

SUN service bulletin

CARTRIDGE SERVICE INSTRUCTIONS

SUN CARTRIDGES ARE BASIC SERVICE ITEMS IN THEMSELVES. THEY ARE EASILY REMOVED FROM THEIR MOUNTING FOR CLEANING OR REPLACEMENT, BUT ARE NOT DESIGNED TO BE DISASSEMBLED IN THE FIELD.

IT IS NEVER NECESSARY TO REMOVE AN ENTIRE SUN VALVE FROM THE CIRCUIT PIPING OR SOLENOID VALVE STACK. SIMPLY UNSCREW THE SUN CARTRIDGE FROM ITS BODY FOR TROUBLE SHOOTING (BELOW) OR REPLACEMENT.

If, for any reason, a **SUN** cartridge valve does not perform as required, the trouble-shooting steps given below may be taken. Following this, if the cartridge still does not function, it should be replaced with a new factory-tested **SUN** cartridge.

The non-functioning cartridge may be returned to **SUN** through your local **SUN** distributor for evaluation if desired. A full report of our findings will be issued upon request.

SERVICE KITS

Service kits are available for replacement of external seals and for most removable control parts. Charts (inside) show complete details.

FACTORY REPAIR

SUN HYDRAULICS will repair or replace any standard cartridge of its manufacture at a cost of 60% of current list price, fob factory.

TROUBLE SHOOTING

THE MOST COMMON CAUSE OF A SUN CARTRIDGE FAILING TO OPERATE IS DIRT IN THE HYDRAULIC FLUID – dirt which lodges in the working parts and interferes with their operation.

MOST SUN CARTRIDGES CAN BE CLEANED WITHOUT ALTERING THEIR SETTINGS.

To check and clean a cartridge which is not functioning:

- 1) Remove the cartridge from the cavity.
- 2) Inspect for visible contaminants and carefully remove obvious particles.
- 3) Through the nose of the cartridge, manually operate the inner working parts several times. Use a piece of plastic tubing to avoid damaging soft seats, sharp edges, finished surfaces or the screen protecting the pilot orifice. All parts should move freely. If possible, do this with the cartridge submerged in clean mineral spirits.
- 4) After "flushing", blow dry with clean filtered air.
- 5) Replace seals if indicated, using the appropriate **SUN** service kit.
- 6) Dip the cartridge in clean hydraulic oil, then reinstall the cartridge, tighten to specified torque and retest.
- 7) If this procedure does not eliminate the problem, replace with a new factory-tested **SUN** cartridge.

INSTALLATION TORQUE VALUES

WHEN INSTALLING SUN CARTRIDGES, BE SURE TO TORQUE TO THE VALUES SHOWN.

SERIES 1	SERIES 2	SERIES 3	SERIES 4
30 to 35 LB./FT. 40 to 50 Nm	45 to 50 LB./FT. 60 to 65 Nm	150 to 160 LB./FT. 200 to 215 Nm	350 to 375 LB./FT. 465 to 500 Nm
For cartridges with 7/8" hex (22,2 mm) M20 Thread	For cartridges with 1-1/8" hex (28,6 mm) 1"-14 UNS Thread	For cartridges with 1-1/4" hex (31,8 mm) M36 Thread	For cartridges with 1-5/8" hex (41,0 mm) M48 Thread
Cavities T-10A, T-11A T-13A, T-21A T-31A	Cavities T-2A, T-3A T-5A, T-22A T-32A	Cavities T-16A, T-17A T-23A, T-33A	Cavities T-18A, T-19A T-24A, T-34A

CARTRIDGE SEAL KITS

SUN

During 1985, SUN made a running change of all external seals on Series 2 Cartridges [1 1/8" (28,6mm) hex, 1"-14 thread]. The seals were changed FROM 3/32" (2,62mm) cross-section TO 1/16" (1,78mm) cross-section O-rings and back-up rings. All Series 2 service kits now contain a full set of seals and back-ups of both sizes.

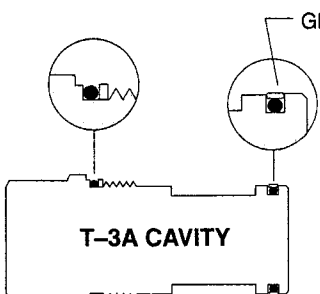
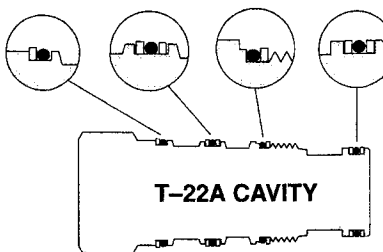
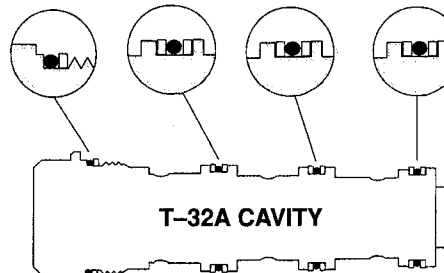
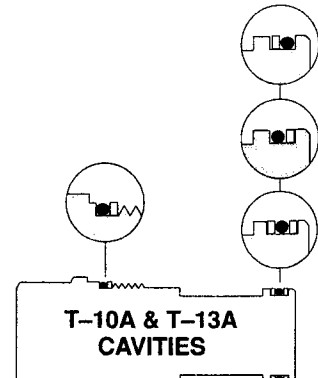
When replacing spiral back-up rings, take special care that the **SPIRAL IS WOUND LIKE A LEFT-HAND THREAD**, so that the back-up ring will follow the cartridge into the cavity properly when being assembled.

When installing continuous back-up rings, use the same technique and the same care used to install O-rings.

