OUT WHEN IN 4th GEAR.

**OR**

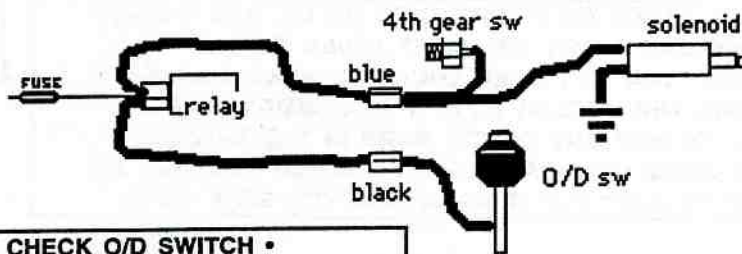
**WIRE IS BROKEN OR PULLED OFF THE SWITCH  
TERMINAL.**

**\* FUSE #12 BLOWN - THE WIRE GOING TO THE TRANS SOLENOID HAS WORN OFF THE INSULATION, GROUNDING IT OUT AGAINST TRANS. THE WIRE DETERIORATES WHERE IT COMES OUT OF THE BODY BY THE SHIFT LEVER HOUSING. YOU SHOULD REPLACE OR RE-INSULATE WIRE.**



41

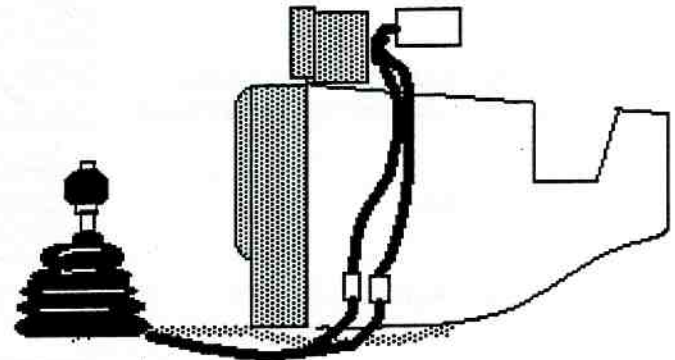
234



- CHECK O/D SWITCH •  
BLACK CONNECTOR  
KEY 'ON' [KP II] ENG 'OFF'
- 1 - BLUE WIRE 'HOT'
- 2 - HOLD O/D BUTTON DOWN  
BROWN WIRE 'HOT'

#### BLUE CONNECTOR

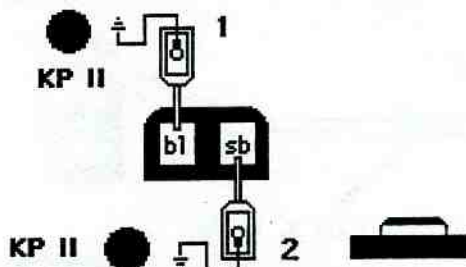
- [KP II] SHIFT LEVER IN 4th GEAR
- 1 - PUSH O/D SWITCH
  - 2 - YEL WIRE 'HOT' IF O/D IS TURNING ON. IF NOT 'HOT' CHECK OUT SYSTEM TO DETERMINE FAULT.



41 237

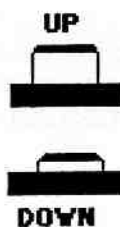
- 1 - KP II BLUE WIRE  
[ POWER SUPPLY TO O/D SW ]

TEST LITE 'OFF'  
CHECK  
✓ FUSE #12



- 2 - KP II BROWN[bn] WIRE  
ACTIVATE SW [BUTTON DOWN]

TEST LITE 'OFF'  
CHECK  
✓ TERMS AT O/D SW  
✓ BROKEN WIRES TO  
SHIFT/LEVER



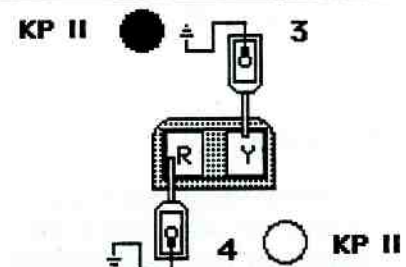
T/LITE

○ 'OFF'  
● 'ON'

- 3 - KP II YEL WIRE SOLENOID  
[ POWER SUPPLY TO SOLENOID]  
SHIFT LEVER IN 4th GEAR

TEST LITE 'OFF'  
GO TO 4 [CHECK 4th G/SW]

ALSO CHECK  
✓ RELAY & CONNECTIONS



- 4 - KP II RED WIRE 4th G/SW  
BYPASSES 4th GEAR SW GROUND

IF YEL SOLENOID WIRE IS 'HOT'  
& SOLENOID NOW CLICKS 'ON'  
CHECK 4th GEAR SW AND THE RED  
WIRE TO IT. USE T/LITE TO  
GROUND[-] WIRE AT 4th G/SW

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**AUTO TRANS LEAK**  
**BORG-WARNER**  
**BW-35,55,70,71**  
**FRONT RIGHT SIDE**  
**OIL PAN AREA**

TRANS LEAKS THAT APPEAR TO BE OIL PAN GASKET LEAKS ARE OFTEN THE SHIFT LEVER SEAL LEAKS. YOU MAY OVER LOOK THE SEAL BECAUSE IT IS BEHIND THE COOLER PIPE. IT IS COMMON FOR THE SEAL TO POP OUT OF IT'S BORE IN THE TRANS. REPLACING THE SEAL IS BEST THOUGH YOU MAY BE ABLE TO JUST PUT IT BACK IN IF IT'S STILL GOOD.

43

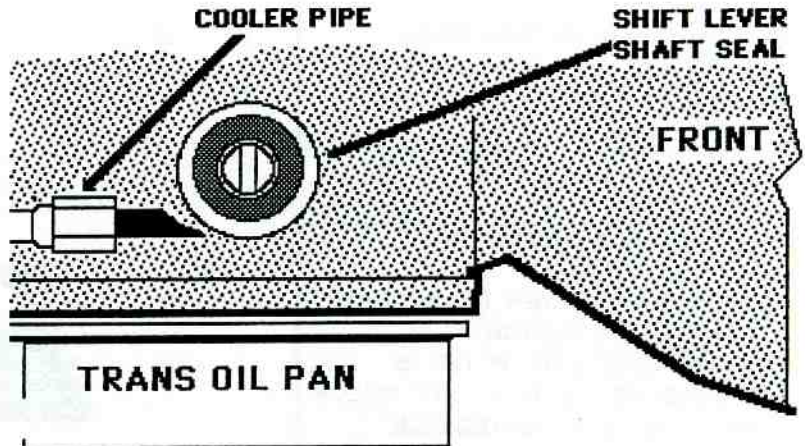
101

\* IF NECESSARY, REMOVE THE TRANS COOLER LINE TO GET AT THE SEAL.

\* CHECK THE SHAFT FOR ANY ROUGH SURFACES. CLEAN ANY THAT ARE FOUND.

\* REPLACE SEAL.

\* RECHECK FOR ANY LEAKS.



**PARKING PAWL**  
**DOESNT HOLD**

**BW-55,70,71**

LOCKING ROLL PIN CAN BREAK, THE SPRING PRESSURE WILL THEN BE GONE THAT PUSHES THE ACTUATOR AGAINST THE PARKING PAWL. WHEN THIS HAPPENS IT WILL NOT FULLY ENGAGE THE TEETH ON THE OUTPUT SHAFT DRUM AND IT WILL NOT HOLD.

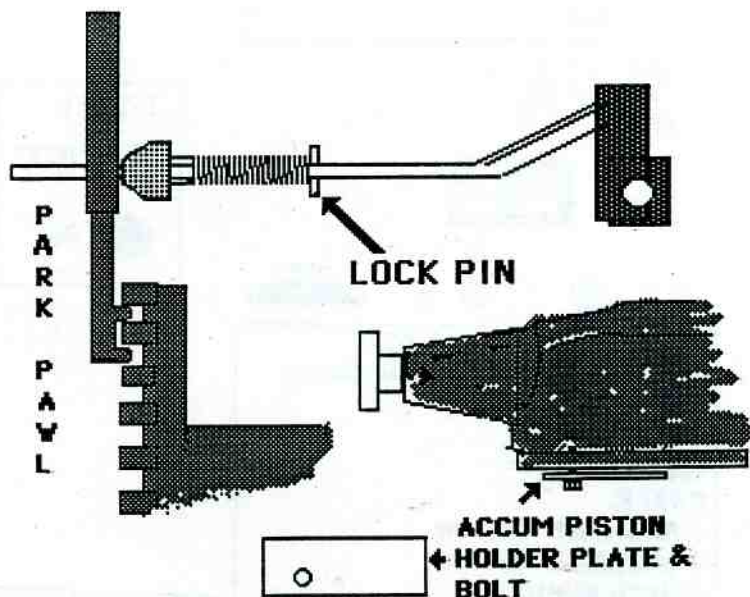
43

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\* R&R TRANS OIL PAN

\* REMOVE THE VALVE BODY. BE CAREFUL OF ACCUMULATOR PISTONS (R REAR OF TRANS) HOLD THE PISTONS UP WITH A PLATE MADE FROM PLASTIC OR TIN AND HELD TO TRANS BODY WITH AN OIL PAN BOLT.

\* REPLACE LOCK PIN



## DRIVE SHAFT

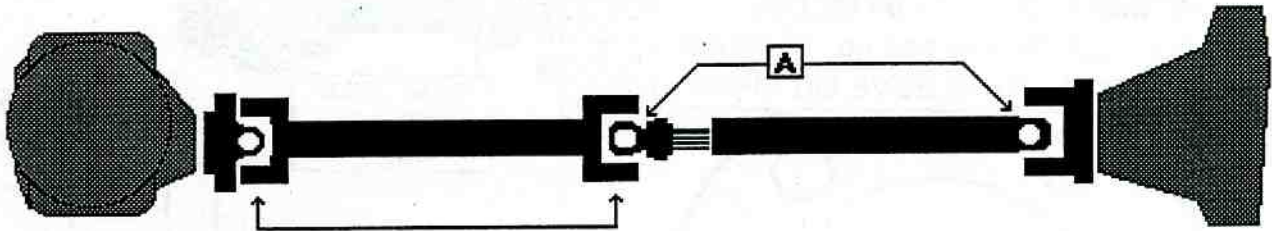
### U-JOINT ALIGNMENT

THE DRIVESHAFT SHOULD BE THOUGHT OF AS ACTUALLY TWO SEPARATE SHAFT ASSEMBLIES.

EVEN THOUGH THE SPLINE SHAFT IS MOUNTED ON THE REAR SHAFT, IT IS SUPPOSE TO BE ALIGNED WITH THE FRONT SECTION IN A WAY AS IF IT WAS A SOLID PART OF THE FRONT SHAFT. ITS' U-JOINTS FACING THE SAME WAY. SEE 'A'

45

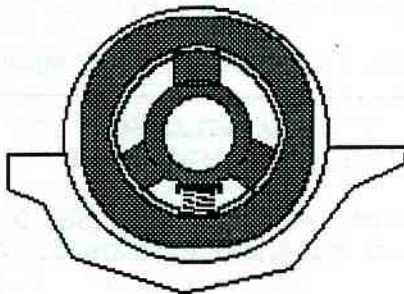
101



#### \* DRIVESHAFT VIBRATION

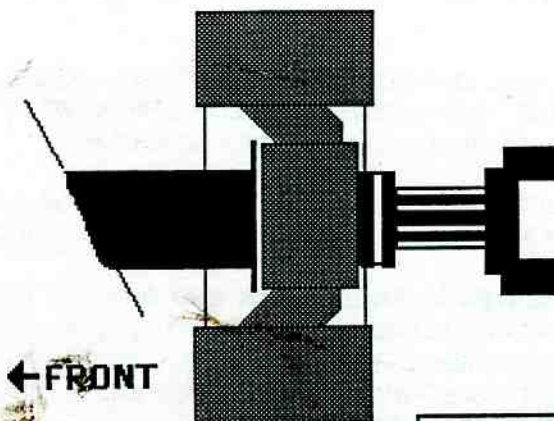
- ✓ SECTIONS ARE NOT PROPERLY ALIGNED
- ✓ WORN, FROZEN OR LOOSE U-JOINTS

MARK FLANGES, SPLINE SHAFT & DRIVE SHAFT HALVES BEFORE THEY ARE DISASSEMBLED, SO THEY WILL BE ABLE TO BE PUT BACK TOGETHER IN THE SAME ORDER & ALIGNMENT.



