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18-132 HIGH LEVEL ALARM

INSTRUCTION MANUAL

Manual # 990566A

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SECTION I

GENERAL DESCRIPTION

1.1 The 18-132 is an accurate, low-cost, level-sensing alarm. Internal scaling is provided to allow the unit to accept a wide variety of voltages, 1VDC or greater, and currents scales to provide a 1V drop at full range input.

1.2 A noninverting operational amplifier provides an input stage with range scaling and a high input impedance on all voltage ranges. This stage is connected to a precision voltage comparator through a trip-point adjustment network. When the input signal reaches the trip-point, a relay, which is normally energized for fail-safe operation, is de-energized and its contacts open, indicating an alarm condition.

1.3 Two basic models are available - a single-alarm unit and a dual-alarm unit. Each alarm operates independently (with a common return) and can be set for "Hi" or "Lo" operating mode, various input ranges and different values of hysteresis. Calibration components are easily accessible to facilitate changes in alarm mode, input ranges and hysteresis.

1.4 A battery back-up feature is standard on the 18-132. If Terminals #6 and #7 are connected to a 24V battery (or other 24VDC power source that is independent of the 117VAC line), a failure of the 117VAC line will not disable the alarm. The battery automatically keeps the alarm activated during the failure. When the 117VAC power returns, the load is automatically removed from the battery. This feature is not available if the remote trip-point adjustment option has been specified.

SPECIFICATIONS

2.1 General

a.	Power Requirements	115V, ±10V, 50/60Hz, 10VA. 24VDC Operation - Optional, 140mA Max.
b.	Temperature Effect	Less than ±0.02%/°F of Span (20° to 120°F).
c.	Resolution of Trip Adj. (Blind Adjustment)	0.1% of Span
d.	Repeatability	0.1% of Span
e.	Minimum Trip Point	2% of Span
f.	Hysteresis	1% Standard; up to 10% available in 1% steps.
g.	Relay Contact Rating (S.P.S.T. - Coil normally energized for fail-safe operation, and closed contacts provided.)	Standard: 3A Resistive @ 24VDC/115VAC, Dust-Tight Case. Rated 10 million mechanical operations. Optional: 10A Resistive @ 24VDC/115VAC, Open-Type Construction (18-132-A). Rated 20 million mechanical operations. Optional: 3A Resistive, 100VA maximum, 250VDC maximum, hermetically-sealed (18-132-B). Rated 20 million mechanical operations at full load and 100 million at 1/2 load.

2.2 Inputs

a. Standard Input Ranges

18-132-8	0/1V	Ri = 150K
-7	0/2V	Ri = 150K
-6	0/5V	Ri = 150K
-5	0/10V	Ri = 150K
-1	0/5mA	1V Drop @ 5mA
-2	1/5mA	1V Drop @ 5mA
-3	4/20mA	1V Drop @ 20mA
-4	10/50mA	1V Drop @ 50mA

b. Nonstandard Input Ranges are available.

2.3 Alarm Modes

Each alarm section can be set up independently for "Hi" or "Lo" trip operation, various input ranges and different hysteresis values.

2.4 Options Available

a.	LED Alarm Indicators	Option DL
b.	Remote Trip-Point Adjustment	Option RS
c.	Latching Alarms, includes LED Indicators	Option LS
d.	External 24VDC Operation	Option E92

2.5 Housing

a. Indoor-Type — General-purpose, anodized aluminum. Four (4) insulated bushings, 6-32 tapped, located for Devar Inc. module spacing.

b. Channel Mounting — **Wall Brackets M31 and M32 available.**

2.6 Product Coding (Single Alarm)

18	132	1			
		2			1/5mA Input
		3			4/20mA Input
		4			10/50mA Input
		5			0/10V Input
		6			0/5V Input
		7			0/2V Input
		8			0/1V Input
			H		High Alarm
			L		Low Alarm
				A	Substitute 10A Relay SPST / A1C SPDT/ A2C DPDT
				B	Substitute 3A Reed Relay
				DL	Add Alarm Indicator
				LS	Latching Alarm with Indicator
				RS	Substitute Remote Trip-Point Adjustment
				E92	Substitute 24VDC Operation
				M31	Add Wall Mounting Bracket
				M32	Add Wall Mounting Bracket & Cover

Product Coding (Dual Alarm)

18	132	11			
		22			1/5mA Input
		33			4/20mA Input
		44			10/50mA Input
		55			0/10V Input
		66			0/5V Input
		77			0/2V Input
		88			0/1V Input
			HH		High-High Alarm
			HL		High-Low Alarm
			LL		Low-Low Alarm
				AA	Substitute (2) 10A Relays SPST /AA1C (2) Relays SPDT
				BB	Substitute (2) 3A, 100VA Reed Relays
				DL	Add (2) Alarm Indicators
				LS	Latching Alarms with Indicators
				RS	Substitute (2) Remote Trip-Point Adjustments
				E92	Substitute 24VDC Operation
				M31	Add Wall Mounting Bracket
				M32	Add Wall Mounting Bracket & Cover

SECTION III

INSTALLATION

3.1 Four (4) plastic mounting bushings (6-32 thread) are part of the Series 18-132 Alarm case. This mounting electrically isolates the case from the mounting surface or rails. The power transformer shield is connected to the case.