SEAL KIT NUMBER DESCRIPTION	PRICE	CARTRIDGE MODELS	DESCRIPTION
990-002-006 (VITON) 990-002-007 (BUNA-N) SERIES 2 Cartridges 1 1/8" hex (28,6mm) 1"-14 thread T-2A CAVITY	\$2.40	For all Series 2 3-Port Cartridges	3/32" (2,62 mm) CROSS-SECTION SEALS SPECIAL CROSS-SECTION NOTE PROPER ORIENTATION 3/32" Nominal (2,62mm)
	\$.60	CAEA CAEG CAEK CAEL CBDA CBDC CBDG CBDH CBEA CBEC CBED CBEF CBEG CBEH CBEI CBEW CBey CCEA CKEA CKEB CKEC CKED CKEE CKEF CKEG CKEH CKEI CKEV CNEE COFA* COFB* COFC* CXEE CXFC DPCA DPCB DPCC DPCD FAFA FBFA FRDA LKFA LKFB LKFC LKFD LOFA LOFB LOFC LOFD LOFO LPFA* LPFC* LRFA LRFC PBFA* PBFb* PBFc* PPFA* PPFB* PPFC* PPFD* PPFE* RPGA RSFC RSFE RSFF RVEA RVEB RVEC SCEA SCFA SQFB XBAA XBCA XBOA	990-102-006 VITON SEALS 1) 500-101-118 1) 500-102-117 1) 500-102-115 990-102-007 BUNA-N SEALS 1) 500-001-118 1) 500-002-117 1) 500-002-115 BACK-UP RINGS (supplied with above) 1) 525-002-118 1) 550-004-002 1) 525-002-115
		* Install nose end back-up and seal in reverse order. See balloon cross-section for details.	1/16" (1,78 mm) CROSS-SECTION SEALS 1/16" Nominal (2,62mm)
USE THE KIT WHICH CONTAINS THE SAME SIZE (CROSS SECTION) SEALS AS THOSE USED ON THE CARTRIDGE BEING REPAIRED. DO NOT CHANGE O-RING CROSS SECTION SIZES. COMPLETE SETS OF BOTH SIZES OF SEALS AND BACK-UP RINGS ARE INCLUDED.			
990-003-006 (VITON) 990-003-007 (BUNA-N) SERIES 2 Cartridges 1 1/8" hex (28,6mm) 1"-14 thread T-3A & T-5A CAVITIES	\$1.60	For all Series 2 2-Port Cartridges (except model RDFA)	3/32" (2,62 mm) CROSS-SECTION SEALS SPECIAL CROSS-SECTION NOTE PROPER ORIENTATION 3/32" Nominal (2,62mm)
	\$.40	T-3A CNFB* CXFB* CXFD* CXFF* NKEA NQEB NQED RBAA RBAB RGFA RRGB RPGC RPGD RPGE RQGB RZEA XCCA XCOA T-5A CNEC CNFA* CNFC* CXEB CXEC CXED CXFA* FCAB FCDB FDCB FQEA FXDA NBFA NCEA NCEB NCEC NFDB NFDC NKEB XDCA	990-103-006 VITON SEALS 1) 500-102-117 1) 500-102-115 990-103-007 BUNA-N SEALS 1) 500-001-117 1) 500-002-115 BACK-UP RINGS (supplied with above) 1) 550-004-002 1) 525-002-115 1) 550-004-002 1) 525-002-115
		* Install nose end back-up and seal in reverse order. See balloon cross-section for details.	1/16" (1,78 mm) CROSS-SECTION SEALS 1/16" Nominal (2,62mm)
USE THE KIT WHICH CONTAINS THE SAME SIZE (CROSS SECTION) SEALS AS THOSE USED ON THE CARTRIDGE BEING REPAIRED. DO NOT CHANGE O-RING CROSS SECTION SIZES. COMPLETE SETS OF BOTH SIZES OF SEALS AND BACK-UP RINGS ARE INCLUDED.			

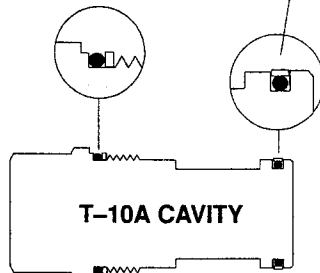
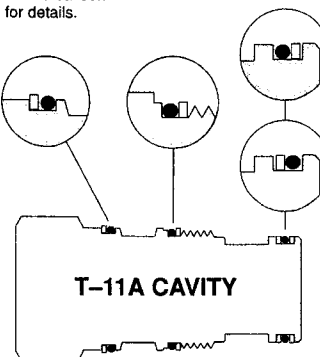
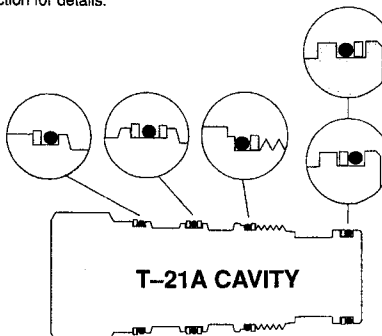
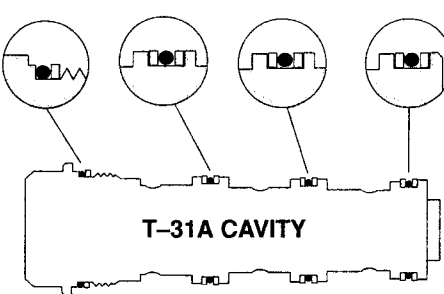
CARTRIDGE SEAL KITS

SUN

SEAL KIT NUMBER DESCRIPTION	PRICE	CARTRIDGE MODELS	DESCRIPTION
990-303-006 (VITON) 990-303-007 (BUNA-N) SERIES 2 Cartridges 1 1/8" hex (28,6mm) 1"-14 thread	\$4.60 \$3.40	For Series 2 2-Port Cartridge RDFA only	 GLYD® Ring T-3A CAVITY 990-303-006 VITON SEALS 1) 500-102-020 1) 500-101-017 990-303-007 BUNA-N SEALS 1) 500-002-020 1) 500-001-017 BACK-UP RINGS (Supplied with above) 1) 515-002-020 1) 530-102-018 GLYD® Ring
990-022-006 (VITON) 990-022-007 (BUNA-N) SERIES 2 Cartridges 1 1/8" hex (28,6mm) 1"-14 thread	\$3.20 \$.80	For all Series 2 4-Port Cartridges (except FLOW DIVIDERS) CVEV CWEA CWEG CWEK CWEL DPCM DPCN DPCO DPCP FVDA PVFA PVFB RVED XNCA XNOA	 T-22A CAVITY 990-022-006 VITON SEALS 2) 500-101-021 1) 500-102-020 1) 500-101-018 990-022-007 BUNA-N SEALS 2) 500-001-021 1) 500-002-020 1) 500-002-018 BACK-UP RINGS (Supplied with above) 3) 515-002-021 1) 515-002-020 2) 515-002-018
990-032-006 (VITON) 990-032-007 (BUNA-N) SERIES 2 Cartridges 1 1/8" hex (28,6mm) 1"-14 thread	\$3.20 \$.80	For Series 2 4-Port FLOW DIVIDER CARTRIDGES DSEH FSDA FSDD FSDH FSDS LHFA XSCA	 T-32A CAVITY 990-032-006 VITON SEALS 1) 500-102-020 1) 500-101-018 2) 500-101-017 990-032-007 BUNA-N SEALS 1) 500-002-020 1) 500-001-018 2) 500-001-017 BACK-UP RINGS (supplied with above) 1) 515-002-020 2) 515-002-018 4) 515-002-017
990-010-006 (VITON) 990-010-007 (BUNA-N) SERIES 1 Cartridges 7/8" hex (22,2 mm) M20 thread	\$1.00 \$.40	For all Series 1 2-Port Cartridges (except model RDDA) T-10A CNDDB CXDB CXDF RBAC RBAT RPEC RPEE RPET RQEB XFCA XFOA T-13A CDAC CNCC CNDC CSAA CSAC CXCB CXCD CXDA FCCB FDBA FQCA FXCA NCCA NCCB NCCC NFCB NFCC NKCB RDDB SCCB SCDB XGCA	 T-10A & T-13A CAVITIES ALL MODELS (except) CNDDB CXDB CXDF CNDC CXDA NFFC 990-010-006 VITON SEALS 1) 500-102-017 1) 500-102-015 990-010-007 BUNA-N SEALS 1) 500-002-017 1) 500-002-015 BACK-UP RINGS (supplied with above) 1) 515-002-016 2) 515-002-015