#### \* CENTER BEARING SUPPORT \*

- ✓ FACING CORRECT WAY
- ✓ LOCATED IN THE BRACKET CORRECTLY NOT TWISTED OR TURNED.
- ✓ SPRING AND WASHER INSTALLED.
- ✓ BEARING ROTATES EASILY, NO BINDING OR NOISE.



45

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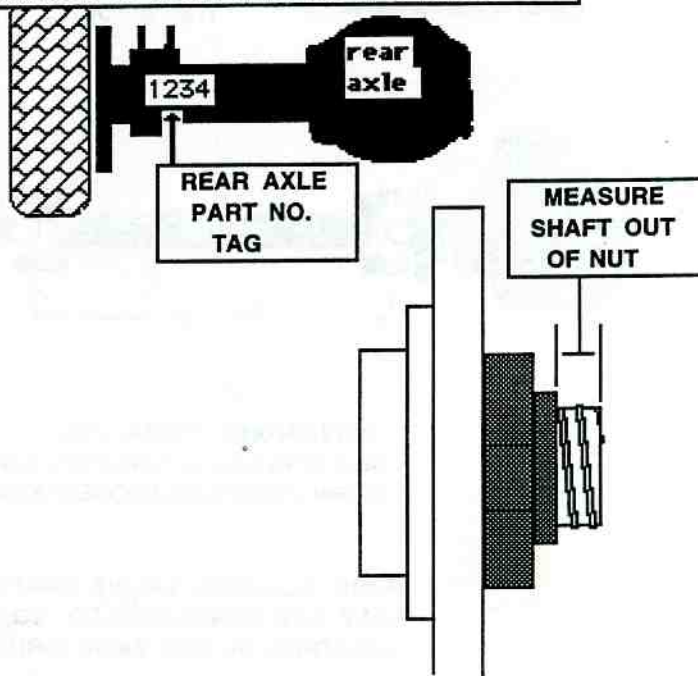
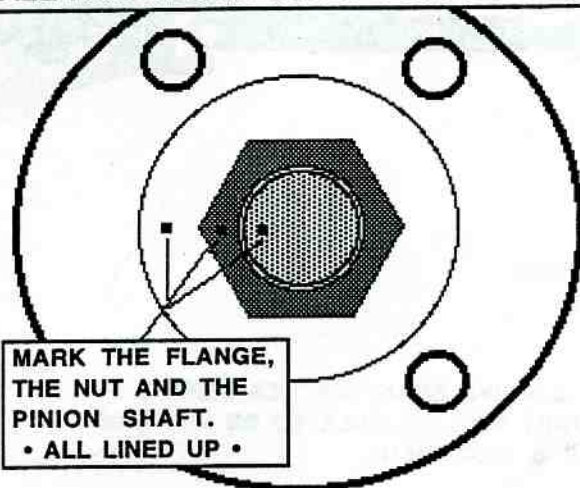


**REAR END PINION  
SEAL  
REPLACEMENT  
CRUSH SLEEVE  
VERSION**

WITH CRUSH SLEEVE FLANGE NUT TORQUE IS VERY LOW... 1.5 ft/lbs  $\sqrt{\text{axle part number}}$ .  
CAUTION - ON EARLIER AXLES SHIMS WERE USED TO SET BEARING PRE-LOAD, WITH SHIMS THE FLANGE NUT TORQUE IS VERY HIGH... 220 ft/lbs .

47  
241

CRUSH SLEEVE USED STARTING SOMETIME IN THE '83 - 84 MODEL YEARS. CHECK axle part no. TO SEE IF AXLE HAS CRUSH SLEEVE OR SHIMS.



**CAUTION — CAUTION — CAUTION**  
YOU MUSTN'T TIGHTEN THE FLANGE NUT PAST ITS' ORIGINAL SPOT OR THE CRUSH SLEEVE WILL COLLAPSE CAUSING THE PINION BEARING TO SIEZE.  
THE TORQUE USED TO RETIGHTEN THE NUT IS ONLY 1.5 ft/lbs, WHICH IS MINIMAL.

47  
244

CHECK AXLE PART NO. TAG ON THE REAR LEFT SIDE OF AXLE HOUSING. IT MAY BE COVERED WITH UNDERCOATED.

• AXLE PART NUMBERS •  
WITH THE CRUSH SLEEVE FOR PINION BRNG PRE-LOAD.  
STARTING IN 1983-84.

**PART NUMBERS:**

1216 094  
1216 104  
1216 162  
1216 096  
1216 105  
1216 151

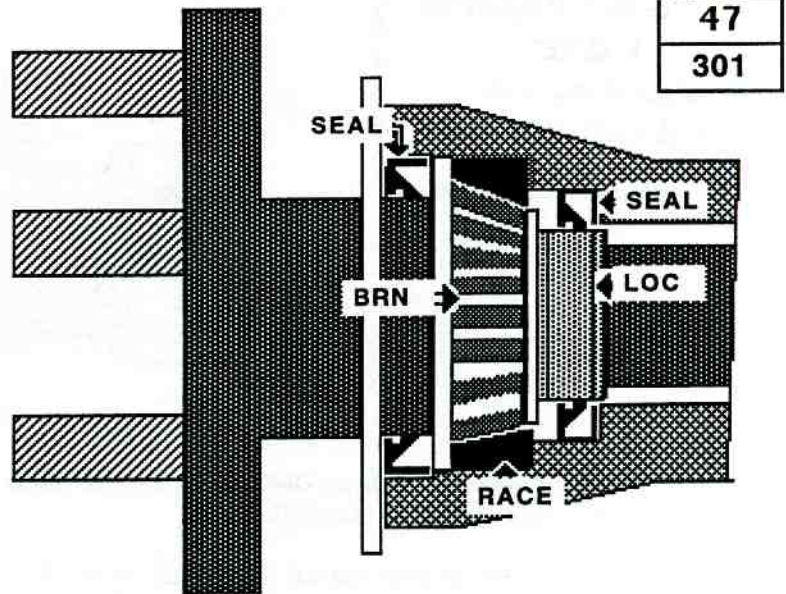
ALSO ANY PART NUMBER  
BEGINNING WITH AN 'S'

**\*\*\*\* SEAL REPLACEMENT \*\*\*\***

- 1- REMOVE REAR DRIVESHAFT FROM REAR AXLE.
- 2- MARK THE FLANGE, NUT AND SHAFT.[SEE DRAWING]  
MEASURE HOW FAR THE SHAFT EXTENDS OUT FROM THE NUT & FLANGE.
- 3- REMOVE NUT, PULL OFF FLANGE, REMOVE OLD SEAL. LUBE AND INSTALL NEW SEAL.
- 4- INSTALL FLANGE, LINING UP MARKS. DO NOT USE A HAMMER TO PUT ON FLANGE, OR THE CRUSH SLEEVE MAY COLLAPSE FURTHER.  
**~ REAR END DAMAGE WILL RESULT ~**
- 5- INSTALL NUT TO THE POSITION SO ITS' MARK LINES UP AND THE SHAFT EXTENDS OUT TO THE SAME DISTANCE AS BEFORE REMOVAL [MEASURE TO BE SURE].  
**DO NOT TIGHTEN FURTHER. REAR END DAMAGE WILL RESULT.**  
TURN THE REAR AXLE FLANGE BY HAND, IT SHOULD BE ABLE TO BE TURNED WITH NO MORE OR LESS EFFORT THAN BEFORE REPAIR WAS BEGUN.  
IF NOT THE CRUSH SLEEVE WILL HAVE TO BE REPLACED & PINION BEARING PRE LOAD WILL HAVE TO BE RESET.

**REAR AXLE  
BEARING**

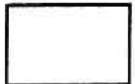
**CORRECT  
INSTALLATION**



✓ PACK BEARING & SEAL WITH A GOOD QUALITY, HIGH TEMP WHEEL BRNG GREASE.

✓ RACE GOES IN FIRST, FACING TO THE OUTSIDE OF AXLE HOUSING.  
IT SHOULD BE POSSIBLE THAT IF AXLE WAS PULLED OUT THAT THE RACE COULD STILL REMAIN IN THE HOUSING.

**NOTES**

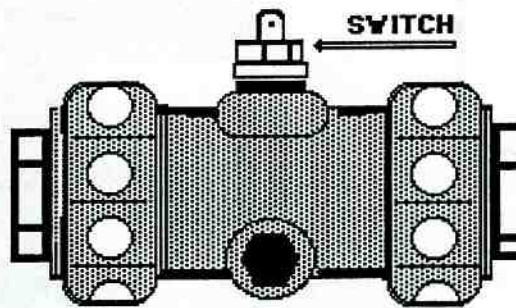




**BRAKE WARNING  
VALVE  
LEAKING OR  
W/LAMP OFF/ON**

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**• SYMPTOMS & CHECKS OF WARNING VALVE •**

- \* **SPONGY PEDAL** > CHK ALL CALIPERS, LINES, HOSES AND MASTER CYLINDER FOR SIGNS OF LEAKING.
- \* **THERE SHOULD BE NO BRAKE FLUID AT SWITCH.** REMOVE THE SWITCH TO CHECK. ANY FLUID MEANS AN INTERNAL LEAK CAUSING A PRESSURE DIFFERENTIAL.
- \* **IF THE WARNING LAMP IS ONLY DIMLY LIT, BUT NO BRAKE PERFORMANCE PROBLEM** > CHK WIRE TO SWITCH FOR A PARTIAL GROUNDING. IF NONE IS FOUND, DISCONNECT SWITCH, IF LAMP IS NOW OUT, THE W/VALVE SWITCH IS MAKING A WEAK GROUND[-] CONTACT DUE TO INSULATION BEING WORN OFF OF SLIDING PISTON.

\* **BEFORE REPLACING THE BRAKE W/VALVE MAKE SURE EVERY LINE TO IT CAN BE REMOVED & ISN'T FROZEN TO IT'S FITTING NUT.** THIS WILL PREVENT HAVING TO TIE UP CAR WAITING FOR AN ORDERED LINE TO REPLACE THE FROZEN LINE TO ARRIVE. YOU CAN THEN ORDER FROZEN LINE IF NEEDED BEFORE ATTEMPTING TO REPLACE VALVE.

\* **IF THE CAR HAS MORE THAN 50,000 miles OR IS MORE THAN 4 YEARS OLD, IT IS WISE TO REPLACE BRAKE WARNING VALVE IF THE MASTER CYL IS BEING REPLACED.** THIS IS BECAUSE THE VALVE IS PROBABLY GOING TO START LEAKING SOON.

\* **ALWAYS BLEED AND FLUSH THE WHOLE BRAKE SYSTEM AFTER REPLACING ANY HYDRAULIC BRAKE PARTS.**  
FLUSH UNTIL CLEAN, NEW FLUID COMES OUT OF ALL BLEED SCREWS.