3.2 The mounting bushings are spaced according to Devar Inc. module mounting standards. This permits the use of available hardware for installation with Devar Inc. modules and multi-channel rack cabinets. It can also be wall mounted by either M31 or M32 Bracket Assembly. (See Figures 3-1, 3-2 and 3-3.)

3.3 Connect the wires from the 115VAC line to the corresponding terminals marked "AC," "ACC" and "GND," or - if external 24VDC operation is specified, connect the 24V power to the corresponding terminals. (Refer to Figure 3-4.)

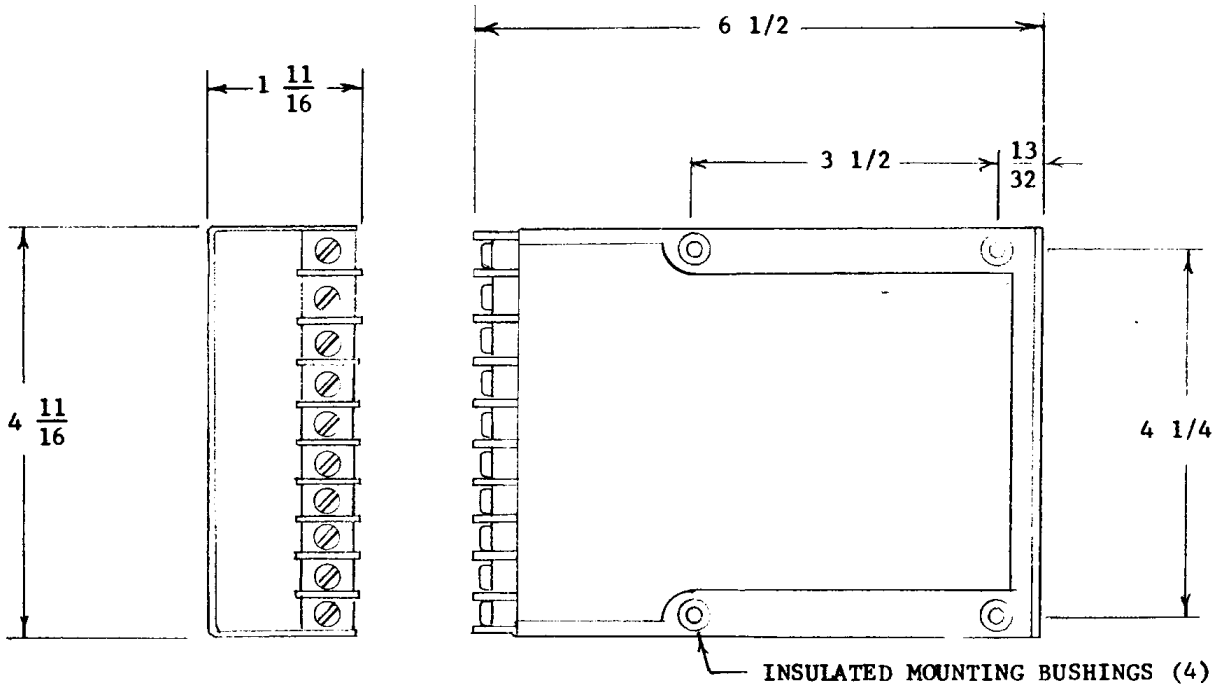


Figure 3-1

OUTLINE DIMENSIONS - ALARM CASE

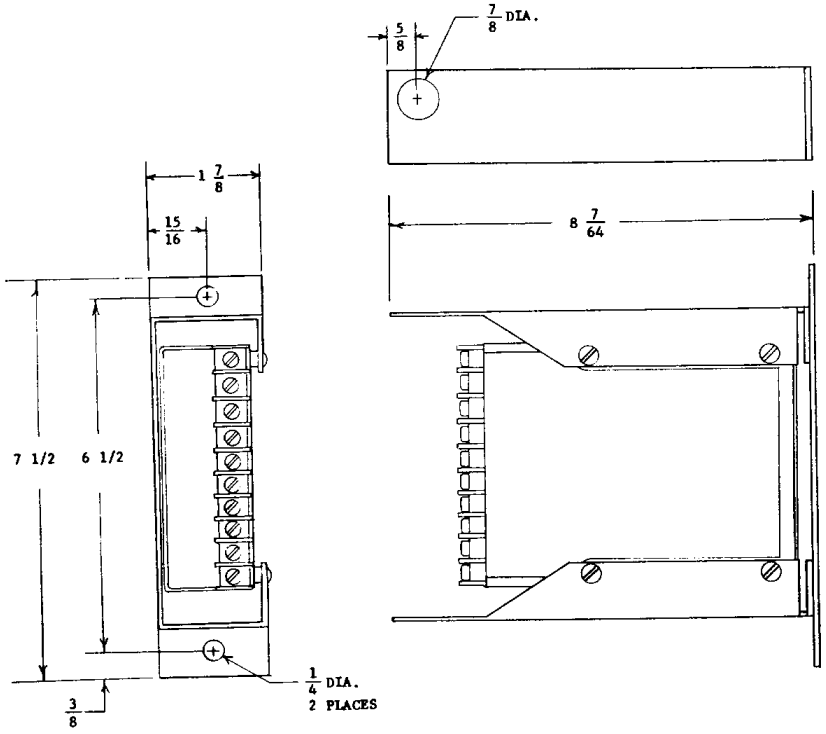


Figure 3-2

OUTLINE DIMENSIONS - ALARM CASE WITH MOUNTING BRACKET (M31)

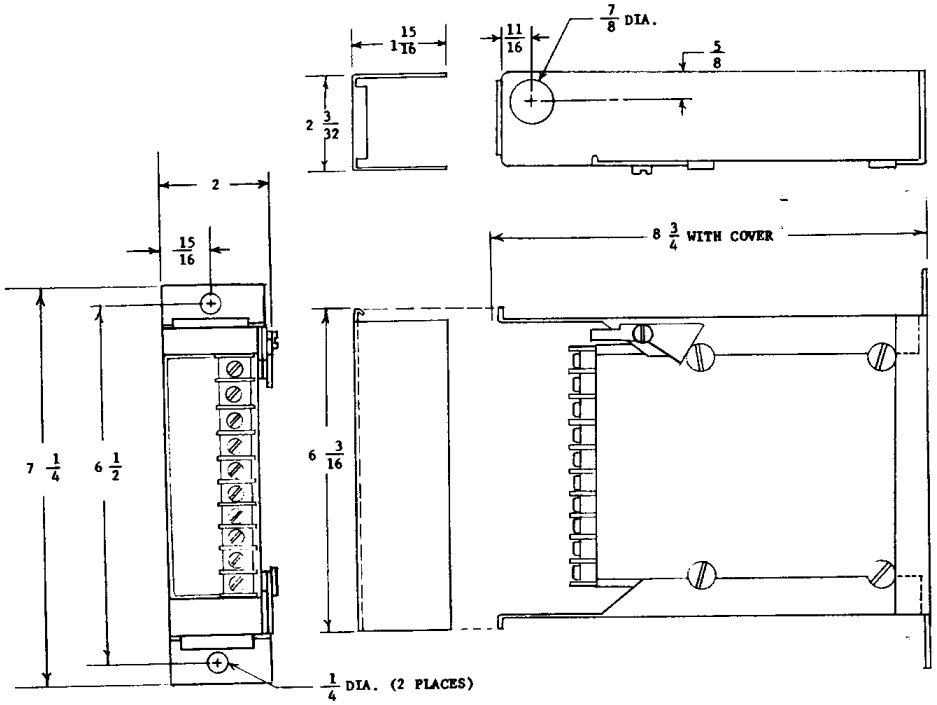
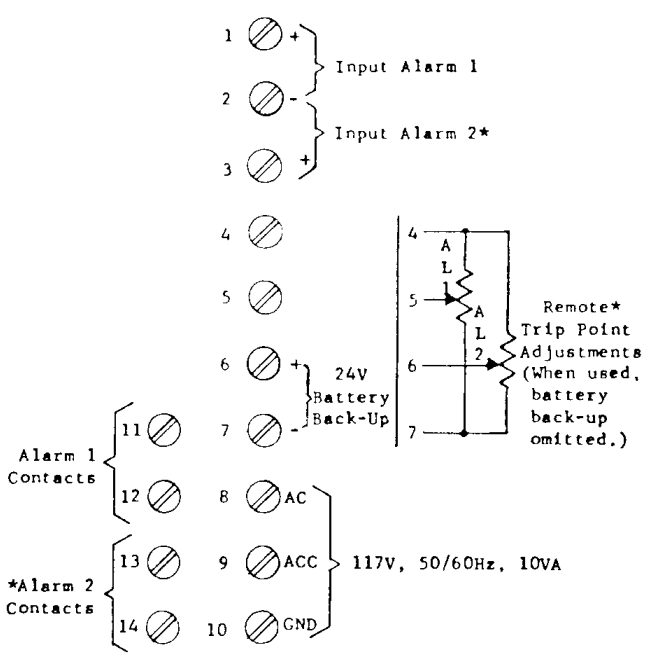
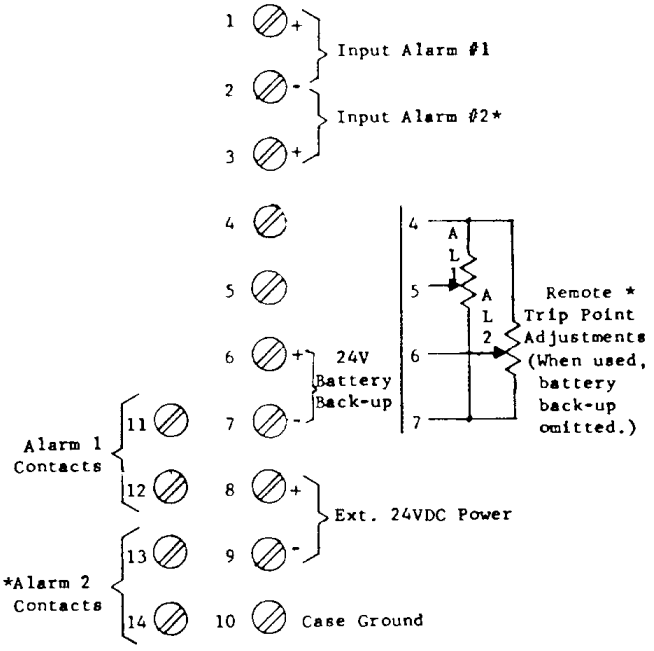