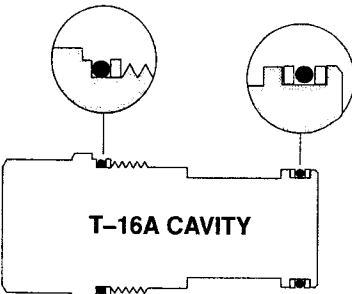
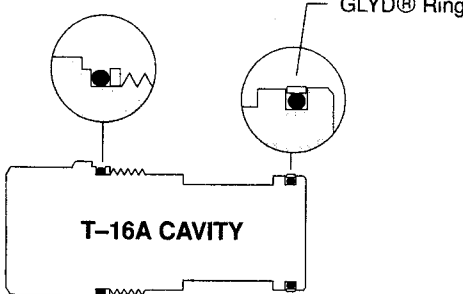
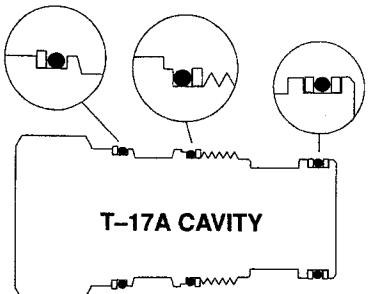
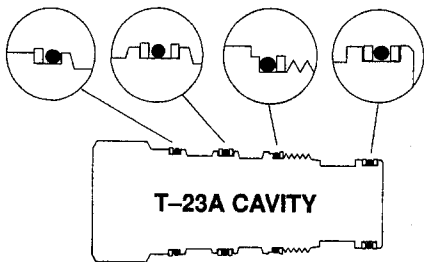
CARTRIDGE SEAL KITS

SUN

SEAL KIT NUMBER DESCRIPTION	PRICE	CARTRIDGE MODELS	DESCRIPTION
990-310-006 (VITON) 990-310-007 (BUNA-N) SERIES 1 Cartridges 7/8" hex (22,2 mm) M20 thread	\$4.00 \$3.40	For Series 1 2-Port Cartridge RDDA only	 GLYD® Ring T-10A CAVITY 990-310-006 VITON SEALS 1) 500-102-017 1) 500-101-014 990-310-007 BUNA-N SEALS 1) 500-002-017 1) 500-001-014 BACK-UP RINGS (Supplied with above) 1) 515-002-016 1) 530-102-015 GLYD® Ring
990-011-006 (VITON) 990-011-007 (BUNA-N) SERIES 1 Cartridges 7/8" hex (22,2 mm) M20 thread	\$1.50 \$.60	For all Series 1 3-Port Cartridges CACA CACG CACK CACL CBBA CBBG CBBH CBCA CBCG CBCH CBCY CCCA CDAB CDAD CKCA CKCB CKCC CKCD CKCE CKCF CKCG CKCH CKCI CKCL CKCV CNCD CNCE CNDE CODA* CODB* CODC* CODD* CSAB CSAD CXCE CXDC DPBA DPBB DPBC DPBD FADA FBDA FRCA LKDA LKDB LKDC LKDD LODA LODB LODC LODD LODO LPDA* LPDC* LRCC LRDA LRDC PBDB* PPDB* RBAD RSDC RVCA RVCB SCCA SCDA SQDB XECA XEOA	* Install nose end back-up and seal in reverse order. See balloon cross-section for details.  T-11A CAVITY 990-011-006 VITON SEALS 2) 500-102-017 1) 500-102-015 990-011-007 BUNA-N SEALS 2) 500-002-017 1) 500-002-015 BACK-UP RINGS (Supplied with above) 1) 515-002-017 1) 515-002-016 1) 515-002-015
990-021-006 (VITON) 990-021-007 (BUNA-N) SERIES 1 Cartridges 7/8" hex (22,2 mm) M20 thread	\$2.00 \$.80	For all Series 1 4-Port Cartridges (except FLOW DIVIDERS) CVCV CWCA CWCG CWCK CWCL DPBM DPBN DPBO DPBP FVCA PVDA* PVDB* RVCD XMCA XMOA	* Install nose end back-up and seal in reverse order. See balloon cross-section for details.  T-21A CAVITY 990-021-006 VITON SEALS 1) 500-101-018 2) 500-102-017 1) 500-102-015 990-021-007 BUNA-N SEALS 1) 500-001-018 2) 500-002-017 1) 500-002-015 BACK-UP RINGS (Supplied with above) 1) 515-002-018 2) 515-002-017 1) 515-002-016 1) 515-002-015
990-031-006 (VITON) 990-031-007 (BUNA-N) SERIES 1 Cartridges 7/8" hex (22,2 mm) M20 thread	\$2.00 \$.80	For Series 1 4-Port FLOW DIVIDER CARTRIDGES DSCH FSBA FSBD FSBS FSCA FSCD FSCH FSCS LHDA XRCA	 T-31A CAVITY 990-031-006 VITON SEALS 1) 500-102-017 1) 500-101-015 2) 500-101-014 990-031-007 BUNA-N SEALS 1) 500-002-017 1) 500-001-015 2) 500-001-014 BACK-UP RINGS (Supplied with above) 1) 515-002-016 2) 515-002-015 4) 515-002-014

