

**APPENDIX D: SMALL PARTS INC ORDERING
INFORMATION**

THE 2001 FIRST ROBOTICS COMPETITION MANUAL

SPARK

SMALL PARTS ADDITION TO ROBOTICS KIT

IN ACCORDANCE WITH F.I.R.S.T. RULES AND REGULATIONS FOR THE 2001 ROBOTICS COMPETITION YOU MAY INCLUDE \$1200 OF PURCHASES OF DRIVE COMPONENTS, MATERIALS AND PARTS FROM SMALL PARTS INC. IN YOUR FINAL ROBOT.

THIS SPARK CERTIFICATE PROVIDES A GRANT TO YOUR TEAM TO PURCHASE THESE PRODUCTS IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

FIRST \$200.00 — FREE!
NEXT \$1,000 — 50% DISCOUNT
ABOVE \$1,200 — CATALOG PRICE



JAMES R. EDGAR
VICE-PRESIDENT FOR PROGRAM MANAGEMENT

SUBJECT TO TERMS AND CONDITIONS ON THE REVERSE SIDE OF THIS CERTIFICATE

THIS CERTIFICATE IS SUBJECT TO THE FOLLOWING TERMS AND CONDITIONS:

1. YOUR TEAM HAS BEEN AUTHORIZED BY **FIRST** TO ENGAGE IN THE 2000 ROBOTICS COMPETITION.
2. YOUR TEAM HAS REGISTERED WITH **SMALL PARTS INC.** AND PROVIDED SMALL PARTS WITH ALL THE REQUIRED INFORMATION FOR SUCH REGISTRATION.
3. THE FOLLOWING KITS, DESIGNED SPECIFICALLY FOR THE 2001 ROBOTICS COMPETITION BY **SMALL PARTS INC.** AND PRODUCED WITH THE ASSISTANCE OF **DEKA** AND **FIRST** ARE NOT INCLUDED IN THE SPARK GRANT:

WHEEL HUB KIT: PART NUMBER: FIR-DC01

DRILL MOTOR COUPLING KIT: PART NUMBER: FIR-DC02

THE FOLLOWING ITEMS IN THE FIRST SUPPLEMENT TO CATALOG 21 ARE ALSO EXEMPT:

ROBO SAPIENS by Menzel and D'Alusio — **MIT Press:** PART NUMBER: BCK-32
METRIC CONVERSION CALCULATOR PART NUMBER: MCAL-100

NOTE: ALL FREIGHT CHARGES ARE MADE IN ACCORDANCE WITH SMALL PARTS INC. TERMS AND CONDITIONS
AND ARE NOT INCLUDED IN THE SPARK GRANT.



Toll-Free Fax: **877-573-9273**
Web Site: **www.smallparts.com/first**
E-mail: **first@smallparts.com**
Tel: **305-825-7961**

ORDERING GUIDELINES

FIRST – Robotics Competition 2001

SMALL PARTS, INC. is your team's major source for the additional material and parts needed to design, prototype and build your final robot. In accordance with **FIRST** rules and regulations for the 2001 Robotics Competition you may include up to \$1200 of drive components, materials and parts from **SMALL PARTS, INC.** in your final robot. Be sure to see the accompanying certificate for full details of the **SPARK** grant schedule.

REGISTERING

By Fax: Fill out the Registration Form (next page) and send it **Toll-Free** to **877-573-9273**
By Internet: Go to **www.smallparts.com/first** and follow the instructions.

Once registered you may immediately order from the **SMALL PARTS** Catalog, or from our supplemental brochure.

ORDERING *(Your team must register before ordering.)*

We encourage teams to place their orders via Fax or the Internet. This allows us to enter your order directly from a hard copy and immediately contact you if any problems are found. Please make sure you fill out all sections of the Order Form. Any section not completely filled out may delay the processing and shipping of your order.

When placing orders with **SPI** it is not necessary to specify which materials you will use in your final robot. All purchases by your team will be placed in your team's account. **SPARK** discounts will be applied to your account and reflected on your invoice.

SHIPPING *(Shipping charges apply to all orders. They are not included in SPARK discounts and will appear on your invoice.)*

All orders will be shipped within 24 hours ARO (after receipt of order). We will make every effort to ship orders placed before noon (your time zone) that same day. Our standard method of shipping for the competition will be via FedEx with 2-Day guaranteed delivery, unless you request an alternate method. 2-Day is guaranteed delivery on the second business day after pickup from **SPI**.

Please plan accordingly. Placing orders late in the week may require additional charges to assure delivery by Friday or Saturday. Shipping charges will be applied as follows:

Shipping weights under 20 lbs\$6.00 shipping charge.
Shipping weights in excess of 20 lbsCurrent FedEx rate.
Overnight ShippingCurrent FedEx rate.
Saturday DeliveryOvernight shipping charge + \$10.00.
Other CarrierActual charges per your direction.

BACK ORDERS

SPI has increased its product stocking levels for the competition. However, sometimes the demand exceeds our on-hand quantity. Should a part be temporarily out-of-stock, **SPI** will make every effort to supply your item in a timely manner or recommend a substitute.

RETURNS

Returns must be made within 30 days of receipt. For full credit, products must be returned in their original unopened individual packages. Please call Customer Service at **305-557-7955** to obtain an RMA number. Be sure to have your packing slip(s) available when you call, since you must provide the packing slip number(s) for the material to be returned. Returns may be subject to a 15% restocking fee.

Holiday Schedule

SPI will be closed on these National Holidays, but feel free to send orders by E-mail or fax.

Monday, January 15, 2001 Martin Luther King Day
Monday, February 19, 2001 Presidents' Day

FAX ORDER FORM



**SMALL
PARTS
INC.**

Toll-Free Fax: 877-573-9273

Tel: 305-825-7961

Web Site: www.smallparts.com/first

E-mail: first@smallparts.com



FIRST – Robotics Competition 2001

Team No. _____

Team Name _____

Corporate Sponsor _____

Date: _____ Ref. No. _____

Your Name: _____

E-mail: _____

Phone: _____ Fax: _____

PAYMENT METHOD

☐ From Allotment (If this order exceeds allotment, please bill as indicated)

☐ Blanket P.O. No. _____ ☐ Credit Card

SHIPPING METHOD

FEDEX ☐ 2-Day ☐ Priority ☐ Saturday Delivery (Priority Only)

FEDEX Account No. (If needed) _____

CREDIT CARD INFORMATION

☐ AMEX ☐ VISA ☐ MASTERCARD Expiration Date: _____

Card No.: _____

Cardholder Name: _____

Billing Address: _____

City: _____ State: _____ ZIP: _____

USE THIS ALTERNATE SHIPPING ADDRESS

Attention: _____

Address: _____

City: _____ State: _____ ZIP: _____

Phone: _____ Fax: _____

USE THIS ALTERNATE BILLING ADDRESS

Attention: _____

Address: _____

City: _____ State: _____ ZIP: _____

Phone: _____ Fax: _____

ITEM	QTY.	PART No.	DESCRIPTION	UNIT PRICE	TOTAL
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					

