

Crimping Pin and Socket Contacts

CRIMPING

Crimping may be defined as the art of joining a conductor to a pin or socket contact by controlled compression and displacement of metal. It has been used for many years.

In a good crimp joint, there is a mutual metal flow causing symmetrical distortion of wire strands and contact material. The mil cross-sectional area is but slightly reduced and all voids are practically eliminated. Such a joint is similar to a cold weld. Mechanical strength and good electrical continuity are established. Because of the new environments to which electrical connectors are subjected, there has been a drastic change in thinking relative to the use of precision crimp joints in preference to solder.

CRIMPING CONFIGURATIONS

There are many different types of crimps employed today. These range from the terminal fold-over tab type of crimp to the single indenter crimp, the dual indenter crimp, the three indenter crimp, hex crimps, and, finally, the MIL standard four indenter crimp. The four indenter crimp (Fig. 1) provides the most uniform displacement of wire and contact material. The wire strands and the contact material are formed together in a solid mass with little or no reduction of the mil area of the wire strands. A minimum of voids exists and very little extrusion of the wire strands takes place.

The four indenter crimp principle has been used to produce a variety of impressions, the most common being the “bathtub” and “octadent” (also called double indenter) (Fig. 2) The octadent configuration has been chosen by the Military for use in the M22520/1 and /2 tools.

CRIMPING CHARACTERISTICS

Connectors utilizing crimping contacts usually permit the removal of these contacts several times so that modification, circuit changes, or replacement of contacts may be made with little difficulty and with the same quality assurance as in production line assembly. Crimping may be accomplished either with hand tools, power tools, or automated power tools. Repeatability of the crimp operation is characteristic provided precision crimping tools are employed. These tools must be capable of being gaged to insure that proper crimp depths are maintained. Inspection holes in each contact permit quality control personnel to view the wire strand ends thereby assuring that the conductor is properly positioned in the crimp barrel.

MIL-DTL-22520

This specification covers all the requirements for crimping tools used on removable type contacts in electrical connectors.

CRIMP DEPTH DETERMINATION

Having resolved an indenter design, the determination of crimp depth range must be established for each application. There are many factors which contribute to the selection of the proper indenter setting. These are primarily related to contact material and dimensions as well as wire type and size.

The proper crimp depth for a given contact is the one that yields the best mechanical and electrical joint. To determine this setting, many contacts of the same type are crimped though a range of indenter settings from too loose to too tight. The crimped contacts are then subjected to tensile and voltage drop tests.

WIRE PREPARATION

Proper wire preparation also plays an important part in making a good crimp joint. There are two popular methods of wire stripping — mechanical and thermal. During the mechanical stripping process, extreme care must be taken to avoid nicking or removing wire strands, otherwise a loss of tensile strength will result. Conversely, if the insulation is not completely removed, erratic values may be obtained. Heat stripping eliminates the danger of nicking strands. However, depending on the type of insulation being stripped, too much heat can cause actual charring of the insulation or decompose the insulation with the evolution of corrosive gases which react with the conductor platings. There is also a possibility of local annealing of the conductor. Too little heat can deposit an insulation film which can act as a lubricant. Any of these conditions can affect tensile results. Wire preparation is, therefore, another area that requires control if proper tensiles are to be achieved with a wire-contact combination.

Before making a tensile test it is also important that the stripped length of the wire be checked to ensure that the wire extends all the way into the contact wire barrel. During the tensile test it is necessary for the uncrimped end of the wire to be held in such a way that the pull force is evenly distributed to all the strands.

TENSILE TESTING

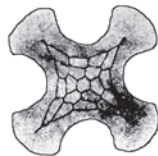
Tensile testing is a controlled pull test on the crimp joint to determine its mechanical strength. It is a destructive test which usually results in wire breakage in the crimped barrel, the wire pulling out of the crimped barrel, or wire breakage outside of the crimped area. The method and device used to conduct this test have a direct bearing on the results obtained. Per specification, the testing device pulls at the rate of one inch per minute. During the tensile test, the wire is elongating. The breakage or separation point, therefore, is associated with not only the pull force but also the rate of increase of this force.

Tensile curves are plotted for each contact and wire combination. They will usually differ, depending on the type of wire, plating, size of wire, and variations in contact design and material. A desirable tensile range must be determined for each of these combinations.

MILLIVOLT DROP

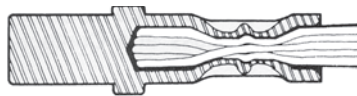
Millivolt drop tests are performed across the crimp joint to determine the electrical characteristics. The test current is passed through the contacts and voltage drop is measured from a point on the shoulder of the contact to a point on the wire. Voltage drop values under the maximum allowable indicate a good electrical joint.

FIG 1



4-Indenter Crimp
Cross-section
Across Axis

FIG 2



Octadent Crimp –
Horizontal Cross-section



VISUAL INSPECTION

Each contact is inspected under a microscope to make certain the indenture does not crack or tear the base metal, or cause excessive distortion of the contact.

CONTROLLING CRIMP DEPTH

From the tensile curves, a known crimp depth range is established. It is imperative, therefore, that the crimp tool settings be within the established tolerance.

To insure full closure of the tool handles and positive bottoming, it is necessary that tools be cycle controlled. This is accomplished by the use of a precision ratchet device which releases the handles at the positive bottoming position within specification tolerances. This release point and positive bottoming are applicable to all contact sizes.

MEASURING CRIMP DEPTH (GAGING)

Too loose a crimp setting will result in wire pullout and high millivolt drop (high resistance). Too tight a setting will nick the wire strands causing low tensiles and wire breakage within the contact.