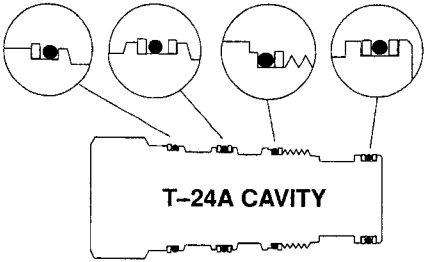
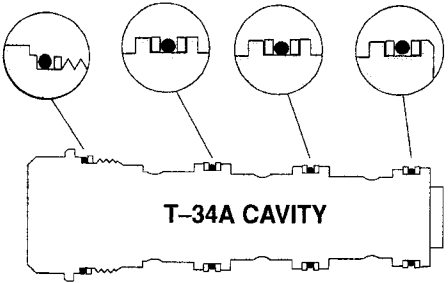
CARTRIDGE SEAL KITS

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SEAL KIT NUMBER DESCRIPTION	PRICE	CARTRIDGE MODELS	DESCRIPTION
990-016-006 (VITON) 990-016-007 (BUNA-N) SERIES 3 Cartridges 1 1/4" hex (31,8 mm) M36 thread	\$3.00 \$1.00	For all Series 3 2-Port Cartridges (except model RDHA) CNGC CNHC CXGB CXGD CXHA CXHF FCEB FDEA FQGA FXEA NCFB NCFC NCGA NFEB NFEC RPIC RPID RPIE RQIB XICA XIOA	 T-16A CAVITY 990-016-006 VITON SEALS 1) 500-102-124 1) 500-101-120 990-016-007 BUNA-N SEALS 1) 500-002-124 1) 500-001-120 BACK-UP RINGS (supplied with above) 1) 515-002-123 2) 515-002-121
990-316-006 (VITON) 990-316-007 (BUNA-N) SERIES 3 Cartridges 1 1/4" hex (31,8 mm) M36 thread	\$7.00 \$5.00	For Series 3 2-Port Cartridge RDHA ONLY	 T-16A CAVITY 990-316-006 VITON SEALS 1) 500-102-124 1) 500-101-023 990-316-007 BUNA-N SEALS 1) 500-002-124 1) 500-001-023 BACK-UP RING 1) 515-002-123 1) 530-102-024 GLYD® Ring
990-017-006 (VITON) 990-017-007 (BUNA-N) SERIES 3 Cartridges 1 1/4" hex (31,8 mm) M36 thread	\$4.50 \$1.50	For all Series 3 3-Port Cartridges CAGA CAGG CAGK CAGL CBFG CBGA CBGG CBGH CBGY CCGA CCGG CKGA CKGB CKGC CKGD CKGE CKGF CKGG CKGH CKGI CKGV CNGE CNGV COHA COHB COHC CXGE CXHC FAHA FBHA FREA LKHA LKHB LKHC LKHD LOHA LOHB LOHC LOHD LOHO LPHA LPHC LRHA LRHB LRHC PBHB PBHC PPHB PPHC PPHE RSHC RVGA RVGB SCGA SCH A SQHB XHCA XHOA	 T-17A CAVITY 990-017-006 VITON SEALS 1) 500-101-126 1) 500-102-124 1) 500-101-120 990-017-007 BUNA-N SEALS 1) 500-001-126 1) 500-002-124 1) 500-001-120 BACK-UP RINGS 1) 515-002-126 1) 515-002-123 2) 515-002-121
990-023-006 (VITON) 990-023-007 (BUNA-N) SERIES 3 Cartridges 1 1/4" hex (31,8 mm) M36 thread	\$6.00 \$2.00	For all Series 3 4-Port Cartridges (except FLOW DIVIDERS) CVGV CWGA CWGG CWGK CWGL FVEA PVHA PVHB RVGD XPCA XPOA	 T-23A CAVITY 990-023-006 VITON SEALS 2) 500-101-126 1) 500-102-124 1) 500-101-120 990-023-007 BUNA-N SEALS 2) 500-001-126 1) 500-002-124 1) 500-001-120 BACK-UP RINGS 3) 515-002-126 1) 515-002-123 2) 515-002-121

GLYD® Ring is a registered trademark of W.S. Shamban & Co., Los Angeles, Ca., U.S.A.

CARTRIDGE SEAL KITS

SEAL KIT NUMBER DESCRIPTION	PRICE	CARTRIDGE MODELS	DESCRIPTION
990-024-006 (VITON) 990-024-007 (BUNA-N) SERIES 4 Cartridge 1 5/8" hex (41 mm) M48 thread	\$8.00 \$2.00	For all Series 4 4-Port Cartridges (except FLOW DIVIDERS) CVIV CWIA CWIG FVFA PVJA PVJB RVID XQCA XQOA	 T-24A CAVITY 990-024-006 VITON SEALS 2) 500-101-134 1) 500-102-131 1) 500-101-127 990-024-007 BUNA-N SEALS 2) 500-001-134 1) 500-002-131 1) 500-001-127 BACK-UP RINGS (Supplied with above) 3) 515-002-134 1) 515-002-131 2) 515-002-127
990-034-006 (VITON) 990-034-007 (BUNA-N) SERIES 4 Cartridge 1 5/8" hex (41 mm) M48 thread	\$8.00 \$2.00	For Series 4 4-Port FLOW DIVIDER CARTRIDGES DSIH FSFA FSFD FSFH FSFS LHJA XVCA	 T-34A CAVITY 990-034-006 VITON SEALS 1) 500-102-131 1) 500-101-129 2) 500-101-128 990-034-007 BUNA-N SEALS 1) 500-002-131 1) 500-001-129 2) 500-001-128 BACK-UP RINGS (Supplied with above) 1) 515-002-131 2) 515-002-129 4) 515-002-128

O-RING REFERENCE

SUN O-ring designations include the **ARP568 Uniform Dash No.** as part of the coding. For field repair when SUN Seal Kits are not available, the information at right applies.

SUN O-ring P/N		
***	***	***
Material		ARP 568
101 - 70 duro. Viton		Uniform
102 - 90 duro. Viton		Dash No.
001 - 70 duro. Buna-N		
002 - 90 duro. Buna-N		

MANUFACTURING DATE CODE REFERENCE

Date codes are stamped on one hex flat of all cartridges, and on valve bodies under the body designation.

Through December 31, 1985
SUN used a system which designated the calendar quarter in which a product was manufactured.