TOTAL



**SMALL
PARTS
INC.**

Toll-Free Fax: 877-573-9273

Tel: 305-825-7961

E-mail: first@smallparts.com

Web Site: www.smallparts.com/first

REGISTRATION FORM

FIRST – Robotics Competition 2001

Team No.: _____ Date: _____

Team Name: _____

Corporate Sponsor: _____

Contact Person: *(Individual responsible for team purchasing records.)*

Name: _____ Title: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: () _____ Fax: () _____ E-mail: _____

24-hour emergency phone number for problem resolution: _____

Other team members who can order:

Name: _____ Affiliation: _____

Name: _____ Affiliation: _____

Name: _____ Affiliation: _____

Name: _____ Affiliation: _____

Name: _____ Affiliation: _____

Billing Information: *(For charges outside the SPARK credit)*

Name: _____ Title: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: () _____ Fax: () _____ E-mail: _____

Use Purchase Order No.: _____

CREDIT CARD INFORMATION

☐ AMEX ☐ VISA ☐ MASTERCARD

Expiration Date: _____

Card No.: _____ Cardholder Name: _____

Billing Address: _____

City: _____ State: _____ Zip: _____

Shipping Address: *(All packages will be shipped to this address unless an alternative is given with the order.)*

Name: _____ Title: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: () _____ Fax: () _____ E-mail: _____

FEDEX Account No. (if applicable): _____



SMALL PARTS INC.

13980 NW 58th Court
P.O. Box 4650
Miami Lakes, FL 33014-0650

ENGINEERING FINDINGS

Quality Components, Materials and Tools

Toll-Free Fax: 877-573-9273

Web Site: www.smallparts.com/first

E-mail: first@smallparts.com

Phone: 305-825-7961

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Special Items and Components for



FIRST Robotics Competition 2001

This year's **SPARK**, the Small Parts Addition to Robotics Kit, allows each team to select materials and parts from the **SMALL PARTS** catalog needed to complete their robot. Inside this supplement, you will find special items and components to help you meet the goals of the 2001 **FIRST** Robotics Competition. A description of **SPARK** appears in the Rules Book.

FIRST asked **SMALL PARTS, INC.** to help solve two drive-system related problems. Here we offer two solutions:

The **Wheel Hub Kit** (page 2) provides an answer to connect a sprocket to the wheelchair wheels provided in the kit. In addition, we have added a selection of hubless sprockets to complement the wheel hub kit.

The **Drill Motor Coupling Kit** (page 3) provides a simple but effective solution to attaching a shaft to the threaded output shaft of the drill motor gear assembly.

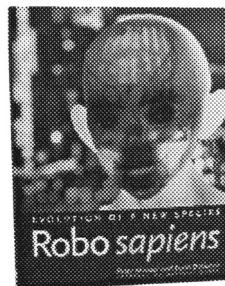
Don't miss the new products we've added specifically for the 2001 FIRST Robotics Competition.

BOSCH Aluminum Structural Framing System (page 4-6) is included this year to help **FIRST** teams construct strong, lightweight frames that are easy to build.

A selection of **Flanged Ball Bearings** (page 8) has been added to this supplement at the request of several **FIRST** teams.

New this year is the text, **Robo sapiens** (Book). Shown below, this book offers an eye-opening look at the future of robotics.

Please note that the following items do not qualify for **SPARK** discounts: Wheel Hub Kit, Drill Motor Coupling Kit, **Robo sapiens** Book and the Metric Conversion Calculator.



Robo sapiens

EVOLUTION OF A NEW SPECIES

By Peter Menzel and Faith D'Aluisio.

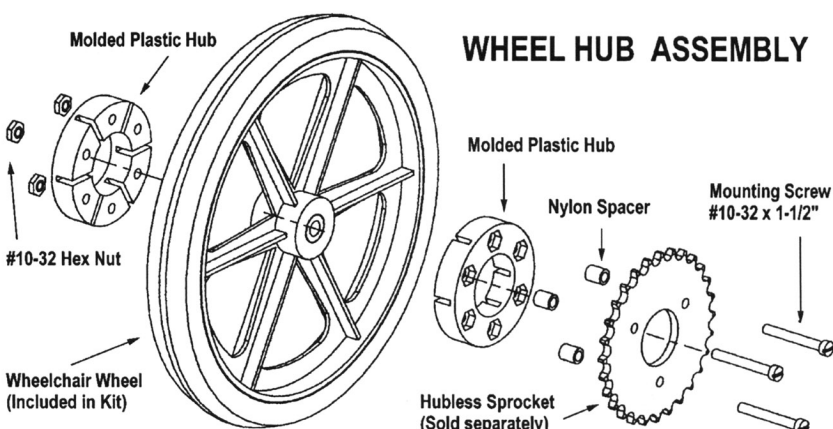
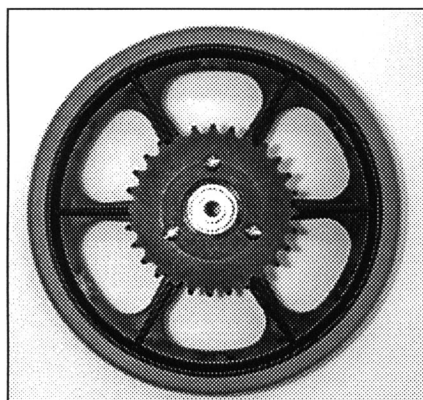
© 2000

The MIT Press.

Hardcover, 240 pages. 9" x 11".

See page 8 for more information.

Wheel Hub Kit



This wheel hub kit provides a fast, secure and inexpensive way to mount a sprocket to the wheelchair wheels provided in your kit of parts. When assembly is completed, the sprocket is mounted directly to the wheel and cannot slip.

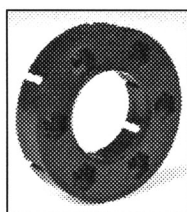
Wheel hub kit contains parts to mount sprockets to two wheels, but does not include sprockets or pulleys.

QTY	DESCRIPTION	SPI REPLACEMENT PART #
4	Plastic Hubs	Only available in kit
6	#10-32 x 1" Fillister Hd Screws	MX-032-16FL
6	#10-32 x 1-1/2" Fillister Hd Screws	MX-032-24FL
12	#10-32 Hex Nuts	HNX-032
12	#10 Lock Washers	LWXA-190
15	#10 x 3/8" Nylon Standoffs	RSN-10/6

PART No.	DESCRIPTION	PRICE EACH
FIR-DC01*	Wheel Hub Kit (for two wheels)	20.00

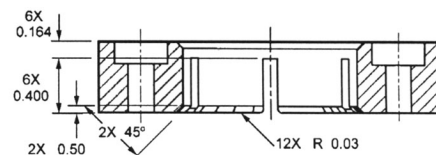
***This item is exempt from SPARK**

*Note: Sprockets are sold separately.
A selection of hubless sprockets is provided below.*

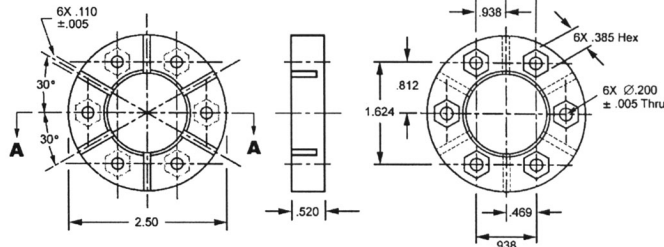


Molded Plastic Hub

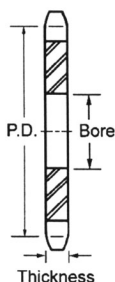
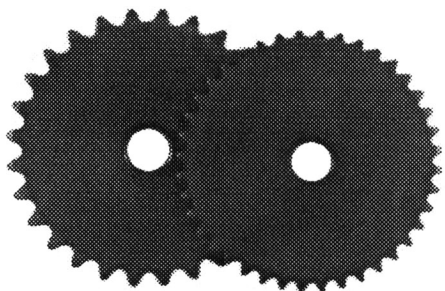
ALL DIMENSIONS IN INCHES



SECTION A-A



Hubless Sprockets



These Hubless sprockets have been selected to use with the wheel hub kit above. They offer a wide range of drive ratios.