\* **FLUSH BRAKE SYSTEM EVERY TWO YEARS OR 30,000 MILES, WHICHEVER COMES FIRST.**

## **BRAKE WARNING VALVE**

### **FROZEN PIPE- TO- FITTING REPAIR**

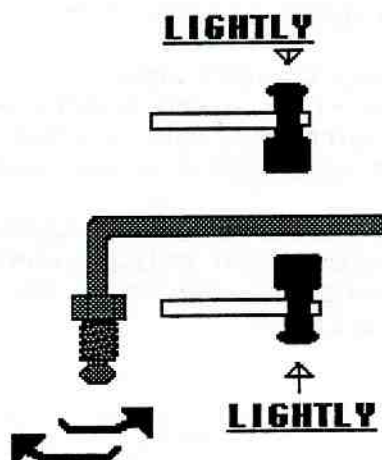
TURN FITTING NUT BACK AND FORTH  
JUST FAR ENOUGH AS NOT TO TWIST  
PIPE.

IF IT STARTS TO TWIST, STOP  
BEFORE ANY DAMAGE IS DONE.  
LIGHTLY TAP WITH HAMMER AS  
YOU TURN FITTING TO HELP  
BREAK LOOSE PIPE.

**CAUTION - DO NOT HIT PIPE SO  
HARD AS TO DENT IT.**

THE PIPE MUST BREAK LOOSE FROM  
ITS' FITTING NUT BEFORE YOU SHOULD  
TRY TURNING IT A FULL 360°.

**\*\* TWISTING A LINE WILL RESTRICT FLUID FLOW,  
MAKING IT NECESSARY TO REPLACE IT.  
THIS CAN BE AVOIDED, BUT YOU MUST USE PATIENCE. IN THE  
LONG RUN YOU WILL SAVE BOTH YOU AND YOUR CUSTOMER A  
LOT OF GRIEF AND AVOID THE CAR FROM SITTING AROUND  
WAITING FOR PARTS.  
A SUDDEN SHOCK WORKS BEST, NOT A TWIST.**



## **MASTER BRAKE CYLINDER**

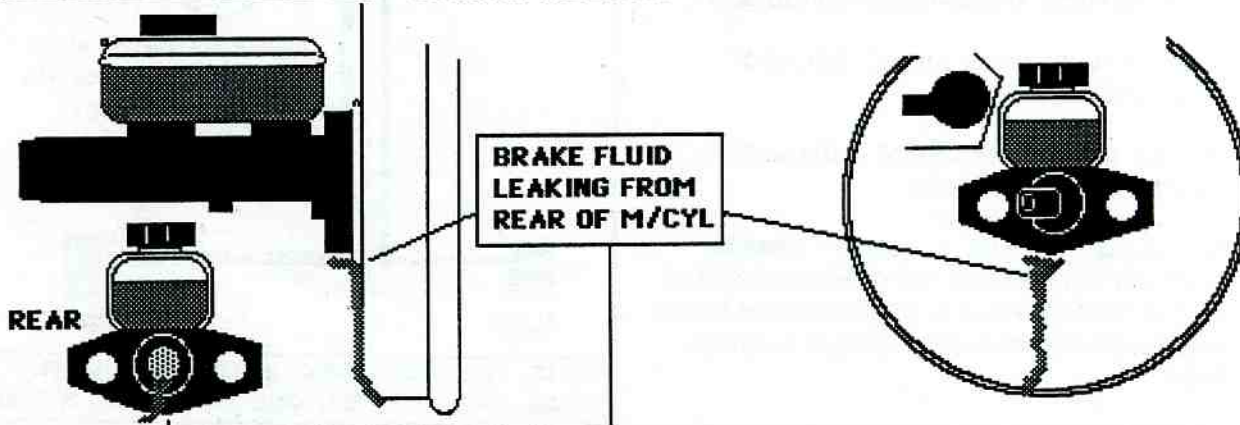
### **PROBLEMS**

\* IF BRAKE PEDAL CREEPS DOWN WHEN HOLDING AT A  
STOP EVERY ONCE IN AWHILE, THE MASTER/CYL  
IS LEAKING OUT THE REAR OR BETWEEN THE TWO  
CYLINDERS INSIDE.

\* NO FLUID SHOULD BE PRESENT BETWEEN M/CYL &  
BRAKE BOOSTER.

\* MAKE SURE THE CALIPER BLEED SCREWS PORTS  
ARE NOT PLUGGED BEFORE YOU BEGIN BLEEDING.  
BEFORE YOU EVEN PRESSURIZE THE BRAKE SYSTEM, LOOSEN  
ALL THE BLEED SCREWS ONE BY ONE. YOU SHOULD GET FLUID  
OUT OF THE SCREW PORTS. IF NO FLUID COMES OUT, REMOVE  
SCREW & PROBE HOLE IN BOTH THE CALIPER AND BLEED SCREW.

- UP TO 1974 MODEL -  
BE SURE O-RING LOCATED AT  
REAR OF M/CYL BY BRK  
BOOSTER IS IN PLACE.





# **BLEEDING & FLUSHING BRAKE SYSTEM**

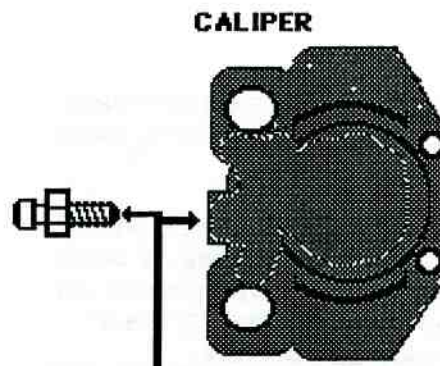
- \*\* USE OF A PRESSURE BLEEDER IS A MUST.**
  - \* IF BRAKE FLUID IS MORE THAN 2 YEARS OLD, BE SURE TO FLUSH THE SYSTEM.**
- FLUSHING MEANS THAT THE FLUID COMING OUT OF BLEED SCREWS IS AS CLEAN AS THE NEW FLUID YOU ARE USING. SO ALL THE DIRT IS GONE, NOT JUST THE AIR.
- \* BE SURE ALL BLEED SCREWS ARE NOT PLUGGED.**

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## **\*\*\*\*\* CLOGGED BLEED SCREWS \*\*\*\*\***

**\* IMPORTANT- BEFORE YOU CONNECT BRAKE BLEEDER PRESSURE TANK. OPEN BLEED SCREWS ONE BY ONE. IF NO FLUID COMES OUT OF PORT, REMOVE SCREW AND PROBE THE HOLE IN THE CALIPER UNTIL FLUID COMES OUT.**

YOU DO THIS SO IF IN THE PROCESS OF BLEEDING AND NO FLUID COMES OUT BECAUSE OF A CLOGGED PORT, YOU DON'T HAVE TO INTERRUPT THE BLEEDING PROCESS TO CLEAN THE CALIPER PORT OUT. WHICH TENDS TO GET MESSY.



**\*\* CLOGGED PORT \*\***  
REMOVE THE BLEED SCREW, PROBE THE INSIDE HOLE OF THE CALIPER UNTIL THE FLUID COMES OUT. PROBE HOLES IN THE SCREW

## **BLEEDING & FLUSHING BRAKE SYSTEM**

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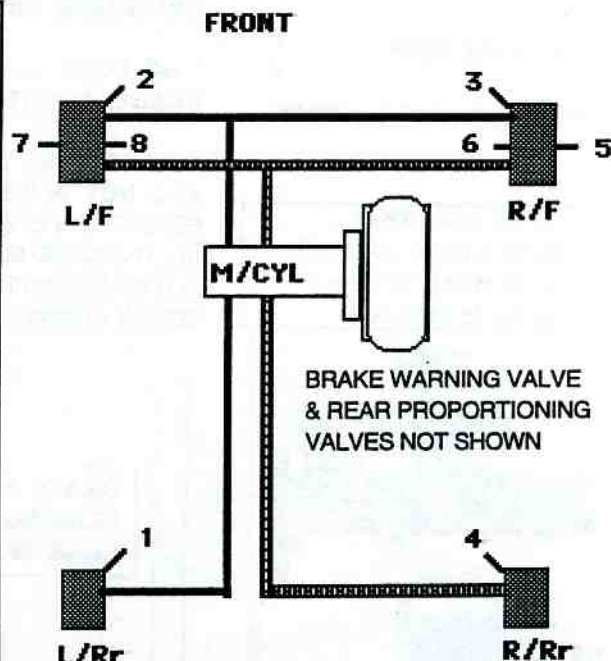
### **\*\*\*\*\* FLUSHING \*\*\*\*\***

- 1- REMOVE ALL THE OLD DIRTY FLUID FROM THE MASTER/CYL RESERVOIR. REFILL TO TOP WITH NEW BRAKE FLUID (USE BRAKE FLUID DOT #4)**
- 2- INSURE ALL BLEED SCREWS ARE NOT CLOGGED. OPEN THEM ONE BY ONE AND ALLOW A LITTLE BRK/FLUID TO COME OUT. (SEE METHOD DESCRIBEDPREVIOUSLY)**

**3- TOP UP FLUID ONCE AGAIN. CONNECT PRESSURE BLEEDER.**

**4- BLEED IN THE SEQUENCE OUTLINED IN PICTURE TO THE RIGHT.**

OPEN BLEEDER UNTIL A STEADY STREAM COMES OUT. THEN AFTER THE FLUID BECOMES AS CLEAR AS THE NEW FLUID IN THE RESERVOIR, CLOSE THE BLEEDER SCREW, AND GO TO NEXT BLEEDER SCREW.



**NOTE; THE MAIN THING IS TO START IN THE REAR AND TO BLEED ONE CIRCUIT AT A TIME.**

**POWER BRAKE  
LACK OF ASSIST'**

**VACUUM PUMP  
DIAPHRAGM**

VACUUM

DISCHARGE

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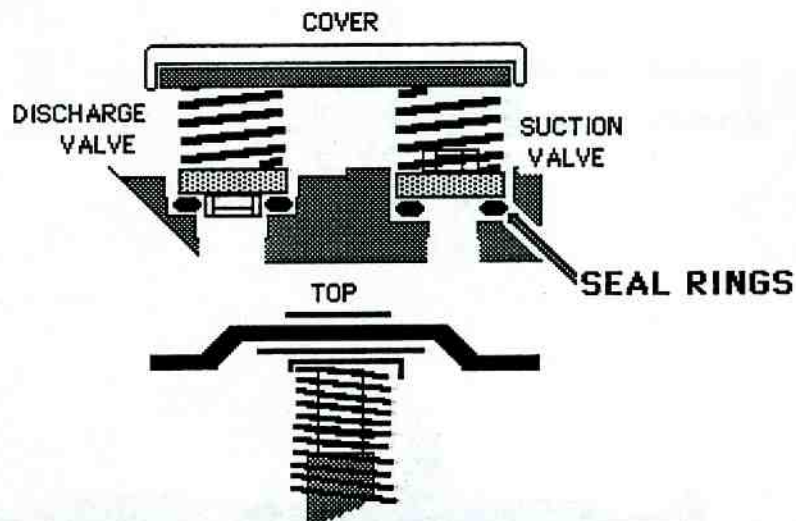
211

**\*\* SYMPTOMS & REPAIR NOTES \*\***

- ✓ POOR POWER BRAKE ASSIST, HARD PEDAL
- ✓ OIL IN THE DISCHARGE TUBE OF VAC PUMP MEANS DIAPHRAGM IS TORN.
- ✓ CRACKED VACUUM HOSES
- ✓ CHECK VALVE, FITTING & SEAL AT BRAKE BOOSTER.
- \*\* CLEAN OIL OUT OF THE VALVES & HOUSING, BE CAREFUL OF SEAL RINGS UNDER VALVES.
- \*\* CLEAN PUMP & HOUSING OF OIL SLUDGE LUBE ALL MOVING PARTS.