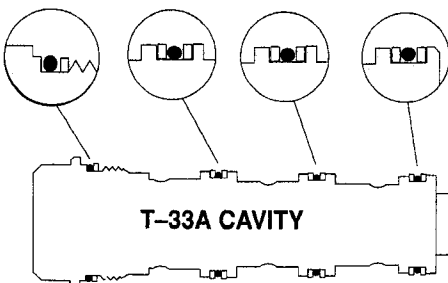
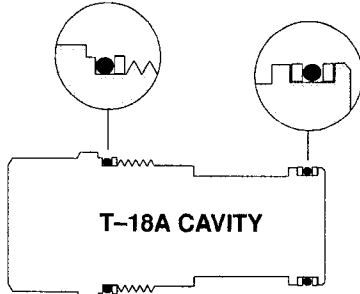
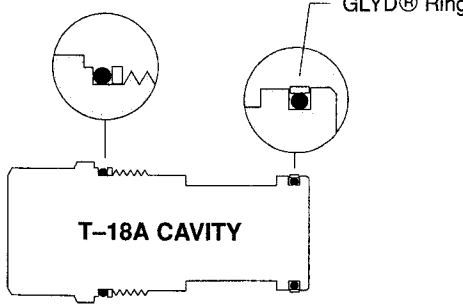
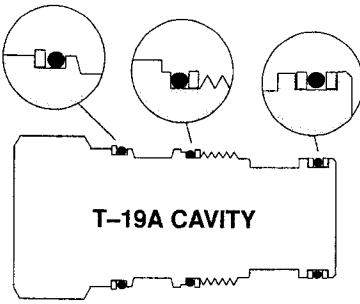
For Example
 61 - Jan. through Mar., 1985
 62 - Apr. through June, 1985
 63 - July through Sept., 1985
 63 - Oct. through Dec., 1985

Beginning Jan. 1, 1986
SUN used a system which designates the specific date of manufacture.

year (1990)		
9A	A0	
Month	Day	
A - Jan. through	A - 1st through	5 - 27th through
L - Dec.	Z - 26th	9 - 31st

CARTRIDGE SEAL KITS

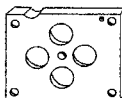
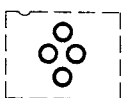
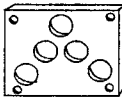
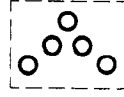
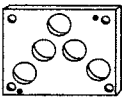
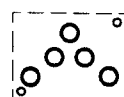
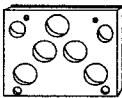
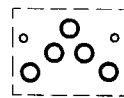
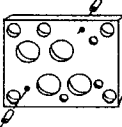
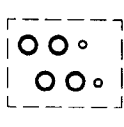
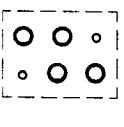
SUN

SEAL KIT NUMBER DESCRIPTION	PRICE	CARTRIDGE MODELS	DESCRIPTION
990-033-006 (VITON) 990-033-007 (BUNA-N) SERIES 3 Cartridges 1 1/4" hex (31,8 mm) M36 thread	\$6.00 \$2.00	For Series 3 4-Port FLOW DIVIDER CARTRIDGES DSGH FSEA FSED FSEH FSES LHHA XTCA	 T-33A CAVITY 990-033-006 VITON SEALS 1) 500-102-124 2) 500-101-121 1) 500-101-120 990-033-007 BUNA-N SEALS 1) 500-002-124 2) 500-001-121 1) 500-001-120 BACK-UP RINGS (Supplied with above) 2) 515-002-123 4) 515-002-121 2) 515-002-120
990-018-006 (VITON) 990-018-007 (BUNA-N) SERIES 4 Cartridges 1 5/8" hex (41 mm) M48 thread	\$4.00 \$1.00	For all Series 4 2-Port Cartridges (except model RDJA) CNIC CNJC CXIB CXID CXJA CXJF FAJA FBJA FCFB FDFA FQIA FXFA NCGB NCGC NFFC RPKC RPKD RPKE RQKB XKCA XKOA	 T-18A CAVITY 990-018-006 VITON SEALS 1) 500-102-131 1) 500-101-127 990-018-007 BUNA-N SEALS 1) 500-002-131 1) 500-001-127 BACK-UP RINGS (Supplied with above) 1) 515-002-131 2) 515-002-127
990-318-006 (VITON) 990-318-007 (BUNA-N) SERIES 4 Cartridges 1 5/8" hex (41 mm) M48 thread	\$8.00 \$5.00	Series 4 2-Port Cartridge RDJA ONLY	 T-18A CAVITY 990-318-006 VITON SEALS 1) 500-102-131 1) 500-101-126 990-318-007 BUNA-N SEALS 1) 500-002-131 1) 500-001-126 BACK-UP RINGS (Supplied with above) 1) 515-002-131 1) 530-102-127 GLYD® Ring
990-019-006 (VITON) 990-019-007 (BUNA-N) SERIES 4 Cartridges 1 5/8" hex (41 mm) M48 thread	\$6.00 \$1.50	For all Series 4 3-Port Cartridges CBHG CBIA CBIG CBIH CBIY CCIA CKIA CKIB CKIC CKID CKIE CKIF CKIG CKIH CKII CKIV COJA COJB CXIE CXJC FRFA LKJA LKJB LKJC LKJD LOJA LOJB LOJC LOJD LOJO LPJA LPJC LRJA LRJB LRJC PBJB PBJC PPJB PPJC RSJC RVIA RVIB SQJB XJCA XJOA	 T-19A CAVITY 990-019-006 VITON SEALS 1) 500-101-134 1) 500-102-131 1) 500-101-127 990-019-007 BUNA-N SEALS 1) 500-001-134 1) 500-002-131 1) 500-001-127 BACK-UP RINGS (Supplied with above) 1) 515-002-134 1) 515-002-131 2) 515-002-127

GLYD® Ring is a registered trademark of W.S. Shamban & Co., Los Angeles, Ca., U.S.A.

SANDWICH VALVES – RETAINERS & SEALS

SUN

VALVE PATTERN INTERFACE	SEAL RETAINER ONLY		SEAL KIT ONLY		SEAL RETAINER WITH SEAL KIT KIT NUMBER	
			KIT CONTAINS	KIT NUMBER		
ISO O3 NFFA DO3 (WAS NFFA DO1) CETOP 3		991-013 \$3.00		VITON 4) 500-101-012 BUNA-N 4) 500-001-012	VITON 990-105-003 \$1.50 BUNA-N 990-105-007 \$1.00	VITON 990-106-003 \$4.50 BUNA-N 990-106-007 \$4.00
ISO O5 NFFA DO5 (WAS NFFA DO2) CETOP 5		991-005 \$3.00		VITON 5) 500-101-014 BUNA-N 5) 500-001-014	VITON 990-110-003 \$1.50 BUNA-N 990-110-007 \$1.00	VITON 990-111-003 \$4.50 BUNA-N 990-111-007 \$4.00
"O2H" (U.S.)		991-008 \$3.00		VITON 5) 500-101-014 2) 500-101-010 BUNA-N 5) 500-001-014 2) 500-001-010	VITON 990-120-003 \$2.00 BUNA-N 990-120-007 \$1.50	VITON 990-120-010 \$5.00 BUNA-N 990-120-009 \$4.50
"O2H" CETOP RP35H		991-009 \$3.00		VITON 5) 500-101-014 2) 500-101-012 BUNA-N 5) 500-001-014 2) 500-001-012	VITON 990-120-004 \$2.00 BUNA-N 990-120-008 \$1.50	VITON 990-120-011 \$5.00 BUNA-N 990-120-012 \$4.50
ISO O7 NFFA DO7 (WAS NFFA DO4) CETOP 7		990-140-001 \$6.50		VITON 2) 500-101-111 4) 500-101-118 BUNA-N 2) 500-001-111 4) 500-001-118	VITON 990-140-002 \$2.50 BUNA-N 990-140-007 \$2.00	VITON 990-140-003 \$9.00 BUNA-N 990-140-008 \$8.50
ISO O8 NFFA DO8 (WAS NFFA DO6) CETOP 8				VITON 2) 500-101-114 4) 500-101-121 BUNA-N 2) 500-001-114 4) 500-001-121	VITON 990-130-003 \$2.50 BUNA-N 990-130-007 \$2.00	