Hubless Sprockets — Steel

1/4" Pitch No. 25 — Nominal Thickness: 0.110"

ALL DIMENSIONS IN INCHES

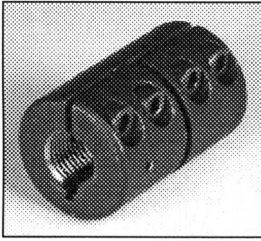
PART No.	No. OF TEETH	O.D.	BORE	WEIGHT (APPROX.)	PRICE
RCHS-2532	32	2.888	3/8	0.14 lbs	15.84
RCHS-2540	40	3.327	1/2	0.20 lbs	16.89
RCHS-2548	48	3.964	1/2	0.32 lbs	17.64
RCHS-2560	60	4.920	1/2	0.54 lbs	18.84

Hubless Sprockets — Steel

3/8" Pitch No. 35 — Nominal Thickness: 0.168"

PART No.	No. OF TEETH	O.D.	BORE	WEIGHT (APPROX.)	PRICE
RCHS-3528	28	3.55	1/2	0.34 lbs	15.06
RCHS-3532	32	4.03	5/8	0.46 lbs	15.78
RCHS-3536	36	4.51	5/8	0.62 lbs	16.53
RCHS-3542	42	5.23	19/32	0.78 lbs	18.33

Drill Motor Coupling Kit



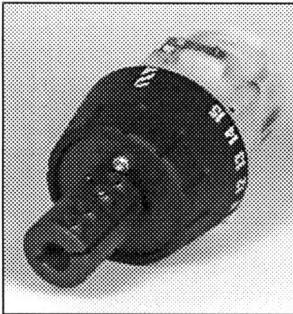
This clamp type coupling made of steel has been modified to provide a means of coupling the drill motor/gear assembly of the Skill Bosch drill to a 3/8" diameter shaft.

One end of the coupling has been threaded to match the 3/8-24 thread on the gear assembly. Included on this end is a 1/16" hole for a spring roll pin. This pin when inserted through the coupling and the gear assembly shaft will lock the coupling and prevent unscrewing when the gear motor is reversed.

The other end of the coupling has a smooth 3/8" ID for coupling to a 3/8" shaft. This coupling end also has a 1/8" keyway to lock the coupling to the shaft. (See Woodruff Keys on page 7. See also Keystock on page 6).

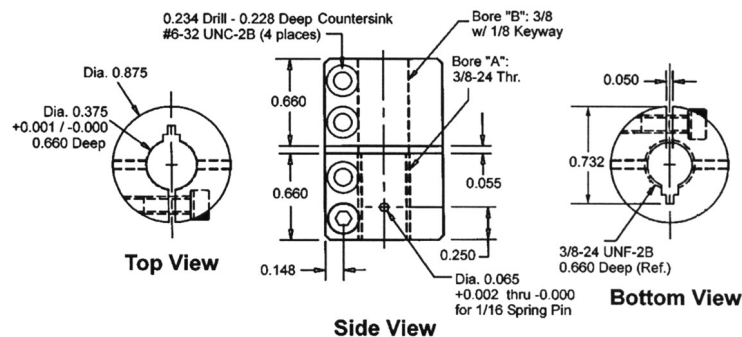
PART No.	DESCRIPTION	PRICE EACH
FIR-DC02*	One Coupling, Two Spring Pins & One Hex Key	25.00

***This item is exempt from SPARK**

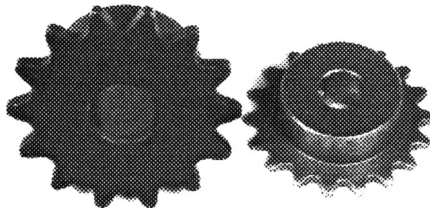


Drill Motor Coupling mounted on gear assembly

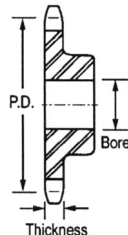
ALL DIMENSIONS IN INCHES



Sprockets — Single Hub



Maximum diameter of chain over sprocket = Sprocket PD + .234



Single hub stock bore Sprockets are made of free-machining, Low Carbon Steel. The 1/4" pitch No. 25 sizes have a one-piece construction. The No. 35 in smaller sizes Sprockets are one-piece; those with 28 or more teeth are of two-piece construction.

3/8" Pitch No. 35 — Low Carbon Steel

ALL DIMENSIONS IN INCHES

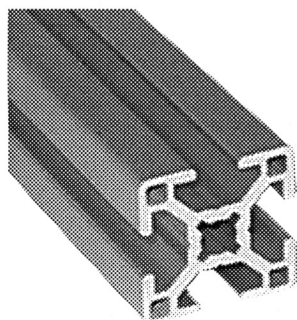
PART No.	TEETH	(PD) PITCH DIAMETER	BORE	HUB DIAMETER	LENGTH THROUGH BORE	PRICE
U-RCSS-3610F*	10	1.214	3/8	31/32	3/4	7.15
U-RCSS-3812F*	12	1.449	1/2	1-7/32	3/4	7.15
U-RCSS-3814F	14	1.685	1/2	1-1/4	3/4	7.70
U-RCSS-3816F	16	1.922	1/2	1-15/32	3/4	7.85
U-RCSS-3818F	18	2.160	1/2	1-23/32	3/4	8.65
U-RCSS-3820F	20	2.397	1/2	1-15/16	3/4	9.80
U-RCSS-3824F	24	2.873	1/2	2	7/8	13.40
U-RCSS-3828F	28	3.349	1/2	2	7/8	15.98
U-RCSS-3830F	30	3.588	1/2	2	7/8	17.65
U-RCSS-3832F	32	3.826	1/2	2	7/8	18.30
U-RCSS-31032F	32	3.826	5/8	2	7/8	24.75
U-RCSS-31036F	36	4.303	5/8	2-1/4	7/8	20.70
U-RCSS-31040F	40	4.780	5/8	2-1/4	1	20.15

* Recessed groove in hub for chain clearance.