Figure 3-3

OUTLINE DIMENSIONS FOR ALARM CASE
WITH MOUNTING BRACKET, TERMINAL COVER (M32)

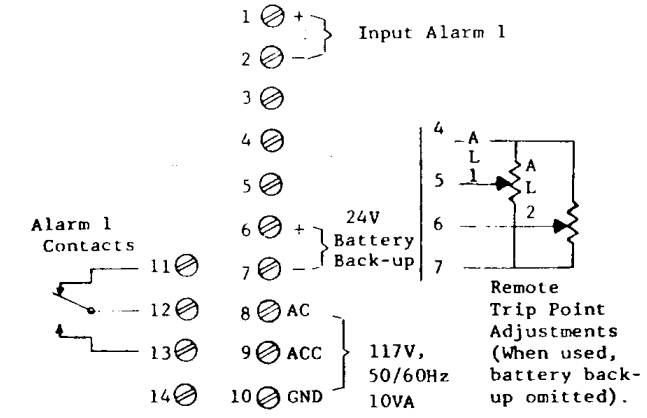


117VAC MODEL

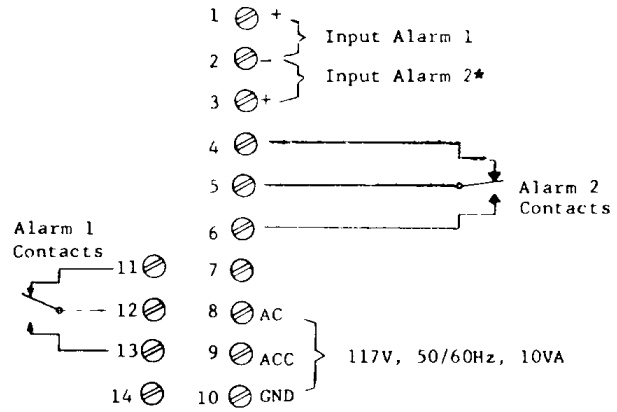


24VDC MODEL

*Optional



A1C SINGLE ALARM WITH ONE SPDT RELAY



*AA1C A2C

DUAL ALARM OR SINGLE ALARM WITH DUAL SPDT RELAYS

Note: For DUAL ALARMS to operate from a single current source, omit R110B and field wire input terminals #1 and #3.

Figure 3-4

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FIELD WIRING TERMINALS

SECTION IV

RECALIBRATION PROCEDURE

4.1 To set the trip point, apply an input signal equal to the desired trip level. If the alarm is set up for "high trip," adjust the potentiometer (located behind the corresponding calibration hole in the case) counter-clockwise until the relay contacts are closed. If the alarm is set up for "low trip," adjust the potentiometer clockwise until the contacts are closed.

Slowly adjust the potentiometer, clockwise for "high trip" or counter-clockwise for "low trip," until the relay contacts open. The alarm is now calibrated to open the relay contacts at the desired input level. The optional alarm indicator is an aid in providing a visual indication of the state of the relay contacts.

On alarms with the "remote trip-point adjustment option," the above procedure is followed, but with the remote potentiometer.

4.2 If a major calibration change is required, the following steps should be followed. (Refer to Figure 4-1.)

4.2.1 "High Trip" Operation

a. Connect a jumper wire from Solder Terminals A to B on the circuit board for Alarm #1. (C and D should have no wires connected to them.)

b. Solder a jumper wire between E and F on the circuit board for Alarm #2. (G and H should have no wires connected to them.)