CAVITY FORM TOOLS

All SUN cartridges fit into a series of standard SUN cavities, which are easily machined to exact dimensions using precision form tools available from SUN. Complete cavity detail drawings will be supplied to any designer or user upon request and are included with each shipment of tools. Basic cavity information is also available in the current SUN catalog.

CARTRIDGE SERIES	CAVITY	DESCRIPTION	PART NO.	PRICE	CARTRIDGE SERIES	CAVITY	DESCRIPTION	PART NO.	PRICE
1 7/8" hex (22,2) M20 Thread	T-10A 2 Port (Long)	Form Drill TD-10A Form Reamer TR-10A Metric Tap M20 X 1.5-6H	994-010-001 995-010-001 998-998	\$150.00 \$185.00 \$ 35.00	2 1-1/8" hex (28,6) 1"-14 Thread	T-2A 3 Port	Form Drill TD-2A Form Reamer TR-2A UNS Tap 1"-14 UNS-2B	994-002-001 995-002-001 998-999	\$160.00 \$195.00 \$ 55.00
	T-11A 3 Port	Form Drill TD-11A Form Reamer TR-11A Metric Tap M20 X 1.5-6H	994-011-001 995-011-001 998-998	\$155.00 \$191.00 \$ 35.00		T-3A 2 Port (Long)	Form Drill TD-3A Form Reamer TR-3A UNS Tap 1"-14 UNS-2B	994-003-001 995-003-001 998-999	\$155.00 \$191.00 \$ 55.00
	T-13A 2 Port (Short)	Form Drill TD-13A Form Reamer TR-13A Metric Tap M20 X 1.5-6H	994-013-001 995-013-001 998-998	\$150.00 \$185.00 \$ 35.00		T-5A 2 Port (Short)	Form Drill TD-5A Form Reamer TR-5A UNS Tap 1"-14 UNS-2B	994-005-001 995-005-001 998-999	\$155.00 \$191.00 \$ 55.00
	T-21A 4 Port Press. Control	Form Drill TD-21A Form Reamer TR-21A Metric Tap M20 X 1.5-6H	994-021-001 995-021-001 998-998	\$160.00 \$197.00 \$ 35.00		T-22A 4 Port Press. Control	Form Drill TD-22A Form Reamer TR-22A UNS Tap 1"-14 UNS-2B	994-022-001 995-022-001 998-999	\$165.00 \$205.00 \$ 55.00
	T-31A 4 Port Flow Divider	Form Drill TD-31A Form Reamer TR-31A Metric Tap M20 X 1.5-6H	994-031-001 995-031-001 998-998	\$170.00 \$220.00 \$ 35.00		T-32A 4 Port Flow Divider	Form Drill TD-32A Form Reamer TR-32A UNS Tap 1"-14 UNS-2B	994-032-001 995-032-001 998-999	\$175.00 \$235.00 \$ 55.00

SOLENOID VALVES and COILS for VALVE ASSEMBLIES

SUN

VOLTAGE CONNECTION	COIL ONLY	NORMALLY OPEN VALVE		FOR SUN VALVE MODELS	NORMALLY CLOSED VALVE		FOR SUN VALVE MODELS
		SOLENOID VALVE ASS'Y			SOLENOID VALVE ASS'Y		
		VITON	BUNA		VITON	BUNA	
12V DC WIRE LEADS	751-012-001 \$21.00	750-221 \$66.00	750-211 \$66.00	YRAG *** ** YRCG *** ** YREG *** ** YREO *** *A YRFG *** ** YRFI *** *B YRHG *** ** YROG *** ** YRPG *** ** YRQG *** **	750-121 \$49.00	750-111 \$49.00	YRAH *** ** YRCH *** ** YREH *** ** YREP *** *A YRFH *** ** YRFJ *** *B YRHH *** ** YROH *** ** YRPH *** ** YRQH *** **
12V DC ISO/DIN	751-012-009 \$25.00	750-229 \$70.00	750-219 \$70.00		750-129 \$53.00	750-119 \$53.00	
24V DC WIRE LEADS	751-012-003 \$21.00	750-223 \$66.00	750-213 \$66.00		750-123 \$49.00	750-113 \$49.00	
24V DC ISO/DIN	751-012-007 \$25.00	750-227 \$70.00	750-217 \$70.00		750-127 \$53.00	750-117 \$53.00	
115V AC 50/60 Hz CONDUIT	751-012-002 \$29.00	750-222 \$74.00	750-212 \$74.00		750-122 \$57.00	750-112 \$57.00	
115V AC 50/60 Hz ISO/DIN	751-012-006 \$33.00	750-226 \$78.00	750-216 \$78.00		750-126 \$61.00	750-116 \$61.00	
230V AC 50/60 Hz CONDUIT	751-012-004 \$29.00	750-224 \$74.00	750-214 \$74.00		750-124 \$57.00	750-114 \$57.00	
230V AC 50/60 Hz ISO/DIN	751-012-008 \$33.00	750-228 \$78.00	750-218 \$78.00		750-128 \$61.00	750-118 \$61.00	