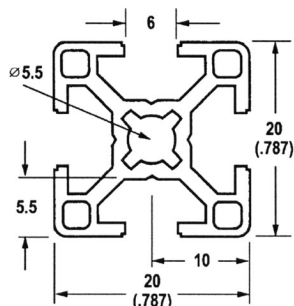
1/4" Pitch No. 25 — Low Carbon Steel

ALL DIMENSIONS IN INCHES

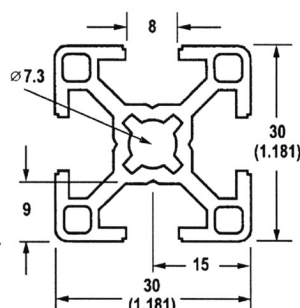
PART No.	TEETH	(PD) PITCH DIAMETER	BORE	HUB DIAMETER	LENGTH THROUGH BORE	PRICE
U-RCSS-2410F	10	0.809	1/4	1/2	1/2	6.47
U-RCSS-2412F	12	0.966	1/4	5/8	1/2	7.40
U-RCSS-2414F	14	1.123	1/4	13/16	1/2	8.70
U-RCSS-2416F	16	1.281	1/4	31/32	1/2	8.13
U-RCSS-2418F	18	1.440	1/4	1-1/8	1/2	9.53
U-RCSS-2618F	18	1.440	3/8	1-1/8	1/2	8.90
U-RCSS-2420F	20	1.598	1/4	1-9/32	1/2	10.51
U-RCSS-2620F	20	1.598	3/8	1-9/32	1/2	10.76
U-RCSS-2622F	22	1.757	3/8	1-7/16	5/8	14.38
U-RCSS-2624F	24	1.915	3/8	1-1/2	5/8	15.39



ALL DIMENSIONS IN MILLIMETERS



20x20 SERIES



30x30 SERIES

Structural Profiles

Why use Bosch aluminum structural framing for your robot rather than welded Steel or Aluminum?

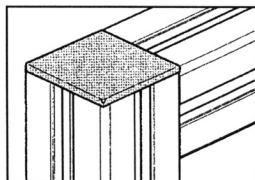
It's easier to work with. Cut to length, attach a gusset and tighten. It's that simple. No welding or grinding. Your frame goes together quickly and easily using a few simple hand tools. And when you're done, you have a strong, lightweight structure that is as functional as it is attractive.

Sold in one-meter lengths.

PART No.	SERIES	DESCRIPTION	PRICE PER METER*
BSF-20888	20x20	20-Series 6mm T-Slotted Profiles	7.50
BSF-30720	30x30	30-Series 8mm T-Slotted Profiles	9.85

* Length is nominal.

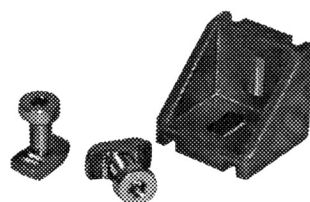
Two Meter Lengths available by Special Order. Additional handling and shipping charges apply.



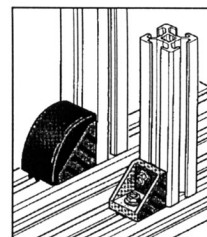
End Caps for Structural Profiles

End caps give your structure a clean, finished appearance. End caps are made of Black Polyamide 6 and require no tools for installation.

PART No.	SERIES	DESCRIPTION	PRICE EACH
BSF-20243	20x20	20-series Square End Cap	0.90
BSF-30232	30x30	30-series Square End Cap	1.00



20X20 M4 x 8 SHCS / 6mm M4 T-Nut
30X30 M6 x 14 SHCS / 8mm M6 T-Nut



Die-Cast Aluminum Gusset — Profile Connector

Die-cast aluminum gussets are used to connect profiles. Elongated holes allow gussets to be adjusted for position on the profile, while guide tabs assure proper alignments of gusset in profile's T-slot.

Gussets can be used anywhere along the profile's T-slot and because of the close tolerances on the gusset's edge a clean professional appearance can be achieved when profiles are connected.

The gusset's close tolerances on its edges provide a clean and tight professional appearance.

PART No.	SERIES	DESCRIPTION	PRICE EACH
BSF-20511	20x20	20-Series Gusset with fasteners	5.25
BSF-30528	30x30	30-Series Gusset with fasteners	4.95



Round Cover Caps for Gussets

Cover Cap material is Black Polyamide 6.

PART No.	SERIES	DESCRIPTION	PRICE EACH
BSF-20513	20x20	20-Series Gusset - Round Cover Cap	1.00
BSF-30534	30x30	30-Series Gusset - Round Cover Cap	1.00

Below is a list of the fasteners used with the BOSCH products listed in this Supplement. If you need additional fasteners, please call. There may be a charge for these products.

Gussets (page 4)

BSF-20997	20X20	M4 x 8 SHCS / 6mm M4 T-Nut
BSF-30997	30X30	M6 x 14 SHCS / 8mm M6 T-Nut

Inside-to-Outside & Inside-to-Inside (page 5)

BSF-20999	20X20	DIN 913 M5x5-45H Set Screw
BSF-20999	30X30	DIN 913 M6x8-45H Set Screw

Corner Brackets (5)

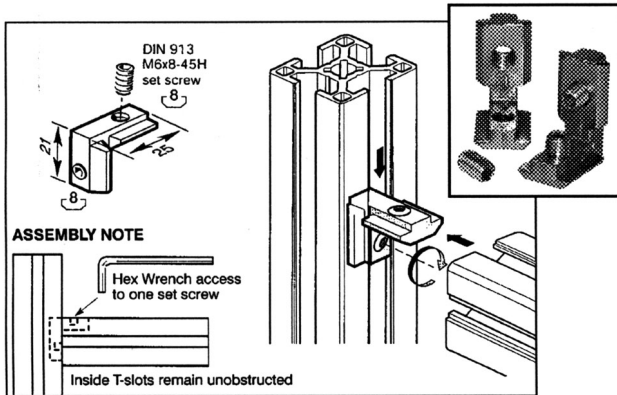
BSF-20998	20X20	S6x16 DIN 7516 Flat Head Screw
BSF-30543	30X30	S8x25 Flat Head Screw

Corner & T-Junction Joining Plates (6)

BSF-30071	30X30	DIN 9427 M6x12 Button Head Cap Screw
BSF-30753	30X30	M6, 8mm T-Nut

Inside-to-Outside and Inside-to-Inside Gussets

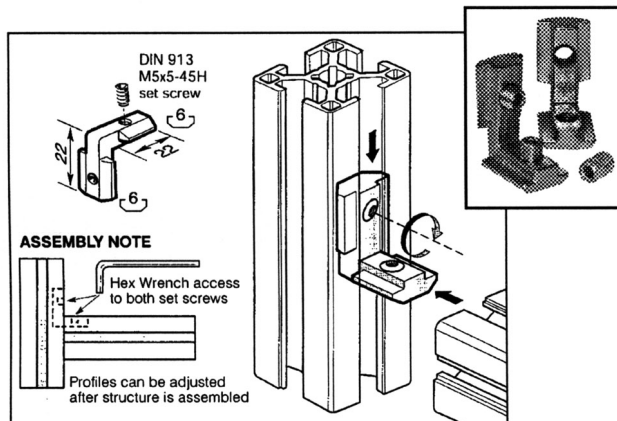
These die-cast brass gussets provide concealed right-angle connections.



INSIDE-TO-OUTSIDE GUSSETS

Inside-to-Outside Gussets are used where the inside T-slot must remain unobstructed.