4.2.2 "Low Trip" Operation

a. Solder jumper wires from A to C and from B to D for Alarm #1. (There should be no wires between A and B or C and D.)

b. Solder jumper wires from E to G and F to H for Alarm #2. (There should be no wires between E and F or G and H.)

See Paragraph 4.4 if "latch option" is present.

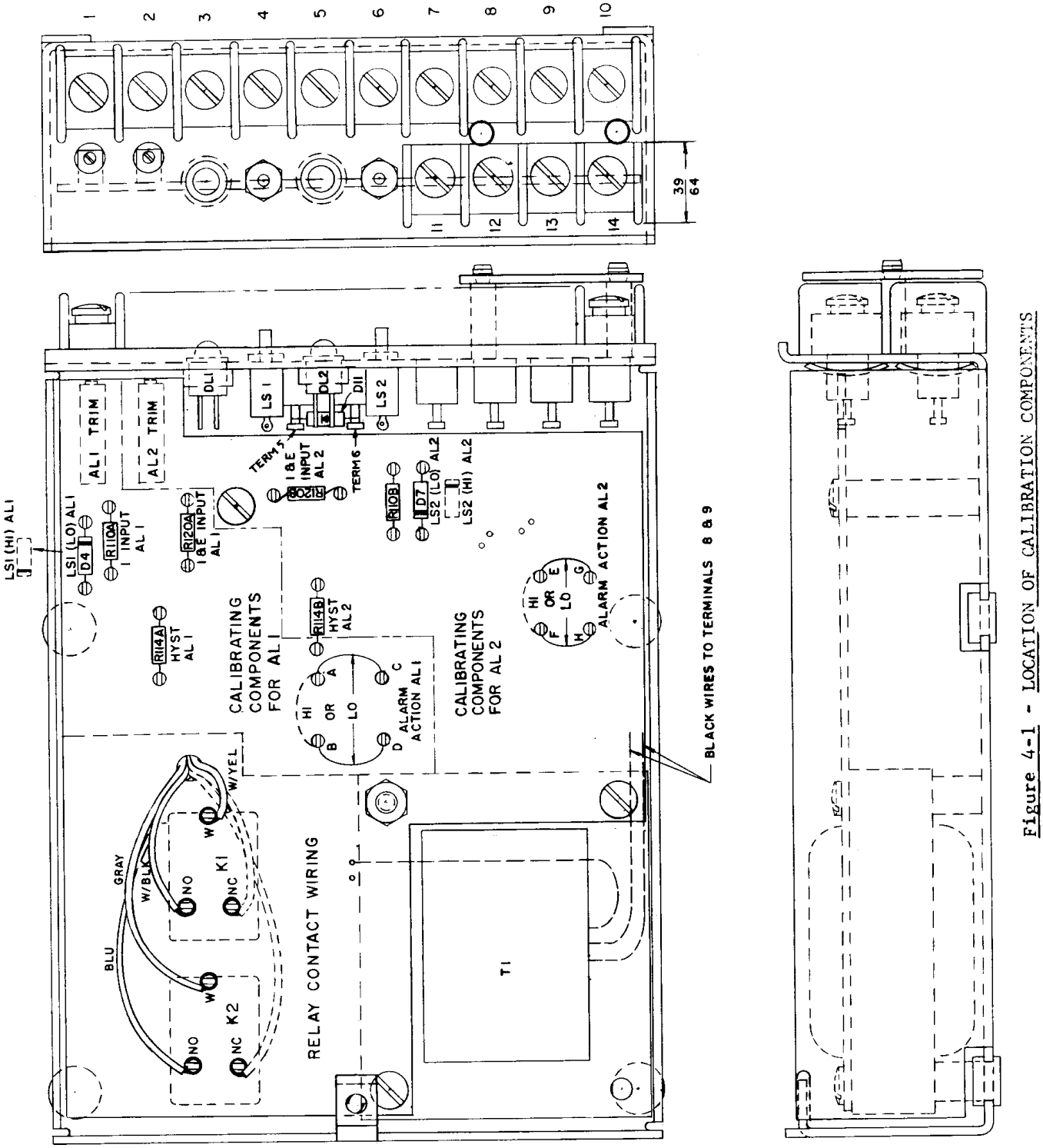

Figure 4-1 - LOCATION OF CALIBRATION COMPONENTS

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SECTION IV - RECALIBRATION PROCEDURE

4.3 Change of Hysteresis Value

The values of R114 are shown below for different values of hysteresis. R114A is for setting the hysteresis value in Alarm #1, and R114B is for setting the hysteresis value in Alarm #2. One percent hysteresis has been provided, unless otherwise specified.