CRACKS  
& RIPS

DIAPHRAGM



**PLACEMENT OF VALVES, O-RINGS,  
SPRINGS, WASHERS & DIAPHRAGM.**

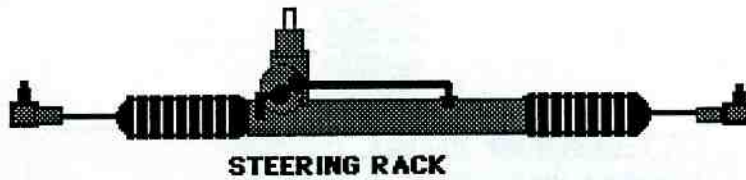
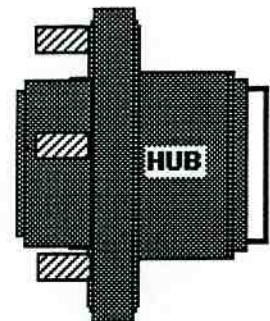
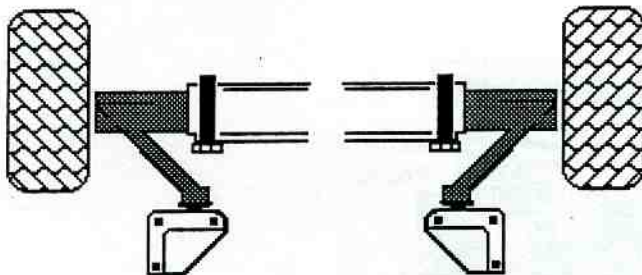
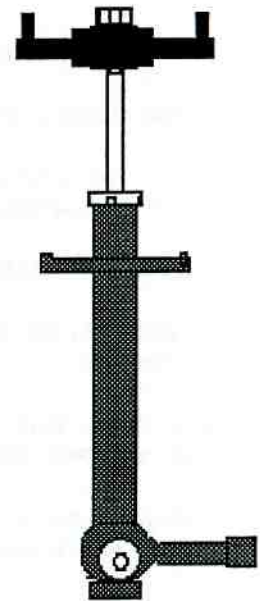
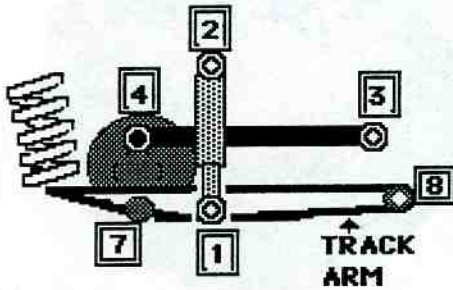
54

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<b>SUSPENSION</b>
<b>SHOCKS</b>
<b>STEERING</b>

<b>60</b>
<b>001</b>



<b>60</b>	<b>004</b>
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**FRONT END NOISES**  
**KNOCKING**  
**& RATTLES**  
**200 SERIES**

**KNOCK**  
**KNOCK**  
**KNOCK**

**RATTLES**  
**RATTLES**  
**RATTLES**

**60**

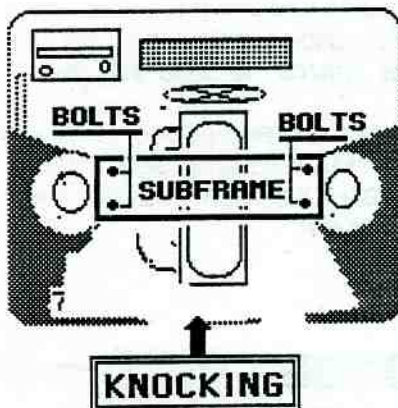
**211**

**— ONE LOUD KNOCK —**

THE SUBFRAME MOUNTING BOLTS ARE OFTEN OVERLOOKED WHEN TRYING TO LOCATE A KNOCKING NOISE FROM THE FRONT END.

THE KNOCK USUALLY OCCURS ONCE ON TAKEOFF AND/OR STOPPING. IT IS ONE, LOUD KNOCK AS THE SUBFRAME MOVES BACK ONE TIME, THEN LATER YOU WILL HEAR IT KNOCK WHEN IT MOVES FORWARD.

YOU NORMALLY WILL BE ABLE TO FEEL THIS KNOCKING RIGHT AWAY ON TAKEOFF OR AT THE INSTANT THE CAR STOPS.



**SUBFRAME BOLTS - 17mm socket -**  
**RETORQUE FROM UNDER THE HOOD**  
**WITH A LONG EXTENSION.**  
**1 - BACK OFF BOLT 1/2 TURN.**  
**2 - THEN TIGHTEN**

**— RATTLES & KNOCKS —**

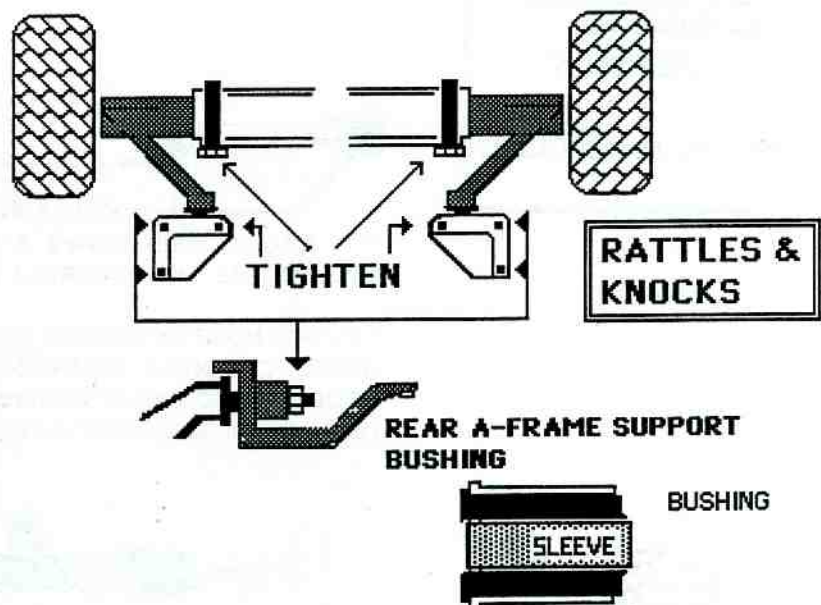
THE A-FRAME SUPPORT BUSHINGS & THEIR BRACKETS, CAN BECOME LOOSE OVER TIME.

THE KNOCKS WILL USUALLY OCCUR WHEN BRAKING AND THE RATTLES OVER BUMPS.

RE-TIGHTENING THE BRACKETS & BUSHING BOLTS WILL STOP A LOT OF THE NOISES.

**CHECK ALL BUSHINGS FOR WEAR.**

THE REAR 'BIG' SUPPORT BUSHING FOR THE A/FRAME IS THE MOST LIKELY TO BE WORN. THE INNER SLEEVE USUALLY BREAKS LOOSE FROM THE RUBBER.



**\* REAR A-FRAME SUPPORT BRACKET BOLTS & BUSHINGS**

✓ CHK BUSHING FOR CRACKS & THAT BUSHING SLEEVE HASN'T SEPARATED FROM RUBBER BUSHING

**60**

**214**



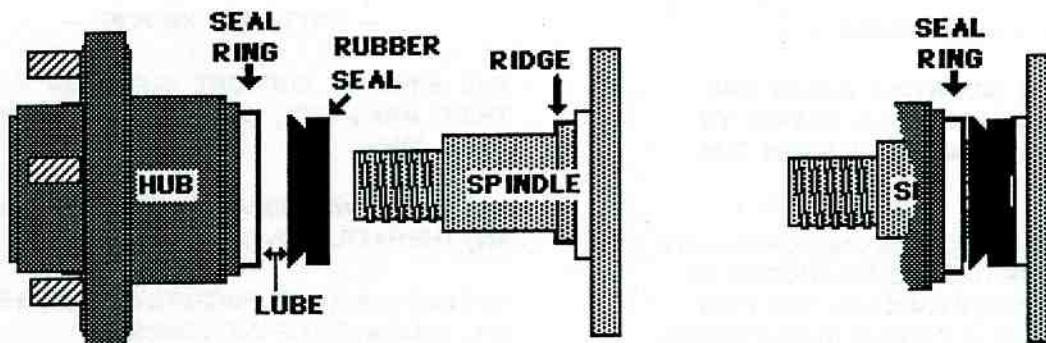
**FRONT AXLE SEAL  
TWO PIECE SEAL  
SEAL RING &  
LIP SEAL**

THERE IS A LIP GREASE SEAL ON THE FRONT AXLE HUB. THE PROPER METHOD OF INSTALLING IT IS SHOWN BELOW.

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INSTALL THE WHEEL BEARINGS AS USUAL. THEN INSTALL THE SEAL RING INTO THE HUB JUST AS YOU WOULD INSTALL A NORMAL GREASE SEAL.

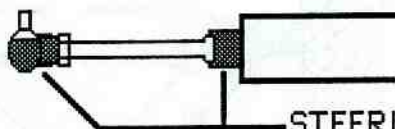


INSTALL THE RUBBER SEAL ON THE SPINDLE FIRST. IT FITS OVER THE RIDGE ON THE REAR OF THE SPINDLE. YOU WILL HAVE TO EXPAND IT A LITTLE TO GET IT ONTO THE RIDGE. LUBRICATE THE SEAL LIP, ALONG WITH THE METAL SEAL RING WITH A FILM OF WHEEL BEARING GREASE. THE THIN LIP OF THE RUBBER SEAL JUST RUBS AGAINST THE SEAL RING. • IT DOES NOT GO INSIDE OF IT •

**STEERING &  
SUSPENSION  
FAULTS & CHECKS**

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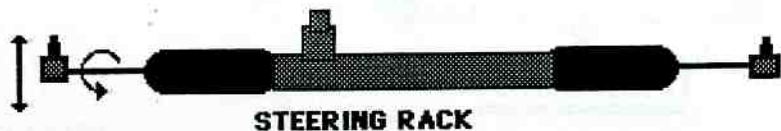
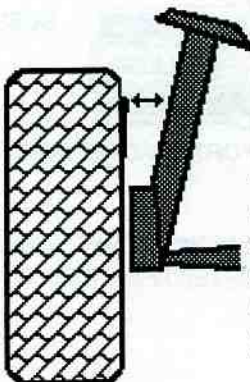
111



STEERING BALL JOINTS

\*\* A GROAN OVER BUMPS & DIPS COMING FROM THE FRONT END MAY BE THE STEERING ROD JOINTS BEHIND THE BOOT.

TEST FOR NOISE BY TWISTING & MOVING THE STRNG ROD UP & DOWN (SEE ARROW), LISTEN FOR GROAN TO DETERMINE WHERE NOISE IS. IF NO NOISE IS HEARD, CHECK SUSPENSION BALL JOINTS BY TURNING WHEELS LEFT & RIGHT. ALSO ROCK CAR UP AND DOWN.



STEERING RACK

\*\* BENT FRONT STRUT? SOMETIMES IT IS HARD TO SEE THE DAMAGE AS THE PARTS MAY ONLY BE OUT OF SYNC JUST A LITTLE. CHK THE SPACE BETWEEN THE STRUT & WHEEL. USE THIS MEASUREMENT TO COMPARE WITH THE OTHER SIDE. A DIFFERENCE MEANS THAT ONE IS BENT, NEEDING REPLACEMENT. ALWAYS COMPARE THE SUSPECTED PARTS WITH ONES KNOWN TO BE GOOD (OTHER SIDE).