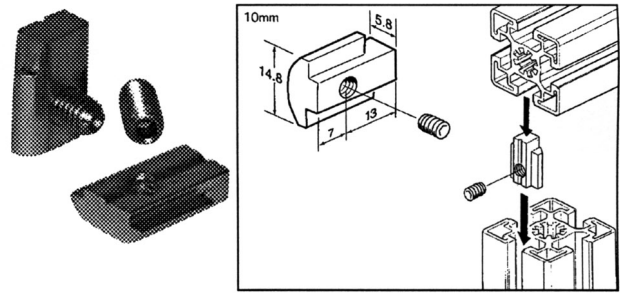
PART No.	SERIES	DESCRIPTION	PRICE EACH
BSF-20718	20×20	20-Series 6mm inside-to-outside . Includes metric Set Screws (10)	5.00
BSF-30334	30×30	30-Series 8mm inside-to-outside . Includes metric Set Screws (10)	5.00



INSIDE-TO-INSIDE GUSSETS

Inside-to-Inside Gussets allow adjustment of both fastening Set Screws when structure is assembled.

PART No.	SERIES	DESCRIPTION	PRICE EACH
BSF-20216	20×20	20-Series 6mm inside-to-inside . Includes metric Set Screws (10)	5.00
BSF-30256	30×30	30-Series 8mm inside-to-inside . Includes metric Set Screws (10)	5.00

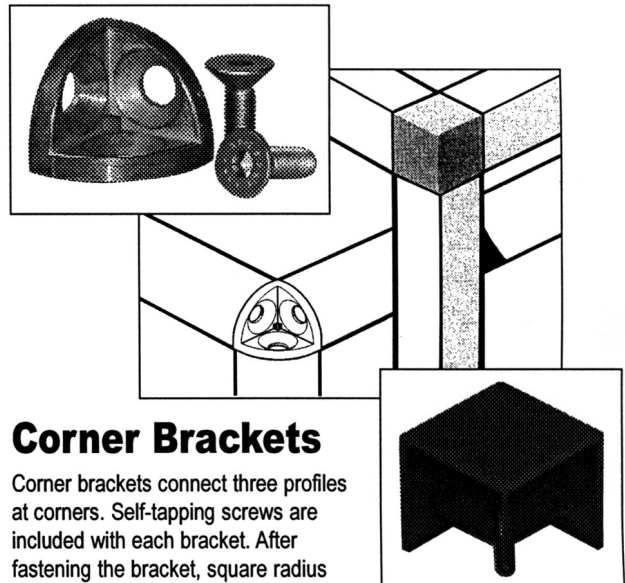


Anti-Rotation T-Block

The Anti-Rotation T-block is used to prevent rotation where twist moments are applied to profile T-joints. It swivels into the T-slot and when locked into place with a set screw, it will prevent rotation of the adjacent profile. Made of industrial grade and steel, zinc-plated.

Can only be used in 30-series 8mm T-Slotted Profiles BSF-30720

PART No.	SERIES	DESCRIPTION	PRICE EACH
BSF-30010	30×30	30-series 8mm Anti-Rotation T-Block	0.95



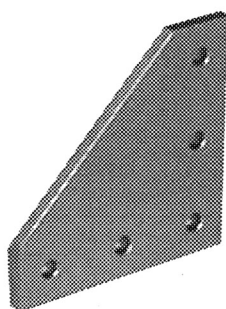
Corner Brackets

Corner brackets connect three profiles at corners. Self-tapping screws are included with each bracket. After fastening the bracket, square radius cover caps provide a neat finished appearance. Brackets are die-cast zinc.

Square Cover Cap

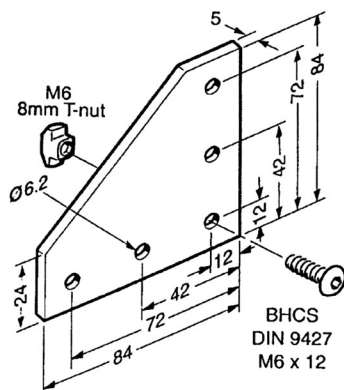
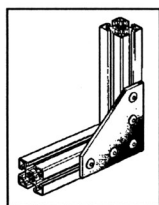
Square Cover Caps are Black Polyamide 6.

PART No.	SERIES	DESCRIPTION	PRICE EACH
BSF-20318	20×20	20mm Corner Bracket with fasteners	7.00
BSF-20147	20×20	20mm Square Cover Cap	1.00
BSF-20319	30×30	30mm Corner Bracket with fasteners	7.25
BSF-20282	30×30	30mm Square Cover Cap	1.00

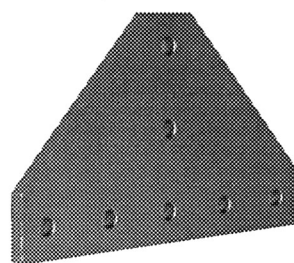


Corner Joining Plate

These joining plates fasten to the outside face of the profile and provide a strong 90° connection without interfering with the inside T-slot. Made of 6063-T6 clear anodized aluminum.

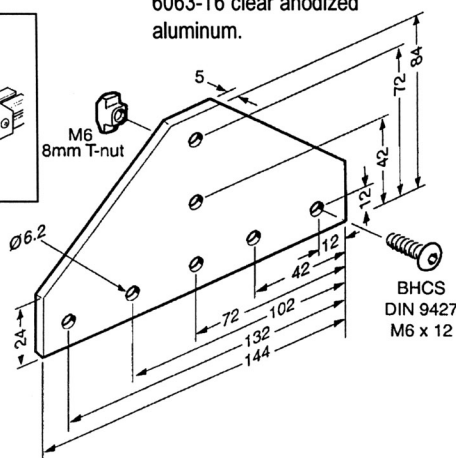
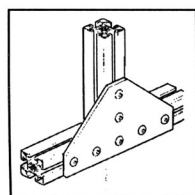


PART No.	SERIES	DESCRIPTION	PRICE EACH
BSF-30457	30x30	30-Series Corner Joining Plate, 5 BHCS Screws and 5 T-nuts	12.25



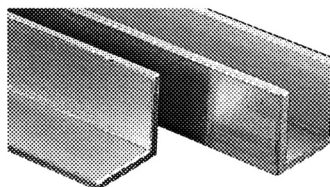
T-Junction Joining Plate

These joining plates fasten to the outside face of the profiles. They provide a strong and convenient method to connect profiles to form a T-connection without interfering with the inside T-slots. Made of 6063-T6 clear anodized aluminum.



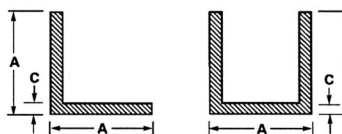
PART No.	SERIES	DESCRIPTION	PRICE EACH
BSF-30461	30x30	30-Series T-Junction Joining Plate, 7 BHCS Screws and 7 T-nuts	16.50

Aluminum Angles & Channels



Aluminum Angles and Channels offer the advantage of low weight, while providing strong structural support. Type 6063-T5 Aluminum has high workability and good finishing characteristics.

Square Aluminum Tubing available on page 114, Catalog 21.