Hysteresis (%)	R114A-B (Ohms)	Part Number
1	180.0K	222087-04
2	82.0K	221862-56
3	54.9K	223737-74
4	45.3K	223737-85
5	35.7K	223737-32
6	30.1K	223737-09
7	25.5K	223737-08
8	23.2K	223737-102
9	20.5K	223737-28
10	18.7K	223737-70

4.4 Latch Option Calibration

See Figure 4-1. The latch is calibrated by connecting D4 and/or D7 in the direction that corresponds to the alarm mode ("Hi" or "Lo" Trip). D4 is for calibrating AL1, and D7 is for calibrating AL2.

4.5 Nonstandard Input Range Calibration

4.5.1 Nonstandard Current Input Ranges

a. R120A-B must be 7.87K ohms, Devar Inc. Number 221734-43.

b. Set R110A-B equal to the value that will develop a voltage drop of 1V at the maximum input current for that range.

i.e., R110A-B = 1/I, maximum

c. The required wattage for this resistor is: P = 4/R110A-B. (This formula gives a power derating factor of four.)

d. The resistor used should have a temperature coefficient of 50PPM/°C or less.

4.5.2 Nonstandard Voltage Input Ranges

a. Ranges less than 10V:

$$R120A\text{-}B = \frac{(70.7K)\ Vi}{9 - (0.459)\ Vi}$$

Where Vi is the maximum input voltage in the range desired.

b. Ranges greater than 10V:

Set R120A-B = 154K ohms, Devar Inc. Part Number 223737-79.

$$R2,\ R21 = 20K\ (Vi) - 200K$$

R2, R21 must be at least 15K.

Where Vi is the maximum input voltage in the range desired.

c. All resistors used should have a temperature coefficient of 50PPM/°C or less.

4.6 Effect of Remote Potentiometer on Trip Point

The recommended value of the remote potentiometer is 5K. A dial may be used with the potentiometer to reference a trip point. However, the potentiometer will have no effect on the trip point for settings below approximately 18% and above approximately 87% of the maximum potentiometer setting. Between these two end points, the trip point can be adjusted with a nonlinearity of 1% of the maximum input signal.

Input Range	R110A, R110B *		R120A, R120B	
	(Ohms)	Part No.	(Ohms)	Part No.
0/1V	-	-	7.87K	223737-42
0/2V	-	-	16.5K	223737-99
0/5V	-	-	48.7K	223737-34
0/10V	-	-	154.0K	223737-79
0/5mA	196.0	223737-122	7.87K	223737-42
1/5mA	196.0	223737-122	7.87K	223737-42
4/20mA	49.9	223737-166	7.87K	223737-42
10/50mA	19.0	220587-49	7.87K	223737-42

*For Dual Alarms to Operate From a Single Current Source, Omit R110B and Field Wire Input Terminal #1 to #3.

Figure 4-2

INPUT RANGE CALIBRATION TABLE

SECTION V

TROUBLESHOOTING

5.1 If the alarm is not operating properly, check to see that it is receiving power and that all terminals are wired correctly. All screw terminals must be tight.

5.2 Once the above probable causes of failure are checked, without determining the fault, refer to the following drawings to aid in troubleshooting.

a. Figure 5-1 - Schematic, 18-132 High Level Alarm

b. Figure 5-2 - Component Location, 18-132 High Level Alarm

5.3 Contact protection should be used for loads other than 'low level' Where 'arc transfer' occurs, the addition of a protective device across relay contacts is recommended. Normally, a 0.01 mfd, 2000 wv disc ceramic capacitor (Part No. 229861-01) will suffice, but an RC network is considered better.

5.4 Replacement parts may be ordered by their part number from Devar Inc., Control Products Division. Most components are readily obtainable from your electronic distributor.