## FRONT SHOCK

### REPLACEMENT NOTES & TIPS

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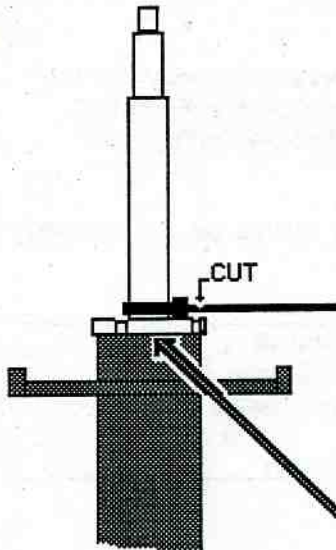
121

#### --- PISTON CREEPS BACK INTO HOUSING ---

WHEN REPLACING THE SHOCKS, THE PISTON MAY CREEP BACK INTO THE HOUSING. WHEN THIS HAPPENS IT WILL BE DIFFICULT TO GET THE PISTON FAR ENOUGH THROUGH THE SHOCK TOWER HOLE.

USING A VISE GRIP ON THE PISTON SHAFT WILL DAMAGE IT, CAUSING A PREMATURE FAILURE.

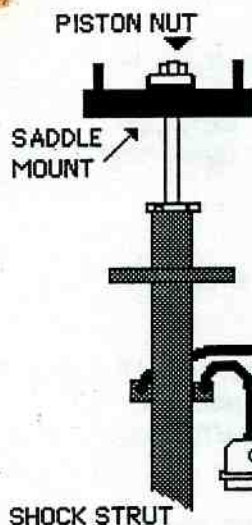
WE SUGGEST THAT YOU PULL THE PISTON ALL THE WAY UP. THEN FASTEN A PLASTIC TIE STRAP TIGHTLY AROUND THE BOTTOM OF THE PISTON NEAR THE COLLAR NUT. CUT OFF THE EXCESS STRAP. THE PLASTIC TIE WILL PREVENT THE PISTON FROM CREEPING BACK INTO THE SHOCK HOUSING.



THE STRAP WILL BE SAFELY PUSHED FARTHER UP THE PISTON WHEN THE CARS WEIGHT IS PUT ONTO THE FRONT WHEELS. THE STRAP WILL NEVER COME CLOSE TO THE COLLAR NUT AFTER THAT.

#### --- LOOSENING COLLAR NUT ---

THE BEST TIME TO LOOSEN THE COLLAR NUT IS BEFORE YOU COMPRESS THE SPRING. WHEN YOU DO THIS PRIOR TO THE SHOCK STRUT REMOVAL, YOU HAVE A MUCH FIRMER ANCHORING OF THE SHOCK THAN IF YOU WAITED UNTIL IT'S OUT OF THE TOWER MOUNT.



- DON'T REMOVE THE STRUT UPPER SADDLE MOUNT FROM THE SHOCK TOWER.

DOING THAT WILL MAKE IT NECESSARY TO RE-ALGN THE FRONT END.

- JUST REMOVE THE SHOCK PISTON NUT IN THE CENTER OF THE SADDLE MOUNT.

DO NOT DISCONNECT THE LINES.

YOU DON'T HAVE TO REMOVE THE BRAKE LINES IN ORDER TO GET THE STRUT FAR ENOUGH OUT OF THE FENDER FOR SHOCK REMOVAL

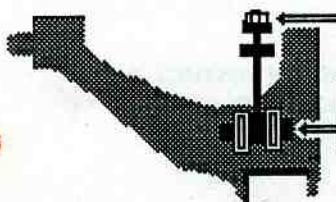
YOU WILL HAVE TO REMOVE THE BRACKET HOLDING THE BRAKE HOSES TO THE BODY MEMBER.

REMOVE THIS BRACKET BOLT

REMOVE THIS NUT ON BOTH THE RIGHT AND LEFT A-FRAMES. EVEN IF YOU ARE ONLY REPLACING ONE SHOCK. WHEN BOTH STABILIZERS LINKS ARE DISCONNECTED, THE REMOVAL AND INSTALLATION OF THE STABILIZER WILL BE MUCH EASIER.

INSTALL THE STABILIZER ROD ON BOTH LINKS BEFORE PUTTING THE NUTS BACK ON.

JUST LOOSEN THIS BOLT TO AID IN THE MOVEMENT OF THE LINK FOR THE INSTALLATION PROCESS.



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**REAR SUSPENSION  
KNOCK, RATTLE &  
RUMBLES  
200 & 700  
SERIES**

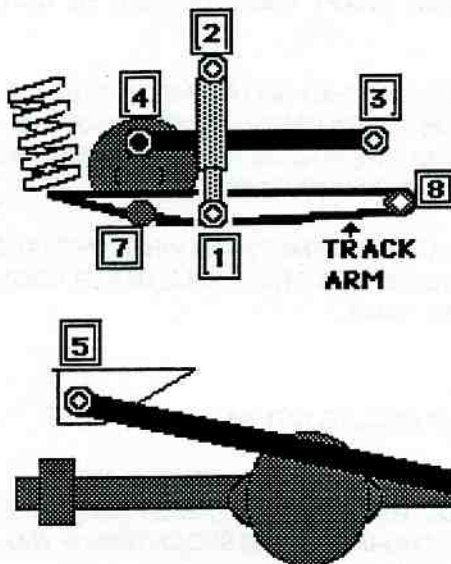
65

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SOMETIMES THOSE ANNOYING KNOCKS AND RATTLES FROM THE REAR OF THE CAR MAY ONLY BE LOOSE ANCHOR BOLTS.

JUST CHECK THE BUSHINGS FOR WEAR (REPLACING WHAT'S NECESSARY) AND TIGHTEN ALL OTHER BOLTS. IT IS BEST TO TIGHTEN THEM WITH THE WEIGHT OF THE CAR ON THE REAR WHEELS, AS WE SAY, 'LOADED'.

NOTE - WE ADVISE THAT THESE BOLTS BE RETORQUED AT ALL INSPECTION SERVICES.



1thru 6	19mm (3/4in) wrench
NOTE	'90 -on 200 series nut sizes vary [15 mm 17 mm 18mm etc]
7 & 8	22mm (7/8in) wrench

\*\*\* SYMPTOMS & CHECKS \*\*\*

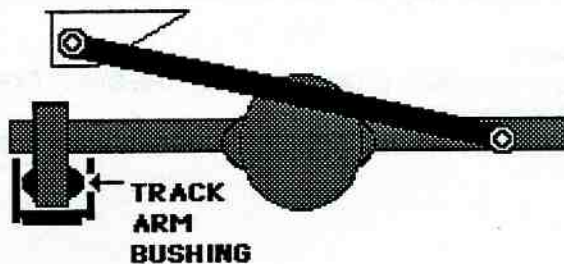
LOUD SINGLE KNOCK OR A METALLIC SCRAPING GROAN FROM THE REAR WHEN YOU;

1. TAKE OFF FROM A STOP
2. ON HARD ACCELERATION WHILE YOU ARE CRUISING ALONG
3. GOING FROM 'PARK' TO 'DRIVE' OR 'PARK' TO 'REVERSE' OR WHEN LETTING THE CLUTCH OUT [MANUAL TRANS]

\* EXCESSIVE AXLE MOVEMENT WHEN AXLE IS 'TORQUED' UNDER ACCEL LOAD.

✓ CHECK FOR THE RUBBER OF THE BUSHING COMING OUT FROM THE BUSHING HOUSING.

✓ EXCESSIVE PLAY WHEN PRYING ARM AWAY FROM AXLE HOUSING.



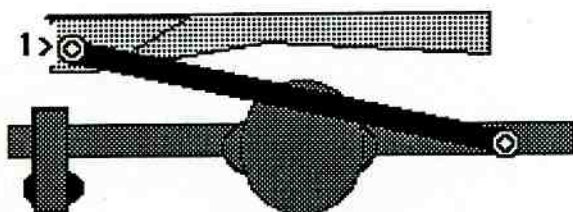
\*\*\* TRACK ARM BUSHING \*\*\*

THIS BUSHING CARRIES MOST OF THE VEHICLE WEIGHT IN THE REAR.

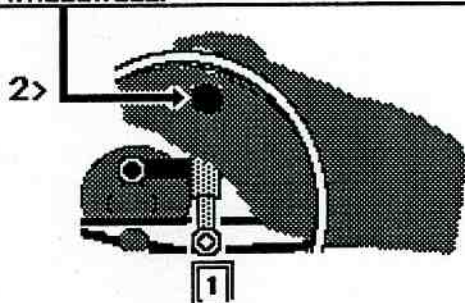
IT IS THE LARGE BUSHING MOUNTED IN THE REAR AXLE. IT IS ATTACHED TO THE TRACK ARM.

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- 700 SERIES KNOCKS & RATTLES**
- 1] ANTI SWAY BAR BOLT IN THE BODY
  - 2] UPPER REAR SHOCK MOUNT IS TIGHTEN THRU HOLE IN BODY BY REMOVING RUBBER GROMMET INSIDE WHEELWELL.



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# 700 SERIES

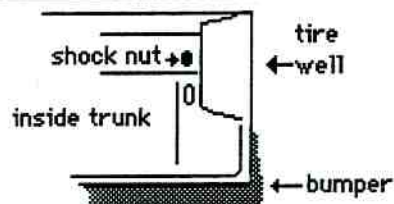
## • UPPER SHOCK NUT & BOLT 'STRIPPED' •

IF THE UPPER SHOCK NUT & BOLT ARE STRIPPED, YOU CAN EASILY REPAIR THE PROBLEM BY PLACING ANOTHER NUT ALONG SIDE THE STRIPPED OUT NUT.

**THERE IS A OPENING IN THE TRUNK THAT WILL GIVE YOU ACCESS TO THE UPPER NUT.**

THIS OPENING HAS A PLASTIC TYPE PLUG YOU CAN POP OUT TO GET TO THE NUT. JUST REMOVE THE TRUNK MAT ON THE SIDE OF THE TRUNK THAT THE NUT IS ON. YOU WILL SEE A FEW PLASTIC PLUGS, USE THE SHOCK'S UPPER BOLT TO GET AN IDEA IN WHAT AREA THE OPENING SHOULD BE AND REMOVE THAT PLUG THAT LINES UP WITH THE BOLT.

YOU SHOULD THEN BE ABLE TO HOLD A NEW NUT NEXT TO THE STRIPPED NUT, AND USE A 1/2" LONGER BOLT SO IT WILL GO COMPLETELY THRU THE NEW NUT.