ANGLES* — Type 6063-T5 ASTM-B221

ALL DIMENSIONS IN INCHES ORDER EXAMPLE: U-ARA2-16/16-12 is 1"x1"x1/8"x12"

PART No.	A	C	6"	12"	24"	36"	** 72"
U-ARA2-8/8	1/2	1/8	1.14	1.82	2.91	3.47	4.20
U-ARA2-16/16	1	1/8	1.79	2.86	4.58	5.45	7.63
U-ARA2-20/20	1-1/4	1/8	2.66	4.23	6.77	7.62	10.16
U-ARA2-24/24	1-1/2	1/8	3.11	4.94	7.90	8.89	11.85
U-ARA3-16/16	1	3/16	2.50	4.00	6.41	7.62	11.16
U-ARA3-32/32	2	3/16	5.01	8.01	12.81	15.25	19.56
U-ARA4-24/24	1-1/2	1/4	3.64	5.82	9.32	11.09	21.01
U-ARA4-32/32	2	1/4	6.44	10.30	16.47	19.60	22.80

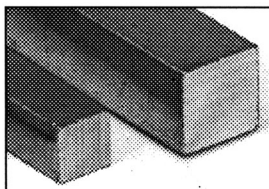
CHANNELS* — Type 6063-T5 ASTM-B221

ALL DIMENSIONS IN INCHES DIMENSIONS PRICE

PART No.	A	B	C	12"	24"	36"	** 72"
U-ARC2-12/12	3/4	3/4	1/8	2.65	4.24	4.76	6.35
U-ARC2-16/16	1	1	1/8	3.70	5.93	6.67	8.89

** Special packaging charge for 72" length.

Square Keystock



Measure, cut, and file Keystock to precise dimensions, using your choice of Oversized or Undersized tolerances. Keystock provides coupling and torque transmission between shafts, pulleys, gears, sprockets, and other rotating power devices. Oversize assures tight fit

in keyways for positive, zero-backlash power transmission. Undersize allows closer or undersized dimension tolerances. Zinc Plated Steel is available with both Oversized and Undersized tolerances.

Other sizes available. See our full line Catalog 21, Page 96

STEEL, ZINC PLATED — Oversized AISI C-1018

PART No.	DIMENSION	TOLERANCE	12" LENGTH
U-KSS-1250	1/8"	+0.003 / -0.000"	0.85

STEEL, ZINC PLATED — Undersized AISI C-1018

PART No.	DIMENSION	TOLERANCE	12" LENGTH
U-KSU-1250	1/8"	+0.001 / -0.002"	0.95

Woodruff Key

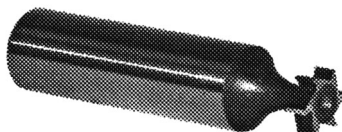


Woodruff Keys or Half-moon Keys fit into keyways and become firmly embedded. Because of their half-moon design they can rock in their seat and adjust to basically any angle. Made of plain steel.

1/8" x 3/8" American Standard 403.

PART No.		PRICE	
		25	100
WK-02	3.00	6.00	12.35

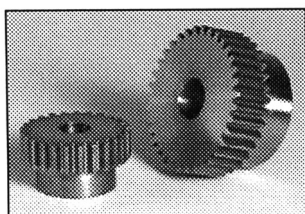
Woodruff Keyseat Cutter



High Speed Steel Straight-tooth. 3/8" x 1/8" .

PART No.	PRICE EACH
WKC-02	15.75

Spur Gears — Steel



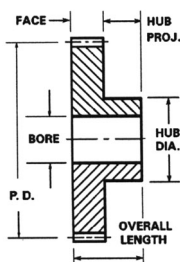
Spur Gears transmit motion and power between parallel shafts.

For higher load carrying capacity, see 20° Pressure Angle Gears on page 391, Catalog 21.

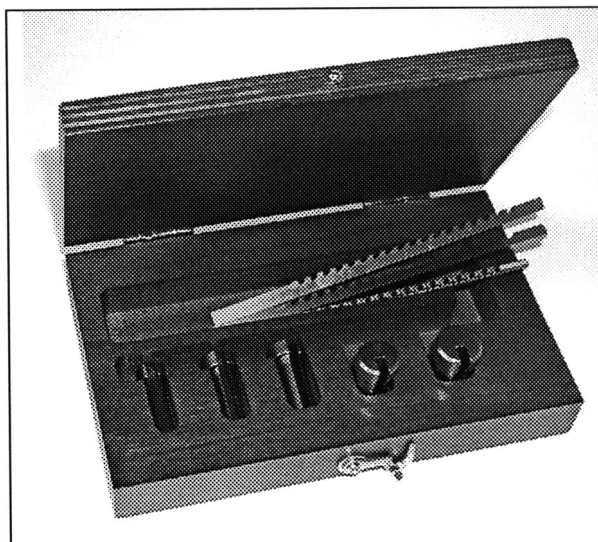
Face Width: 0.500

Outside Diameter: Pitch Dia. + 0.100

Overall Length: 0.500 + Hub Projection



Broach Set — Keyway



Minute Man® Keyway Broach Set keep broaches, slotted bushings, and necessary shims organized and ready to go for short-run production or general maintenance. U-KBS-08 is our Precision Set, with three broaches and five bushings to provide fifteen of the most common keyway combinations for small keyways and bores. Designated by a letter that signifies width of keyway broach and bushing opening. For proper fit, use bushings with the same letter designation as the broach. Furnished in a handsome varnished wood box.

©duMont Corporation

KEYWAY BROACH SET

ALL DIMENSIONS IN INCHES

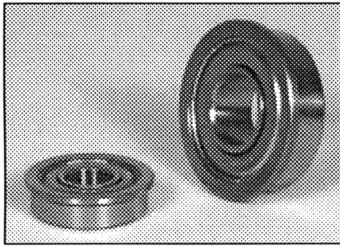
PART No.	STYLE	KEYWAY SIZES	BUSHING DIAMETER	PRICE EACH
U-KBS-08	A	1/16, 3/32, 1/8	1/4, 5/16, 3/8, 7/16, 1/2	139.00

20 Pitch — 1/4-1/2° Pressure Angle

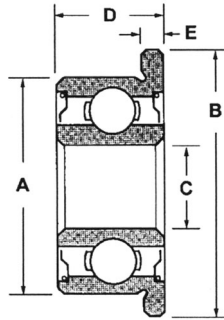
ALL DIMENSIONS IN INCHES

PART No.	TEETH	(PD)		BORE	HUB DIAMETER	HUB PROJECTION	PRICE	
		PITCH DIA.					3-9	10+
U-GSS-1412	12	0.600	0.313	0.46	0.38	6.80	6.12	5.51
U-GSS-1414	14	0.700	0.313	0.56	0.38	8.41	7.57	6.81
U-GSS-1415	15	0.750	0.375	0.60	0.38	8.82	7.94	7.14
U-GSS-1416	16	0.800	0.375	0.66	0.38	8.50	7.65	6.89
U-GSS-1418	18	0.900	0.375	0.74	0.35	9.70	8.73	7.86
U-GSS-1420	20	1.000	0.375	0.84	0.38	10.25	9.23	8.30
U-GSS-1424	24	1.200	0.375	0.92	0.38	11.40	10.26	9.23
U-GSS-1425	25	1.250	0.375	0.97	0.38	12.58	11.30	10.17
U-GSS-1430	30	1.500	0.375	1.22	0.38	13.46	12.11	10.90
U-GSS-1432	32	1.600	0.375	1.32	0.50	14.75	13.28	11.95
U-GSS-1435	35	1.750	0.375	1.47	0.50	17.78	16.00	14.40
U-GSS-1440	40	2.000	0.375	1.72	0.50	18.79	16.91	15.22
U-GSS-1445	48	2.400	0.375	1.33	0.50	22.93	20.64	18.57
U-GSS-1450	50	2.500	0.375	1.42	0.50	24.80	22.32	20.09
U-GSS-1460	60	3.000	0.375	1.92	0.50	26.93	24.24	21.81
U-GSS-1470	70	3.500	0.375	1.25	0.50	29.11	26.20	23.58

Radial Flanged Shielded Bearings — Steel



Flanged bearings help overcome the mounting problems experienced with standard bearings. Made of SAE 52100 Chrome Steel for strength and corrosion resistance.