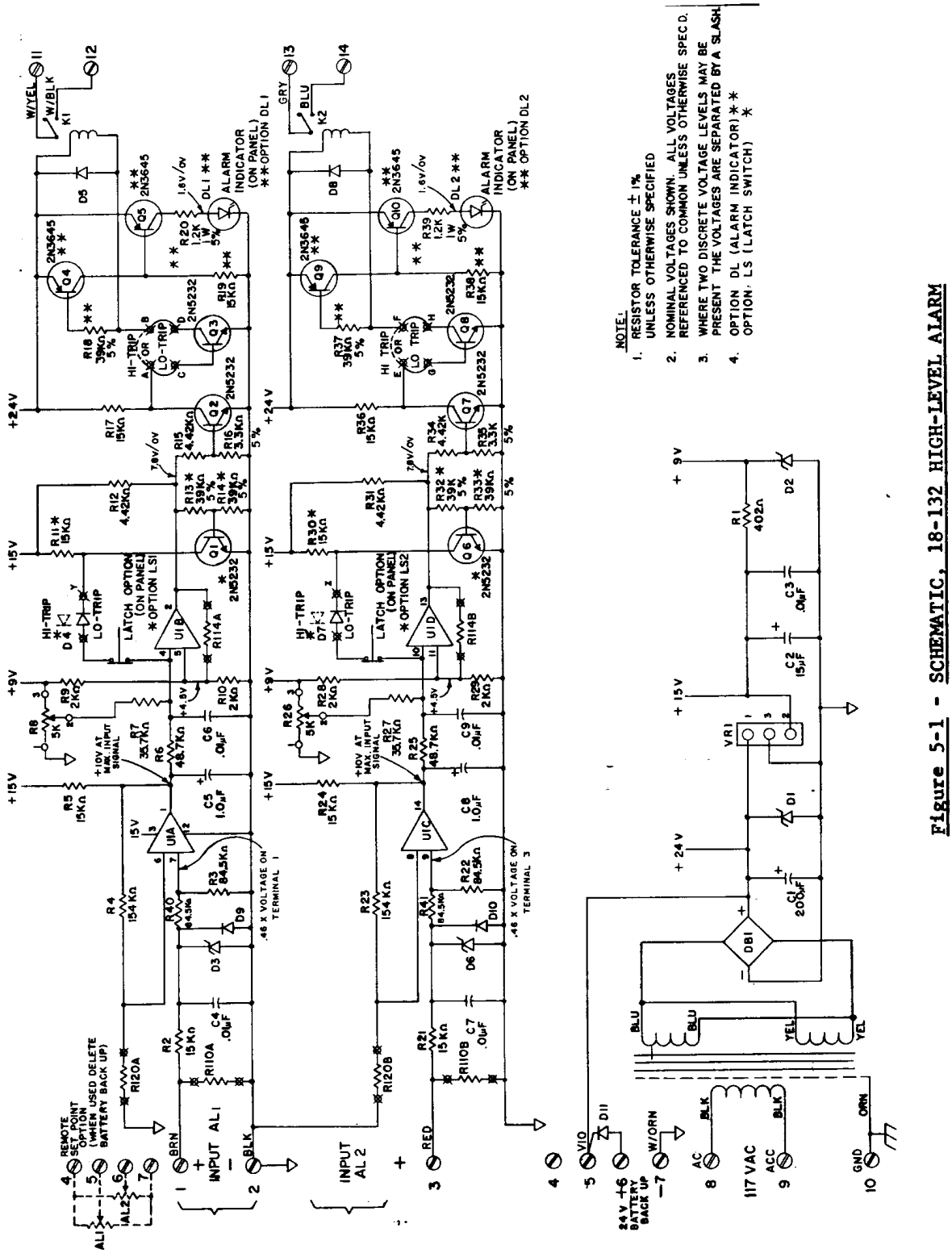

Figure 5-1 - SCHEMATIC, 18-132 HIGH-LEVEL ALARM

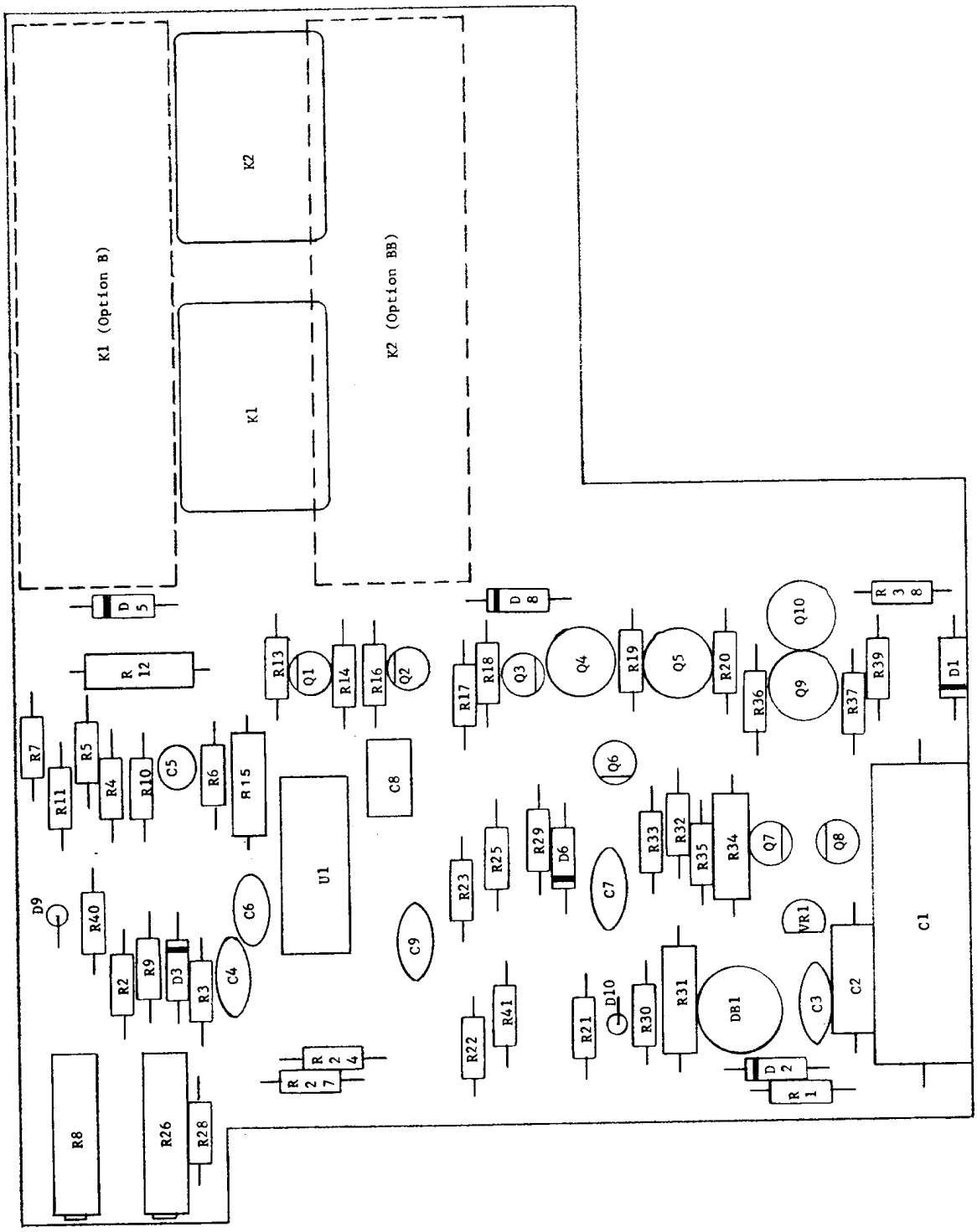

Figure 5-2 - COMPONENT LOCATION, 18-132 HIGH-LEVEL ALARM

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PARTS LIST

6.1 Parts relating to calibration are identified in Section IV - Recalibration Procedure. To order replacement or spare parts, contact your local Devar Inc., Control Products Division representative and, whenever possible, specify items by part number.

6.2 Resistors & Potentiometers

		Part No.
R1	402 Ohms, ±1%, Metal-Film	223737-14
R2,R5,R11,R17,R19, R21,R24,R30,R36,R38	15K, ±1%, Metal-Film	223737-27
R3,R22,R40,R41	84.5K, ±1%, Metal-Film	223737-36
R4,R23	154K, ±1%, Metal-Film	223737-79
R6,R25	48.7K, ±1%, Metal-Film	223737-34
R7,R27	35.7K, ±1%, Metal-Film	223737-32
R8,R26	5K Cermet Trimmer	381098-09
R9,R10,R28,R29	2K, ±1%, Metal-Film	223737-58
R12,R15,R31,R35	4.42K, ±1%, Metal-Film	223763-11
R13,R14,R18, R32,R33,R37	39K, ±5%, Composition, 1/4W	222087-54
R16,R35	3.3K, ±5%, Composition, 1/4W	222087-52