**GROUP 80 BODY & ACCESSORY**

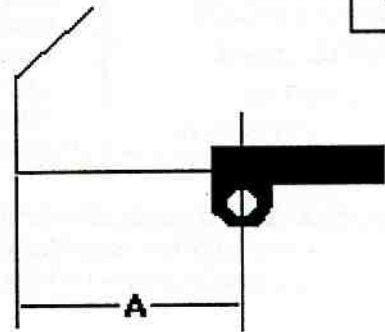
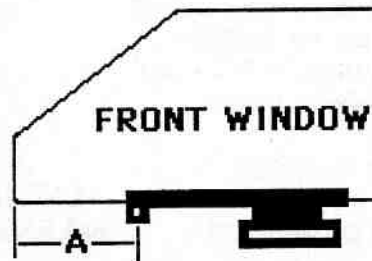
- 81- 101 BROKEN WINDOW OR CHANNEL REPLACEMENT
- 81- 211 DOOR LOCK PROBLEMS \_\_ LOCKING \_\_ LATCHING
- 81- 331 CENTRAL LOCKING PROBLEMS \_\_ COMPONENTS  
200 SERIES
- 81- 337 CENTRAL LOCKING PROBLEMS \_\_ COMPONENTS  
700 SERIES
- 82- 101 HEAT WON'T TURN OFF \_\_ HTR VALVE CHECKS &  
PROBLEMS
- 82- 201 AIR CONDITIONING \_\_ CHECKS & PROBLEMS  
WET CARPETS
- 85- 131 SEAT HEATER \_\_ PROBLEMS & REPAIRS

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**240 DOOR  
WINDOW CHANNEL  
PLACEMENT**

81

101

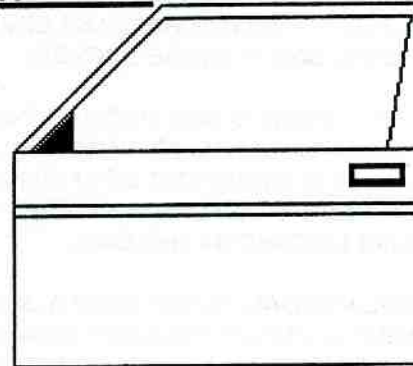


FOR A BROKEN WINDOW, WINDOW CHANNEL OR CHANNEL PULLED OFF. THE PLACEMENT OF THE BOTTOM CHANNEL IS CRITICAL.

AFTER THE WINDOW IS INSTALLED IN DOOR ANY ADJUSTMENTS WILL HAVE TO BE MADE BY LOOSENING THE WINDOW LIFT REGULATOR'S BOLTS AND MOVING 'W L REG' IN THE BOLT SLOTS.

WINDOW SHOULDN'T BIND & MUST GO ALL THE WAY UP INTO THE UPPER DOOR CHANNEL WHEN WINDOW IS FULLY RAISED.

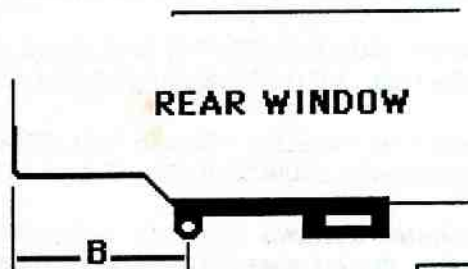
upper door channel



**240 DOOR  
WINDOW CHANNEL  
PLACEMENT  
240 DOOR  
WINDOW CHANNEL**

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\* ALL MEASUREMENTS ARE MADE FROM THE EDGE OF THE WINDOW-TO-THE CENTER OF THE HOLE IN THE CHANNEL.

\* A NEW CHANNEL SHOULD BE USED WHEN THE OLD CHANNEL HAS JUST BEEN PULLED OFF. THIS IS BECAUSE IT IS PROBABLY WEAKEN & SPREAD APART. THIS MEANS IF IT'S REINSTALLED IT WILL PROBABLY JUST COME OFF AGAIN.

\* IT IS ALSO RECOMMENDED THAT THE WEATHERSTRIP THAT GOES AROUND THE UPPER DOOR CHANNEL BE REPLACED WHEN THE WINDOW HAS BEEN BROKEN. THIS IS BECAUSE THE FRAGMENTS OF GLASS TRAPPED IN IT CAN JAM THE NEW GLASS AND EVEN BREAK IT.

\*\*\*\* CAUTION -- IF YOU ATTEMPT TO CLEAN THE GLASS FRAGMENTS OUT OF THE W/STRIP, THEY CAN STRIKE YOUR EYES & SKIN CAUSING INJURY.

**\* MEASUREMENTS \***

**FRONT**

A--- 10 5/16" ± 1/8"

**REAR**

B--- 6 5/8" ± 1/8"

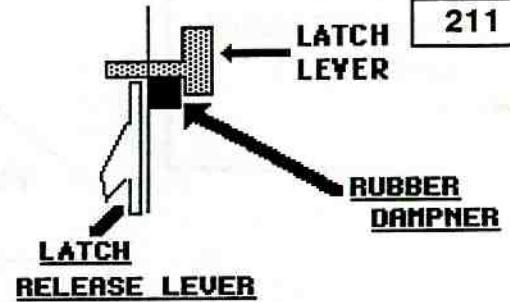


**200 & 700 SERIES  
DOOR LOCKS  
PROBLEMS  
LOCKING &  
LATCHING**

REPLACE THE SWELLED RUBBER DAMPENER WITH A NEOPRENE HOSE THAT IS SMALLER & WILL ALLOW THE LATCH LEVER TO RETURN FULLY, PUSHING THE LATCH RELEASE LEVER DOWN.

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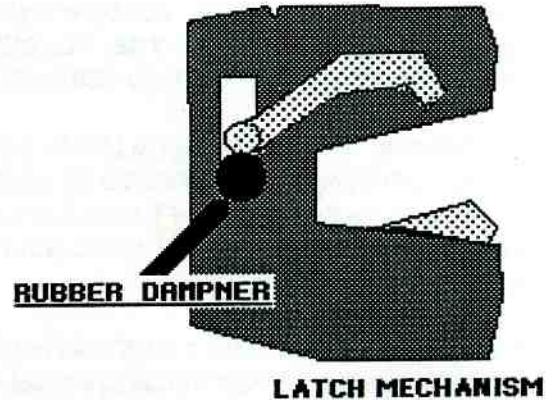
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THE DOORS ON 700 SERIES MAY BECOME HARD TO LOCK WITH THE KEY OR BUTTON DUE TO SOME LUBRICATION SWELLING A LATCH LEVER DAMPENER.

WHAT HAS HAPPENED IS THE RUBBER DAMPENER HAS SWOLLEN & WON'T ALLOW THE LEVER TO FULLY COMEBACK & PUSH THE LATCH RELEASE LEVER DOWN SO THE LOCK CAN THEN BE LOCKED.

SEE, IF THE LATCH LEVER IS NOT PUSHED DOWN THE LOCK WILL BE IN AN 'OPEN DOOR' POSITION, IN THIS POSITION THE LOCK IS DESIGNED SO IT CANNOT BE LOCKED. THIS DESIGN IS USED TO PREVENT THE KEYS FROM BEING LOCKED IN THE CAR.



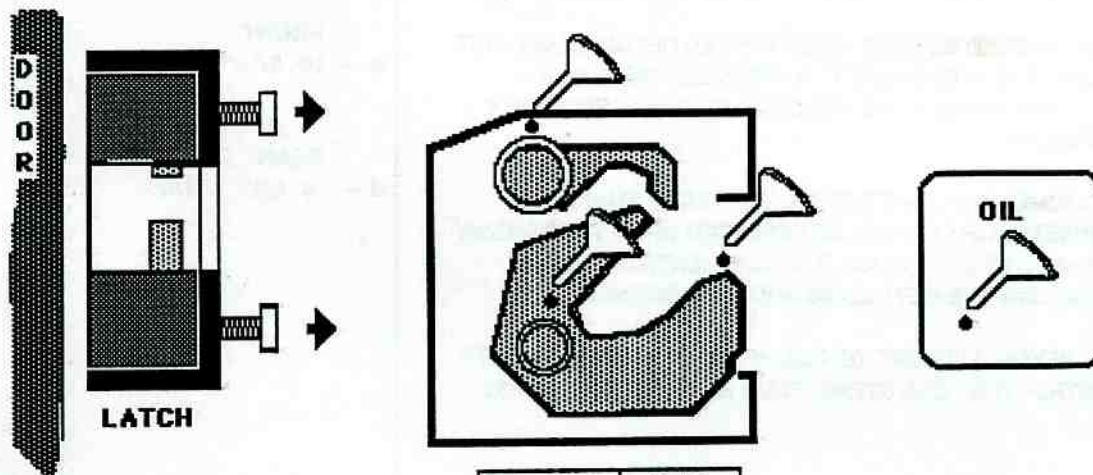
R&R LATCH, REPLACE DAMPENER WITH A SMALLER DIAMETER RUBBER HOSE OR YOU CAN SHAVE A SECTION OFF DAMPENER TO ALLOW LEVER TO COME BACK FARTHER.

\* A STICKING LATCH MECHANISM CAN CAUSE TWO DIFFERENT PROBLEMS.

1- A HARD TIME OPENING THE DOOR. USUALLY BOTH THE INSIDE AND OUTSIDE DOOR HANDLES HAVE A VERY STIFF FEELING. THEY MAY EVEN FEEL LIKE THAT THEY ARE BINDING ON SOMETHING.

2- CLOSING & LATCHING THE DOOR. THE PROBLEM USUALLY WILL RESEMBLE A DOOR HANDLE BEING OPERATED PARTIALLY. THE DOOR NORMALLY BOUNCES BACK WITHOUT LATCHING.

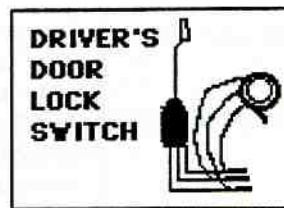
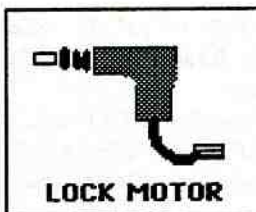
\* REMOVE THE TWO (2) RETAINING SCREWS HOLDING THE LATCH ONTO THE DOOR. CAREFULLY PRY OFF THE PLASTIC SHIELDING, CLEAN AWAY ANY RUST BUILDUP, THEN LUBE WITH BOTH A SEMI-THICK GREASE & A THICK OIL (STP, MOTOR HONEY ETC.).



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**CENTRAL LOCKING  
SYSTEM  
200 SERIES  
CHECK ITEMS**



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**\*\*\*\* CENTRAL LOCK PROBLEMS \*\*\*\***

- \* BLOWN FUSE #8 (CHECK FUSE COVER FOR ITS NUMBER)
- \* WIRING BREAKS AT THE MASTER SWITCH IN THE DRIVER'S DOOR. MAY ONLY LOCK OR UNLOCK EITHER/OR WITH KEY OR LOCK BUTTON.
- \* FRAYED WIRES THAT INTERMITTENTLY GROUND OUT CAUSING AN ERRATIC OPERATION OF THE LOCK SYSTEM.

THE MOST COMMON COMPLAINT IS THAT WHILE DRIVING THE LOCKS RAPIDLY BEGIN BUZZING & PULSATING.

THE PART OF WIRE AT FAULT MAY BE HARD TO LOCATE, IT MAY BE A VERY SMALL CUT IN THE INSULATION.