ELECTRICAL CONNECTOR OPTIONS

18 GAUGE 24" LONG	WIRE LEADS	1/2" NPTF	CONDUIT	18 GAUGE 24" LONG	DIN 43650 PLUG FACE	ISO/DIN

CAVITY FORM TOOLS

CARTRIDGE SERIES	CAVITY	DESCRIPTION	PART NO.	PRICE	CARTRIDGE SERIES	CAVITY	DESCRIPTION	PART NO.	PRICE
3 1-1/4" hex (31,8) M36 Thread	T-16A 2 Port	Form Drill TD-16A Form Reamer TR-16A Metric Tap M36 X 2-6H	994-016-001 995-016-001 998-996	\$215.00 \$265.00 \$ 95.00	4 1-5/8" hex (41,0) M48 Thread	T-18A 2 Port	Form Drill TD-18A Form Reamer TR-18A Metric Tap M48 X 2-6H	994-018-001 995-018-001 998-992	\$365.00 \$420.00 \$165.00
	T-17A 3 Port	Form Drill TD-17A Form Reamer TR-17A Metric Tap M36 X 2-6H	994-017-001 995-017-001 998-996	\$225.00 \$277.00 \$ 95.00		T-19A 3 Port	Form Drill TD-19A Form Reamer TR-19A Metric Tap M48 X 2-6H	994-019-001 995-019-001 998-992	\$375.00 \$430.00 \$165.00
	T-23A 4 Port Press. Control	Form Drill TD-23A Form Reamer TR-23A Metric Tap M36 X 2-6H	994-023-001 995-023-001 998-996	\$235.00 \$290.00 \$ 95.00		T-24A 4 Port Press. Control	Form Drill TD-24A Form Reamer TR-24A Metric Tap M48 X 2-6H	994-024-001 995-024-001 998-992	\$385.00 \$445.00 \$165.00
	T-33A 4 Port Flow Divider	Form Drill TD-33A Form Reamer TR-33A Metric Tap M36 X 2-6H	994-033-001 995-033-001 998-996	\$260.00 \$315.00 \$ 95.00		T-34A 4 Port Flow Divider	Form Drill TD-34A Form Reamer TR-34A Metric Tap M48 X 2-6H	994-034-001 995-034-001 998-992	\$410.00 \$475.00 \$165.00

TOOL REGRINDING

SUN maintains a list of approved tool shops that will sharpen SUN form tools at reasonable prices.

For information on this service, contact your local SUN distributor or the factory.

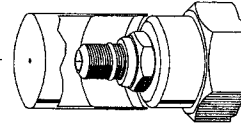
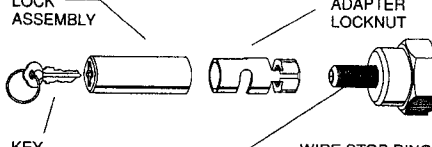
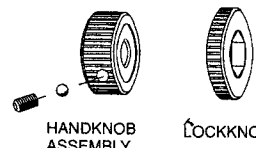
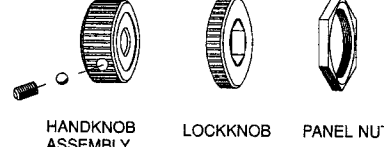
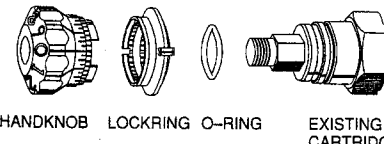
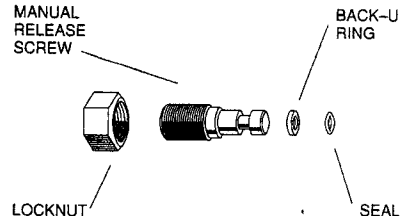
SOCKETS

Deep hex sockets are the preferred tools to use when installing SUN cartridges

Snap-On Tools Corp. is one source from which deep sockets in all sizes are readily available.

Contact your local Snap-On dealer or:
Snap-On Tools Corp., Kenosha, WI 53140
Telephone: 414-656-5200
SUN Cartridges Snap-On P/N
Series 1 - 7/8" hex S 281
Series 2 - 1 1/8" hex S 361
Series 3 - 1 1/4" hex S 401
Series 4 - 1 5/8" hex LS 522

CARTRIDGE CONTROL KITS

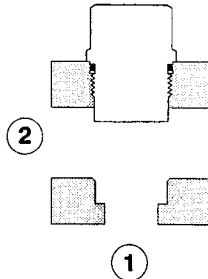
SERVICE KIT NUMBER DESCRIPTION	USE / CARTRIDGE	PRICE	DESCRIPTION	NOTES
991-006 ADJUSTMENT SCREW KIT	ALL F CONTROLS	\$1.00	ADJUST SCREW  LOCKNUT  SEAL 	To assure a complete seal on the stem – Release all pressure on the cartridge after setting. THEN tighten locknut (and cap, on J).
991-010 ADJUSTMENT SCREW KIT	ALL J CONTROLS	\$1.00	CAP  LOCKNUT  SEAL  ADJUST SCREW 	
TAMPER RESISTANT COVER 991-004 991-001 991-002 991-003	For all SUN cartridges with L-adjustment. Series 1 – 7/8" (22,2 mm) hex Series 2 – 1 1/8" (28,6 mm) hex Series 3 – 1 1/4" (31,8 mm) hex Series 4 – 1 5/8" (41 mm) hex	\$4.00 (each)	For all SUN cartridges with L-adjustment 	TAMPER RESISTANT COVER 1. Adjust valve to desired setting and tighten locknut. 2. Using an arbor press or a soft hammer, install cover until it seats on cartridge hex. 3. Cover is a press fit on cartridge shoulder.
993-008 KEY LOCK KIT	For all SUN cartridges with L adjustment (except counterbalance cartridges)	\$20.00		1. Remove original wire stop ring and locknut. 2. Thread on the adapter locknut and install new wire stop ring through slot provided. 3. Adjust valve to desired setting and tighten adapter locknut. 4. Slide lock assembly over adapter, lock and remove key.
991-211 "K" HANDKNOB KIT	Use this kit to adapt all L-controls to K controls (except counterbalance cartridges)	\$2.00		ONLY cartridges date stamped "41" or later and originally supplied with plastic knobs. Lock knob snaps onto locknut furnished on cartridge.
991-215 PANEL HANDKNOB KIT	O CONTROLS All Series 1 cartridges 7/8" (22,2 mm) hex M20 thread	\$3.00		
991-216 PANEL HANDKNOB KIT	O CONTROLS All Series 2 cartridges 1 1/8" (28,6 mm) hex 1"-14 thread.	\$3.00		
"H" HANDKNOB KIT 991-221 991-219 991-220	H CONTROL All series of flow controls. FDBA, NCCB, NCCC, NFCC ONLY FDCB, NCEB, NCEC, NFDC ONLY FDEA, NCFB, NCFC, NFEC, FDFA, NCGB, NCGC, NFFC ONLY	\$4.00 \$4.00 \$6.00		ONLY for cartridges originally supplied with an "H" handknob. Valves can not be modified in the field. NOTE: The "H" control is ONLY available for the cartridges shown to the left.
820-001 LOCKWIRE	All M,Q and R CONTROLS	\$0.30	LOCKING WIRE  LEAD SEAL 	
991-112-003 VITON 991-112-007 BUNA ADJUSTMENT SCREW KIT	For cartridge models: CKCA L** CKCD L** CKCB L** CPCA L** CKCC L**	\$1.75 \$1.75		ONLY cartridges date stamped "62" or earlier.
991-212-003 VITON 991-212-007 BUNA ADJUSTMENT SCREW KIT	For cartridge models: CKEA L** CKED L** CKEB L** CPEA L** CKEC L**	\$1.75 \$1.75		