R20,R39	1.2K, ±5%, Composition, 1W	223341-08

6.3 Capacitors

C1	200uF, 50WV, Electrolytic	381097-01
C2	15uF, 20WV, Tantalum	221674-02
C3,C4,C6,C7,C9	.01uF, 50WV, Disc Ceramic	220589-10
C5,C8	1uF, 35WV, Tantalum	380767-04

6.4 Diodes

DB1	Bridge Rectifier, 100PIV	380766-02
D1	33V Zener	381071-07
D2	9V Zener	221799-01
D3,D6	13V Zener	381071-05
D4,D5,D7,D8	1N4153	222095-01
D9,D10	Hot Carrier Diode	382210-01-17
D11	1N4002	380666-01

6.5 Transistors

Q1,Q2,Q3,Q6,Q7,Q8	2N5232	380668-02
Q4,Q5,Q9,Q10	2N3645	222873-01

			Part No.
6.6	Integrated Circuits		
	U1	LM339 Quad Comparator	382381-01
	VR1	Voltage Regulator	382285-01
6.7	Transformer		
	T1	Power Transformer	381608-01
6.8	Relay		
	K1,K2	3A, 115V Dust Cover	382377-01
	K1,K2	10A, 115V Open-Type	382379-01
	K1,K2	3A, 100VA Hermetically-Sealed	382376-01
6.9	Indicators		
	DS1,DS2	Light-Emitting Diode	382374-01
6.10	Switches		
	SW1,SW2	Pushbutton Switch	382375-01
6.11	Hardware		
	Insulated Mounting Bushing		223844-01
	Speed Nut "U" 6-32		223960-01
	10-Terminal Block		381227-10
	4-Terminal Block		381227-04
	Speed Nut		380821-01
	Spacer		381111-02