Flanged Bearings — Steel

ALL DIMENSIONS IN INCHES

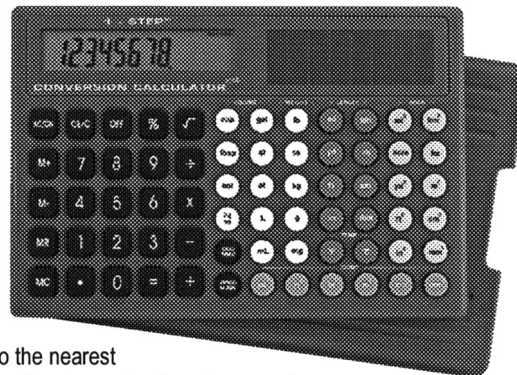
PART NO.	A	B	C	TOLERANCE	D	E	LOAD RATING		PRICE	10
							DYN.	STATIC	EACH	
BRF-01	0.1562	0.2030	0.0469	+0/-0.0003	0.0937	0.031	37	11	10.97	87.78
BRF-02	0.3750	0.4400	0.1250	+0/-0.0003	0.1562	0.030	146	51	4.68	37.40
BRF-03	0.5000	0.5650	0.1875	+0/-0.0003	0.1960	0.042	295	110	4.68	37.40
BRF-04	0.6250	0.6900	0.2500	+0/-0.0003	0.1960	0.042	331	134	4.40	35.20
BRF-06	0.8750	0.9690	0.3750	+0/-0.0003	0.2812	0.062	743	309	4.68	37.40
BRF-08	1.1250	1.2252	0.5000	+0/-0.0004	0.3125	0.062	885	505	4.95	39.60

Conversion Calculator Plus™

Instant conversions of U.S. and Metric units

Enter the known quantity and unit of measurement to be converted, then press the key with the measurement you need.

Quickly find metric or U.S. equivalents for temperature, weight, length, area, volume, and cubic measures. Or switch from decimals to fractions — displays in fraction format to the nearest 1/64". Powerful enough to meet the everyday demands of engineers and scientists, the Conversion Calculator Plus™ is widely used by educators, students, travelers, architects, and by professionals in many industries.



Just press a few keys to convert U.S. to Metric or vice versa!

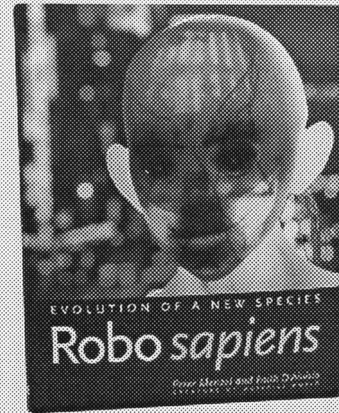
Ounces and pounds to milligrams, grams, and kilograms / Liquids ounces, pints, quarts, and gallons to milliliters and liters / Inches, feet, yards, and miles to millimeters, meters, and kilometers / Acres and square miles, yards, feet, and inches to hectares and square kilometers, meters, centimeters, and millimeters / Cubic yards, feet, and inches to cubic meters, centimeters, and millimeters / Degrees Fahrenheit to degrees Celsius

Also functions as a standard calculator. Solar or battery operation. The finger-friendly, color-coded keyboard quickly identifies units of measure, and the 3/8" LCD display is easy to see. Fitted with a sliding cover to help keep the unit clean during storage or field use. Two 1.55-Volt (44, 76, 357 Series) batteries included. Size: 5-1/2" x 3-3/4" x 3/4"

U-MCAL-100* Calculator39.50

U-BAT-0044 Replacement Battery3.50

* This item is exempt from SPARK



Robo sapiens

EVOLUTION OF A NEW SPECIES

Will they be our partners or our rivals?

Is the merger of human and machine inevitable? Is it true that a whole new order of creation is about to come into existence? Robotic technology is already very advanced. What will happen when the human-likeness of machines turns science fiction into scientific fact? Will humans find it natural to interact intimately with robotic inventions of our intellect?

In this "field guide to our mechanical future", award winning journalists Peter Menzel and Faith D'Aluisio explore the high-stakes race to build ever more intelligent, fully autonomous robots. This synopsis of current development in the robotics field introduces the next generation of intelligent robots and their makers, revealing the complexities of creating smart machines that act like living creatures.

More than a hundred brilliant photographs, extensive interviews with robotics pioneers, anecdotal field notes with behind-the-scenes information, and easy-to-understand technical data about the machines. © 2000 by The MIT Press. Hardcover, 240 pages. 9" x 11".

BCK-32* Robo sapiens 29.95

* This item is exempt from SPARK

THE 2001 FIRST ROBOTICS COMPETITION MANUAL

APPENDIX E: KEE KLAMP ORDERING INFORMATION

PURCHASE ORDER FORM – FIRST Competitors – SPECIAL PRICING

Kee Industrial Products, Inc
100 Stradtman Street, Buffalo, NY 14206 Fax: (716) 896-5696

Kee Klamp® Pipe Fittings

Team #		Corporate Sponsor:							
Phone:		Fax:		Ship To Address:					
PAYMENT METHOD: Master Card / Visa (CIRCLE ONE)				City:		State		Zip	
CARD NO.		Exp. Date		Attn:					
Card Holder Name:				Phone :					
Signature:				SHIPPING METHOD:					
PLEASE FAX COMPLETED FORM TO (716) 896-5696				RPS/UPS Ground		UPS Next Day		Two Day	

Any questions, please call (800) 851-5181

PLEASE NOTE—NO RETURNS OR REFUNDS

Description		NET	
Kee Klamp Goal	All Kee Klamp Fittings Required for one Goal	<u>\$177.12</u>	
Bill of Materials	Note: Please specify Quantity (2 goals per playing field)		
Kee Klamp Goal Structure (1 goal)			
KK 61-7	Kee Klamp Flange	8	5.62
KK 70-7	Kee Klamp Rail Support	4	6.72
Kee Klamp Bridge			
KK 70-7	Kee Klamp Rail Support	8	6.72
Medic			
KK 70-7	Kee Klamp Rail Support	4	6.72
KK 15-7	Kee Klamp Elbow	4	6.16