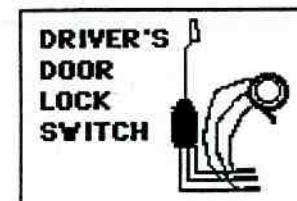
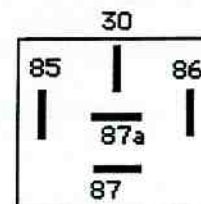
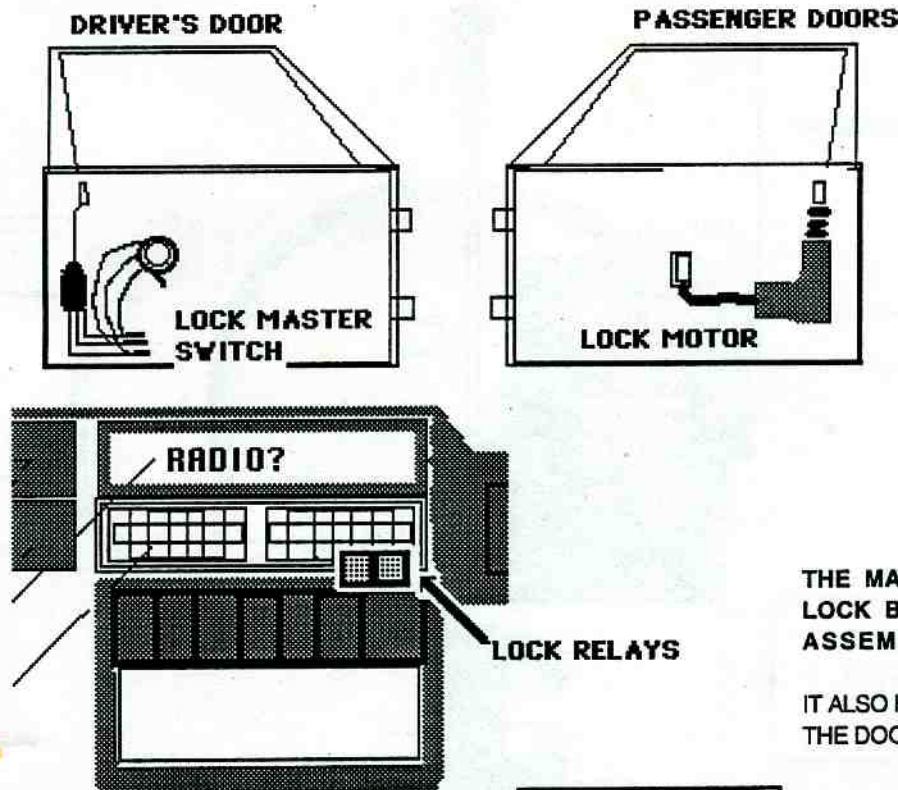
\* WIRING AT RELAYS HAVING POOR OR ERRATIC CONNECTION. THE RELAYS ARE LOCATED BEHIND THE CENTER AIR DUCTS JUST ABOVE THE CENTER CONTROL CONSOLE.

\* THE RELAYS ARE BAD. THERE ARE TWO (2) RELAYS, ONE IS FOR LOCKING, THE OTHER FOR UNLOCKING.

\*\* ONLY ONE RELAY ( EITHER THE LOCK OR THE UNLOCK RELAY) IS ELECTRICALLY OPERATED AT A TIME.

THE ONE THAT IS OPERATED WILL SUPPLY 12v TO LOCK MOTORS.

THE RELAY THAT IS 'NOT' OPERATED WILL SUPPLY THE GROUND(-). POLARITY OF THE 2 WIRES TO THE LOCK MOTORS CHANGES THEN.



THE MASTER LOCK SWITCH IS THE LOCK BUTTON LINKAGE TO THE LOCK ASSEMBLY.

IT ALSO HAS A SWITCH THAT FITS AROUND THE DOOR KEY LOCK CYLINDER.

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## 700 SERIES

### CENTRAL LOCKING

THE CENTRAL LOCKING SYSTEMS USED IN THE 700 SERIES ARE BASICALLY THE SAME AS THE 200 SERIES, EXCEPT FOR A FEW CHANGES.

THESE CHANGES ARE MAINLY WITH THE LOCKING RELAYS. THE 700 SERIES MODELS USE DIFFERENT RELAY SETUPS, DEPENDING ON THE YEAR OF THE CAR. HOWEVER THEY ALL USE LOCK MOTORS AT ALL THE PASSENGER DOORS.

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**1982-83 700 SERIES-**  
**HAVE TWO[2] RELAYS JUST LIKE THE 200 SERIES.** THESE LOCK AND UNLOCK RELAYS ARE LOCATED IN THE FUSE/RELAY BOX BEHIND THE ASH TRAY.

**1986-ON 700 SERIES-**  
**HAS ONE[1] RELAY.** THE LOCK AND UNLOCK RELAYS ARE CONTAINED IN JUST ONE RELAY. THE RELAY IS LOCATED IN THE FUSE/RELAY BOX BEHIND THE ASH TRAY.

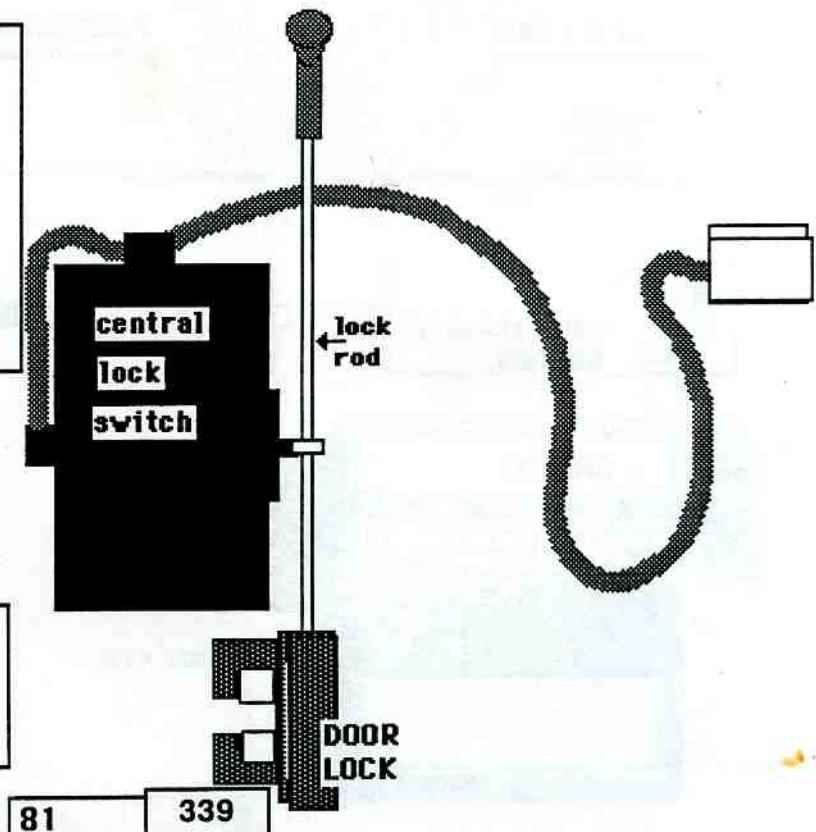
**1984-85 700 SERIES-**  
**THIS RELAY SETUP IS THE MOST PRONE TO FAIL.**

THE LOCK/UNLOCK RELAY IS CONTAINED IN THE CENTRAL LOCK SWITCH WHICH IS CONNECTED TO THE DRIVER'S DOOR LOCK BUTTON ROD. THE INTERNAL RELAY CAN'T HANDLE THE CURRENT NEEDED FOR THE LOCK MOTORS TO OPERATE FULLY. THE POINTS INSIDE BECOME PITTED, AND THE LOCK MOTORS WILL THEN USUALLY JUST GO PARTIALLY UP OR DOWN. REPEATED LOCK OPERATION IN RAPID SUCCESSION WILL USUALLY DO THIS. THE CENTRAL LOCK SWITCH WILL NEED TO BE REPLACED SINCE THE RELAYS ARE INSIDE OF IT.

**1982-83**  
USES A CENTRAL LOCK SWITCH  
  
ALSO HAS 2 RELAYS LOCATED IN THE RELAY BOX.

**1986-ON**  
USES A CENTRAL LOCK SWITCH  
  
ALSO HAS 2 RELAYS LOCATED IN THE RELAY BOX.

**1984-85 700 SERIES-**  
**THE LOCK/UNLOCK RELAY IS CONTAINED IN THE CENTRAL LOCK SWITCH**



**HEATER CONTROL  
VALVE ADJ  
240 SERIES  
HEAT WON'T TURN  
'OFF'**

WHEN A/C OUTPUT IS NOT COLD ENOUGH, YET A/C IS FULLY CHARGED AND OPERATING AT THE CORRECT PRESSURES (LOW SIDE 25-42 psi RANGE) IT MAY BE THE HEATER CONTROL VALVE (H C V) IS NOT COMPLETELY SHUTTING 'OFF'. CHK THE HOSE THAT IS CONNECTED TO 'H C V', IT SHOULD FEEL COOL NOT HOT. IF HOT ADJUST 'H C V'.

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THE HEATER CONTROL VALVE (H C V) IS LOCATED ON LEFT SIDE OF HEATER -A/C HOUSING . THIS IS JUST BEHIND THE PLASTIC DASH PANEL ON LEFT SIDE OF CENTER DASH CONSOLE (by accelerator pedal).

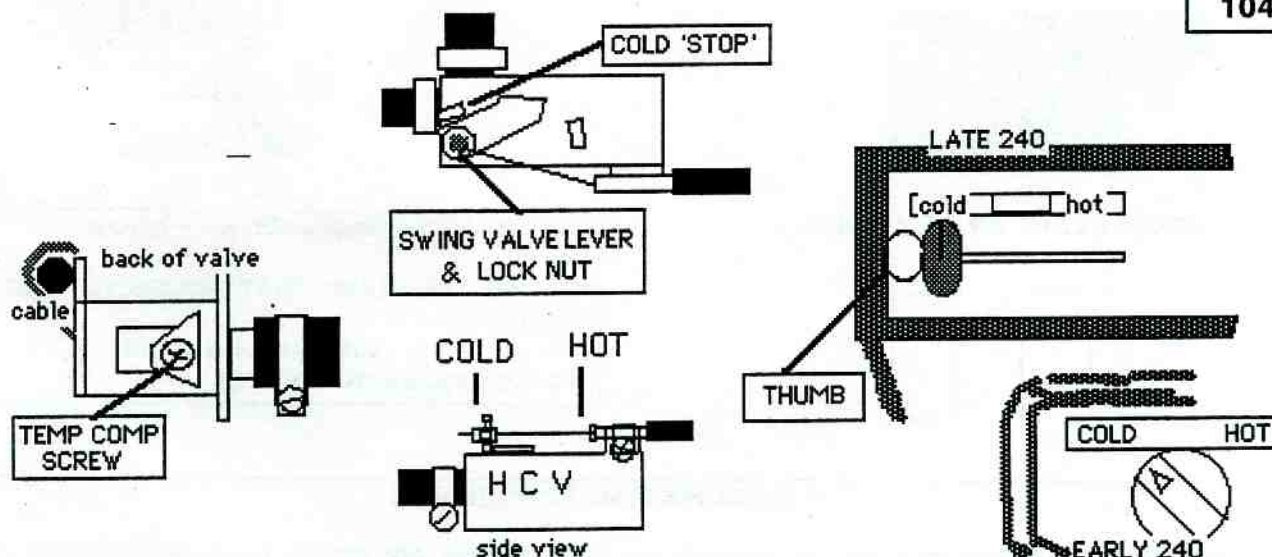
\*\* THE HOSE SHOULD FEEL COOL AFTER THE A/C HAS BEEN ON FOR AWHILE, IT SHOULD NOT BE HOTTER THAN THE CAR'S INTERIOR TEMP.

\*\* THE 'H C V' IS ADJUSTABLE IN TWO (2) WAYS .....1- CABLE OPERATED SWING VALVE  
2- TEMP COMPENSATOR VALVE

1- THE CABLE OPERATED SWING VALVE IS ADJUSTED BY MOVING THE STEEL CABLE IN THE LOCKING NUT. THE SWING VALVE LEVER SHOULD BE MOVED TO ITS' COLD 'STOP' WHEN THE TEMP SELECTOR IS IN THE COLD SECTION. TO INSURE PROPER OPERATION, PLACE THUMB BETWEEN SELECTOR KNOB AND THE DASH PANEL (this done to insure there is room for cable play). LOOSEN CABLE LOCKING NUT & PUSH SWING VALVE LEVER TO COLD 'STOP'(to front of car), HOLD SWING LEVER & TIGHTEN LOCKING NUT.