CAVITY PLUGS

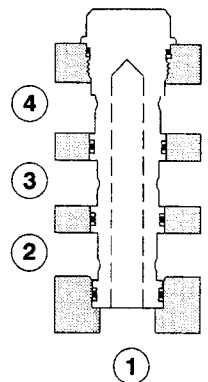
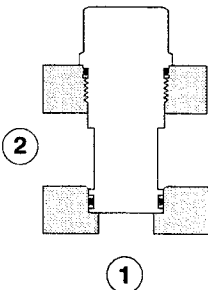
It is sometimes desirable to remove a SUN cartridge valve and still maintain the integrity of the hydraulic system. This may be necessitated by the need to flush a system after repairs or a piping change, or to change an operating function in the circuit. For these requirements, SUN offers two styles of cavity plugs – all ports blocked and main ports open to flow.

FOR CAVITIES T-3A, T-5A, T-10A, T-13A, T-16A, T-18A, T-31A, T-32A, T33A, T-34A
ALL PORTS OPEN

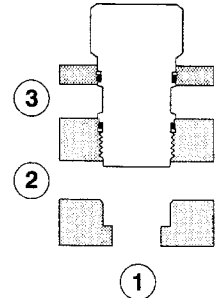
CAVITY	MODEL	PRICE
T-3A T-5A T-32A	XCOA XXN Buna-N XCOA XXV Viton	\$ 7.20 \$ 8.20
T-10A T-13A T-31A	XFOA XXN Buna-N XFOA XXV Viton	\$ 6.50 \$ 7.50
T-16A T-33A	XIOA XXN Buna-N XIOA XXV Viton	\$10.10 \$11.60
T-18A T-34A	XKOA XXN Buna-N XKOA XXV Viton	\$16.60 \$18.10


ALL PORTS BLOCKED

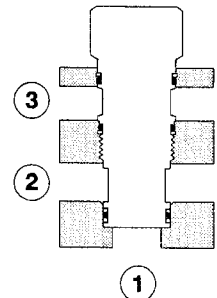
CAVITY	MODEL	PRICE
T-3A	XCCA XXN Buna-N XCCA XXV Viton	\$14.50 \$15.50
T-5A	XDCA XXN Buna-N XDCA XXV Viton	\$14.50 \$15.50
T-10A	XFCA XXN Buna-N XFCA XXV Viton	\$10.10 \$11.10
T-13A	XGCA XXN Buna-N XGCA XXV Viton	\$10.10 \$11.10
T-16A	XICA XXN Buna-N XICA XXV Viton	\$20.00 \$21.50
T-18A	XKCA XXN Buna-N XKCA XXV Viton	\$34.40 \$35.90
T-31A	XRCA XXN Buna-N XRCA XXV Viton	\$19.50 \$21.50
T-32A	XSCA XXN Buna-N XSCA XXV Viton	\$27.50 \$29.50
T-33A	XTCA XXN Buna-N XTCA XXV Viton	\$44.50 \$47.00
T-34A	XVCA XXN Buna-N XVCA XXV Viton	\$78.00 \$80.50


FOR CAVITIES T-2A, T-11A, T-17A, T-19A
PORT 1 OPEN TO PORT 2 – PORT 3 BLOCKED

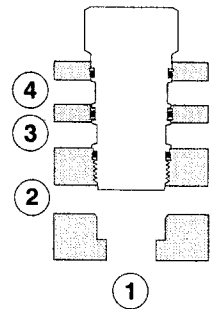
CAVITY	MODEL	PRICE
T-11A	XEOA XXN Buna-N XEOA XXV Viton	\$ 6.50 \$ 8.00
T-2A	XBOA XXN Buna-N XBOA XXV Viton	\$ 9.20 \$10.70
T-17A	XHOA XXN Buna-N XHOA XXV Viton	\$14.40 \$16.40
T-19A	XJOA XXN Buna-N XJOA XXV Viton	\$23.90 \$25.90


ALL PORTS BLOCKED

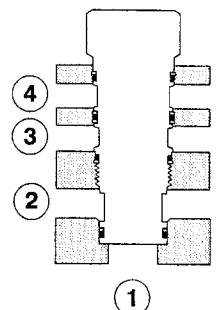
CAVITY	MODEL	PRICE
T-11A	XECA XXN Buna-N XECA XXV Viton	\$12.80 \$14.30
T-2A	XBCA XXN Buna-N XBCA XXV Viton	\$18.50 \$20.00
T-17A	XHCA XXN Buna-N XHCA XXV Viton	\$28.60 \$30.60
T-19A	XJCA XXN Buna-N XJCA XXV Viton	\$49.20 \$51.20


FOR CAVITIES T-21A, T-22A, T-23A, T-24A
PORT 1 OPEN TO PORT 2 – PORTS 3 & 4 BLOCKED

CAVITY	MODEL	PRICE
T-21A	XMOA XXN Buna-N XMOA XXV Viton	\$ 8.50 \$10.50
T-22A	XNOA XXN Buna-N XNOA XXV Viton	\$11.20 \$13.20
T-23A	XPOA XXN Buna-N XPOA XXV Viton	\$17.00 \$19.50
T-24A	XQOA XXN Buna-N XQOA XXV Viton	\$28.00 \$30.50


ALL PORTS BLOCKED

CAVITY	MODEL	PRICE
T-21A	XMCA XXN Buna-N XMCA XXV Viton	\$16.00 \$18.00
T-22A	XNCA XXN Buna-N XNCA XXV Viton	\$20.50 \$22.50
T-23A	XPCA XXN Buna-N XPCA XXV Viton	\$32.50 \$35.00
T-24A	XQCA XXN Buna-N XQCA XXV Viton	\$54.00 \$56.50



Sun Hydraulics Corporation reserves the right to change existing prices and discounts at any time without notice to its customers. Selling prices are governed by the list price in effect at the time of acceptance of a purchase order.



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TELEX: 862319
TELEFAX: 042-41-75-80



CONTACT