Description		NET	
Kee Klamp Barrier	All Kee Klamp Fittings Required for the complete Border and Driver Stations	<u>\$820.56</u>	
Bill of Materials			
Kee Klamp Fitting			
KK 10-7	Kee Klamp Tee	8	5.04
KK 14-7	Kee Klamp Straight Coupling	4	6.16
KK 15-7	Kee Klamp Elbow	4	13.82
KK 26-7	Kee Klamp Two Socket Cross	8	10.09
KK C50-77	Kee Klamp Single Socket Swivel	6	8.66
KK C58-7	Kee Klamp Swivel Flange	6	9.45
KK 61-7	Kee Klamp Flange	6	5.62
KK 70-7	Kee Klamp Rail Support	36	6.72
KK 77-7	Kee Klamp Plastic Plug	6	.91
KK 61-7	Kee Klamp Flange	20	5.62
KK 26-7	Kee Klamp Two Socket Cross	8	6.86
KK 77-7	Kee Klamp Plastic Plug	8	.91
KK 19-7	Kee Klamp Adj. Side Outlet Tee	4	13.82

Effective: January 1, 2001 Terms: Only Master Card/Visa Accepted F.O.B. Buffalo, NY Warehouse

* SPECIAL PRICING FOR FIRST ROBOTICS COMPETITION ONLY

ALL ORDERS MUST BE TAGGED OR IDENTIFIED AS: "FIRST COMPETITION"

APPENDIX F: PROBLEM REPORT FORM

PROBLEM REPORT PROCEDURE

On occasion, your team may experience difficulty with a part supplied by FIRST. If you do, please follow these procedures:

- 1. Try to solve the problem yourself.**
(Refer to the ROBOT section of the manual referring to the Policy on Repair and Replacement of Kit Parts.)
- 2. Contact our engineers or Innovation First, as appropriate.**
(They may be able to give advice and save you shipping costs, time, and money.) If the part is supported by FIRST, then follow steps 3-5 below.
If the part is supported by Innovation First, visit their First web site at www.innovationfirst.com/firstrobotics/ for instructions on returning the part.
- 3. Fill out the Problem Report Form completely:**
 - Team Number
 - Reported Defect (Explain the problem fully)
 - Name
 - Date Sent
 - Phone Number (Where we can reach you during the day)
 - Special Attention (Any special handling, timing, etc.)
- 4. Carefully package the item(s) and enclose the filled out Problem Report Form.**
- 5. Label the package and send it to:**

FIRST
Attn: FRC Part Return
200 Bedford Street
Manchester, NH 03101

We have a one-business day turnaround policy on replacement, and we try very hard to send a replacement item within one day after we receive the non-functional unit.

PROBLEM REPORT FORM

Team Number: _____

Program: FIRST Robotics Competition

Reported Defect(s) (You may use a separate sheet to explain):

Date: _____

Name: _____

Daytime Phone Number: _____

Special Attention:

APPENDIX G -SUPPLIER CONTACT INFORMATION

AMP Foundation Mary Rakoczy P.O. Box 3608 Harrisburg, PA 17105-3608 Phone: 717-592-4869 Fax: 717-592-3043	Associated Spring Raymond Customer Service P.O. Box 586 1705 Indianwood Circle Maumee, OH 43537-0586 Phone: 1-800-458-0867
Autodesk, Inc. Kelly Stanphill 111 McInnis Parkway San Rafael, CA 94903 Phone: 415-507-6562 Fax: 415-507-6107	Brevan Electronics Mr. Stewart Schuster 6 Continental Blvd. Merrimack, NH 03054 Phone: 603-429-1900 Fax: 603-429-1001
CH Products 970 Park Center Drive Vista, CA 92083 Phone: 760-598-2518 Fax: 760-598-2524 Web: www.chproducts.com	CP Clare Corporation For reed switches contact: Newark Electronics 59 Composite Way Lowell, MA 01851 Phone: 800-463-9275 Web: www.newark.com
EBM Industries, Inc. 100 Hyde Road Farmington, CT 06034 Phone: 860-674-1515 Fax: 860-674-8536 Email: sales@ebm.com Web: www.ebm.com	Exide Corporation Marilyn Ragland 13000 Deerfield Parkway Bldg 200 Alpharetta, GA 30004 Phone: 678-566-9137 E-mail: mragland@gnb.com
Fluid Power Distribution Association Fax: 954-429-9515 Backup Fax: 954-429-0858 E-mail: first@hpeco.com	Fisher Price Motor and Gearbox purchase from any authorized Power Wheels Service Center. P/N - Mabuchi RS550PF-6534 Gearbox # 7
Hitec RCD Servos 12115 Paine St. Poway CA 92064 Phone: 858-748-6948 Web: www.hitecrd.com	Innovation First, Inc. 8910 F. Wesley St. Greenville, TX 75401 Phone: 903-454-1978 Web: www.innovationfirst.com/firstrobotics/ NO PHONE ORDERS WILL BE TAKEN
Kee Industrial Products/Green Sales Co. P.O. Box 6186 Nashua, NH 03063-6186 Phone: 800-851-5181 Fax: 603-880-0962 Web: www.keeklamp.com	McMaster-Carr Supply Co. 473 Ridge Rd. P.O. Box 317 Dayton, NJ 08810 Phone: 732-329-3200 Fax: 732-329-3772 Web: www.mcmaster.com

THE 2001 FIRST ROBOTICS COMPETITION MANUAL

<p>Parallax, Inc. 3805 Atherton Road Suite 102 Rocklin, CA 957657 Phone: 888-512-1024 Fax: 916-624-8003 Web: www.parallaxinc.com</p>	<p>S-B Power Tool Company 121 Corporate Blvd South Plainfield, NJ 07080 Phone: 908-769-8208</p>
<p>SERPAC 619 Commercial Ave. Covina, CA 91723 Phone: 626-331-0517 Fax: 626-331-8584</p>	<p>SMALL PARTS, INC. 13980 NW 58th Court Miami Lakes, FL 33014 Phone: 305-820-9371 Fax: 800-423-9009 Web: www.smallparts.com</p>
<p>Skyway Recreation Products Mr. Bart Weems 4451 Caterpillar Road Redding, CA 96003 Phone: 800-332-3357 Fax: 530-243-5104 Email: sales@skywaywheels.com Web: www.skywaytuffwheels.com</p>	<p>Sport Fun, Inc. Mr. Dave Jackson 4621 Sperry Street P.O. Box 39150 Los Angeles, CA 90039-0150 Phone: 800-423-2597 Web: www.sportfun.com USE FAX ORDER FORM ONLY</p>
<p>S.S. Mills, Inc. P.O. Box 1568 Customer Service Dalton, GA 30722 Phone: 800-241-4013 Fax: 706-277-3677</p>	<p>Thomas & Betts Electrical Components Division 8155 T & B Blvd. Memphis, TN 38125 Phone: 901-682-8221 or 800-888-0211 Fax: 800-888-0790</p>
<p>Torrington Bearings For additional bearings call Motion Industries, Inc. P.O. Box 1097 Earth City, MO 63043-0097 Phone: 314-770-2600 Fax: 314-770-2272</p>	<p>Tyton Hellermann 7930 N. Faulkner Rd. P.O. Box 245017 Milwaukee, WI 53224 Phone: 800-537-1512 or 414-355-1130 Fax: 800-848-9866 or 414-355-7341 Email: ksweet@tytonhellermann.com Web: www.tytonhellermann.com</p>
<p>Velcro USA, Inc. 406 Brown Avenue #1 P.O. Box 5218 Manchester, NH 03103 Phone: 603-669-4892 Fax: 603-669-8991</p>	<p>Xenotronix 1031 Miller Drive Altamonte Springs, FL 32701 1-800-624-9366 P/N HPX – 60-1</p>