OPERATE TEMP SELECTOR BY MOVING KNOB BACK & FORTH FROM COLD -TO- HOT A FEW TIMES. CHECK THAT 'H C V' SWING RETURNS ALL THE WAY TO COLD 'STOP' WHEN KNOB IS TO (LEFT) COLD. RE-ADJUST IF NECESSARY, REMEMBER IT MUST BE ALL THE WAY TO COLD 'STOP'.

RUN ENG AND CHK HOSE, IT SHOULD FEEL COOL, NO HOT, NO COOLANT GOING THRU. THE HOSE AT FIREWALL UNDER HOOD SHOULD FEEL HOT, CLOSE TO ENG TEMP.



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2-THE TEMP COMPENSATOR VALVE IS ADJUSTED BY A SCREW IN THE VALVE MECHANISM. IT IS A SENSITIVE ADJUSTMENT, NEEDING LESS THAN ONE(1) COMPLETE TURN CLOCKWISE (cooler).

THE 'H C V' SWING VALVE LEVER MUST BE IN THE COLD 'STOP' POSITION BEFORE MAKING THIS ADJUSTMENT. PUT THE TEMP SELECTOR IN THE 'COLD' POSITION. NOW IF THE HOSE IS STILL HOT OR WARMER THAN IT SHOULD BE THAN YOU CAN TRY THIS ADJUSTMENT. SLOWLY TURN THE TEMP COMPENSATOR SCREW CLOCKWISE(no more than one 1 turn).

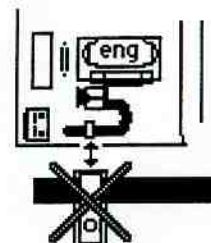
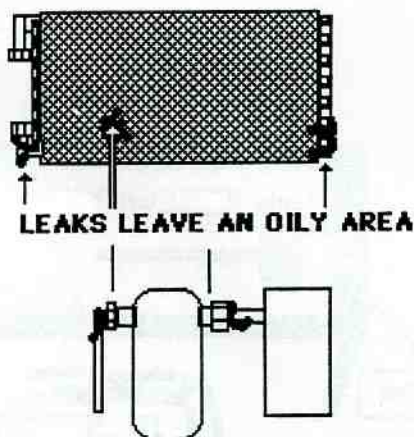
IF THIS DOESN'T HELP (hose temp to high) REPLACEMENT OF 'H C V' IS NEEDED.



**CHECKS &  
PROBLEMS**

**--- LEAKS & CHECKS ---**

- \* LOOK FOR THE OIL, THIS IS THE TELLTALE SIGN OF AN A/C LEAK.
- \* RETIGHTEN ALL HOSE FITTINGS, THIS WILL USUALLY STOP LEAKS THERE.
- \* CONDENSERS ARE THE MOST LIKELY COMPONENT TO LEAK. [HIGH PRESSURES, VIBRATION & NUMEROUS SOLDER JOINTS WILL CAUSE THE LEAKS]
- \* CLAMPS THAT RESTRICT HOSE MOVEMENT [will eventually cause the hose to BREAK]
- \* REC/DRIER REPLACEMENT ELIMINATES MOISTURE THE BIGGEST INTERNAL DANGER FOR IMPROPER OPERATION. SHOULD BE REPLACED ON ANY A/C SYSTEM THAT HAS HAD A LARGE LEAK.
- \* TOO MUCH OF A GOOD THING [OVER CHARGE] FREON
- \* TIGHT A/C BELT, A LOOSE BELT CAN SOUND LIKE A KNOCKING A/C COMPRESSOR.
- \* RECIRCULATION WORKING [ 200 series 'REC' button should be IN for best cooling ]
- \* HEATER VALVE TURNING 'OFF', SEE HTR CONT VALVE, NO HOT WATER BLEEDING THROUGH
- \* PRESSURE SWITCH FOR LOW CHARGE, COMP STAYS 'OFF' IF FREON IS LOW



- \* 200 SERIES [compressor -to - condensor hose]  
REMOVE THE CLAMP THAT RESTRICTS HOSE MOVEMENT.  
[will eventually cause the hose to BREAK AT A/C COMPRESSOR FITTING]

**✓ CHECK POOR A/C PERFORMANCE**

HIGH A/C PRESSURES CAN BE THE RESULT OF NOT ENOUGH AIR GOING THROUGH THE A/C CONDENSER. A RADIATOR, CONDENSER OR A TURBO INTERCOOLER THAT HAS ITS' FINS BLOCKED WITH BUGS AND LEAVES CAN SEVERLY HAMPER THE A/C CAPABILITY TO 'COOL'. THE ENGINE MAY NOT EVEN RUN MUCH HOTTER THAN NORMAL, BUT THE A/C CONDENSER WILL STILL NOT BE ABLE TO SUFFICIENTLY COOL DOWN THE FREON PASSING THROUGH IT. THIS INTURN WILL RAISE THE HIGH AND LOW SIDE PRESSURES WHICH WILL RESULT IN UNSATISFACTORY A/C DUCT TEMPERATURES.

**\*\* WET CARPETS \*\***

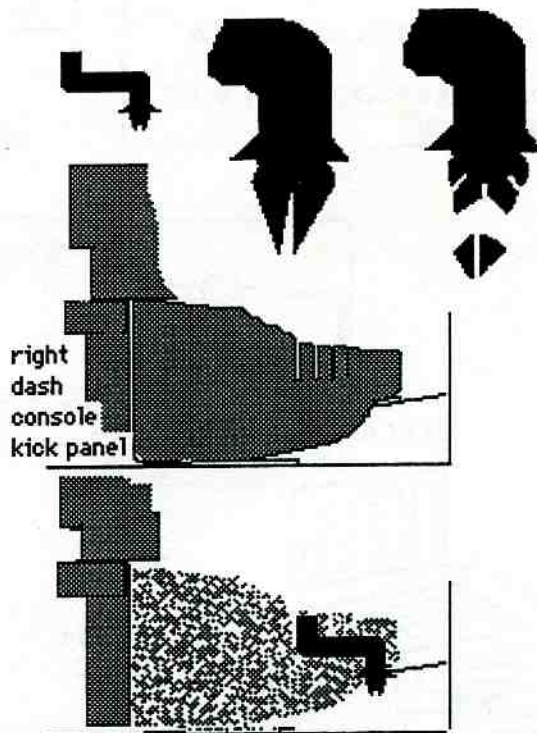
**WET CARPETS AND WATER DRIPPING DOWN FROM A/C DUCT WORK MAY BE CAUSED BY A PLUGGED A/C UNIT DRAIN.**

THIS DRAIN HOSE EXISTS THE PASSENGER COMPARTMENT ON THE RIGHT SIDE OF THE DASH CONSOLE.

REMOVE THE KICK PANEL TO GAIN ACCESS TO THE HOSE.

REMOVE THE HOSE, CLEAN OUT ANY DIRT RESIDUE PLUGGING THE HOSE.

THEN CUT SLOTS IN THE HOSE TO AID THE WATER COMING OUT. THIS WILL PREVENT FUTURE DIRT RESIDUE BUILDUP. [SEE DRAWING]



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**\*NOTES\***

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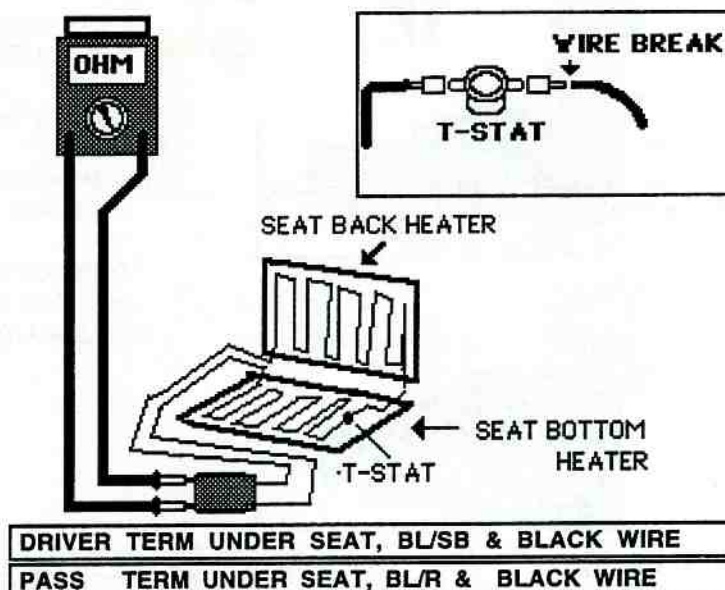
## SEAT HEATER 240 SERIES

- ✓ T-STAT & SEAT HTR ELEMENT WIRE AT T-STAT
- ✓ FUSE #11 OR FUSE NOTED ON FUSE BOX COVER
- ✓ WIRE CONNECTOR UNDER SEAT FLOOR VENT & BY CENTER DASH LEFT SIDE TUNNEL

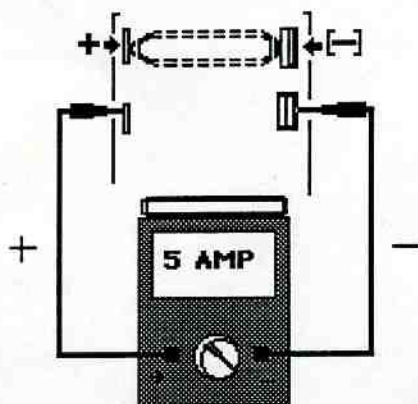
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- 1- THE RESISTANCE OF HEATER UNIT IS APPROX  $2.0 \Omega$  CHECK AT WIRE CONNECTOR UNDER SEAT [UNPLUGGED TERMINAL FIRST]
- 2- AMP DRAW IS APPROX 5.0 AMP PER SEAT CHECKED AT FUSE #8 (WILL DECLINE AS UNIT HEATS UP)
- 3- T-STAT CLOSSES (ON) AT APPROX  $50^{\circ}\text{F}$  OPENS (OFF) AT APPROX  $86^{\circ}\text{F}$



### HOW TO CHECK FOR AMPS AT FUSES



NOTE; IF SEAT TEMP OR OUTSIDE TEMP IS TOO HIGH THE T-STAT WILL NOT ALLOW HEATER TO COME ON.

1- CHECK FUSE BOX COVER LEGEND FOR THE SEAT HEATER FUSE. # 8 OR # 11

2- REMOVE THE FUSE FOR SEAT HEATER.

3- MAKE SURE THAT ALL THE OTHER ACCESSORIES ON THAT FUSE ARE TURNED OFF. YOU DO NOT WANT ANY FALSE AMP READINGS.

4- CONNECT THE AMP METER POS [+] TERM TO THE LEFT SIDE FUSE POST.

CONNECT THE AMP METER NEG [-] TERM TO THE RIGHT SIDE FUSE POST.

5- TURN KEY ON TO RUN POSITION [KP II], IDIOT LAMPS ON. TURN ON THE SEAT HEATER SWITCH. TAKE NOTE OF AMP DRAW, SHOULD BE APPROX 5.0 AMPS. AMP DRAW WILL GO DOWN AS THE SEAT HEATER WARMS UP. IF NO AMP DRAW & THE TEMP IS LOW ENOUGH FOR T-STAT TO OPERATE, CHECK UNIT AT FLOOR VENT TERM CONNECTOR. GO TO 6

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