Positive bottoming tools can readily be gaged by selecting gage pins dimensioned to the end limits of the known crimp range of a given contact.

AXIAL DEFORMATION

During the crimping process considerable force is applied and material displacement takes place, which may result in axial deformation of the contact. The following factors contribute to axial deformation of contacts:

1. Contact material and contact hardness.
2. Crimp barrel wall thickness.
3. Concentricity of conductor hole to O.D. of crimp barrel.
4. If an insulation support is included on the contact, the concentricity of this support (I.D. and O.D.) with respect to the other diameters in the contact.
5. Crimp depth - the deeper the crimp the greater the possibility of contact bending.
6. Conductor characteristics - conductor hardness, number of strands, size of wire, bunching of strands, the lay of the conductors, plating or the use of solid conductor.
7. The condition of the indenters - indenters which are not uniformly dimensioned or aligned or which have extreme variation in surface condition can cause contact bending.
8. The condition of the crimping tool - a worn crimping tool can contribute to contact bending.
9. Method of contact location and support - improperly supporting or positioning the contact in the tool can result in contact bending.
10. Method of measuring axial deformation - we have found that this is one of the least understood items relating to the crimp tool specification.

MIL-DTL-22520 is specific in defining and evaluating the axial deformation of contacts. This paragraph allows the following deformation:

FIG. 3

Contact Size	Contact Deformation
20 & smaller	.011 TIR
16	.012 TIR
12	.012 TIR

The TIR allowed includes a maximum of .005 TIR assignable to the contact during its manufacture. (TIR is an abbreviation for Total Indicator Reading and is a measure of the total deviation from a true center line when the item being measured is rotated through 360 °.)

COMPRESSION FORCES

Crimping compression forces are directly related to: A. Indenter Configuration; B. The Amount of Leverage in a Crimping Tool; C. Crimp Depth Required for Satisfactory Results; D. Contact Hardness and Contact-Conductor Combinations.

A. Indenter Configuration

MS drawings are specific as to indenter configuration of the Class I crimping tool. It is possible to change the shape of the indenters to reduce frontal area and thus reduce crimping forces. If the reduction of compression forces was the only factor involved, a knife blade edge on an indenter, or a conical tip shape would be the most desirable configuration. But this would result in cracked contacts, damage to plating, high wire embrittlement because of the concentrated stress of a small crimp area, and would also result in marginal tensile values.

B. The Amount of Leverage in a Crimping Tool

Leverage or linkage systems could be devised to minimize the amount of crimp compression forces. Archimedes' old adage could apply here wherein he says, "Give me a place to stand and to rest my lever on and I can move the Earth." From a practical viewpoint, however, the geometry of Class I tools under MIL-T-22520 are specific in tool length and width.

C. Crimp Depth Required for Satisfactory Results

Another way to reduce compression forces is to vary crimp depth. MS drawings are specific in designating crimp depths. It is understandable that the less the indenters indent the lower the compression forces involved. On the other hand, if the tool does not indent as deeply as specified, the possibility exists that sub-marginal or marginal tensile values will result.

D. Contact Hardness and Contact-Conductor Combinations

Contact material is definitely a factor contributing to high compression forces. Some contacts are made of hard material; some contacts have thick walls and some contacts are required to cover a range of conductors, all of which could involve high crimping forces. It is felt that an analysis of these conditions and an attempt to make them compatible with the crimping tool could facilitate the reduction of compression forces.

As can be seen from this brief review of crimping, many factors influence the effectiveness of a crimped joint. However, a good crimping tool compensates for many of these factors by providing proper crimp depths, resulting in termination having high tensile strength, low millivolt drop, and minimum contact deformation. With the use of a well-engineered tool, crimping becomes one of the most reliable methods of wire termination.

A glossary of connector terms is available at www.astrotool.com.



Standard Step Adjustable Crimp Tool 615708 (M22520/1-01)



- 8 indent crimp
- Dial selectable
- Uses turret and single position heads
- Cycle controlled ratchet

The **Astro 615708** is qualified to MIL-DTL-22520/1. This dial selectable 8-step tool has extensive applications within the wire barrel sizes 12-22 and wire sizes 12-26 AWG. This tool produces an eight indent crimp configuration which provides maximum tensile strength for both MS and proprietary contacts when used with wire of various compositions.

The beauty of this tool is in the ease of its use. The operator simply has to attach the appropriate turret head, or universal positioner, to the tool and then set the selector to the desired step for the wire being used. The ratchet is designed to ensure a complete cycle of the tool. A complete and accurate crimp is obtained each and every time, with no partial crimps.

The **615708** tool is designed to be used with a turret head, a positioner or a universal head. These heads are easily attached with the use of built in hex socket screws. A data plate is permanently attached to each head. The data plate lists the contacts, for which the head was designed, along with selector settings that correspond to the wire being used.

Astro recommends that all of its tools be gaged periodically, to assure accurate calibration. A gage 615716 (M22520/3-1) is available for this purpose. See page 9.

The **615708** tool is 9¼ inches long and weighs approximately 20 ounces.

The **615708** is available in a pneumatic version, P/N APC708, on page 23.

An adjustable positioner is available, P/N 615712 and 615712-1.

A wide variety of Turret Heads and Positioners are available, in addition to those listed. Please contact factory for additional information.

MS #.	ASTRO TOOL #	USAGE/DESCRIPTION	NSN.
M22520/3-1	615716	Gage For /1-01 /2-01	5220-00-165-7604
M22520/1-01	615708	Tool Frame	5120-00-165-3912
M22520/1-02	615709	Turret	5120-00-016-6382
M22520/1-03	615710	Turret	5120-00-016-6554
M22520/1-04	615711	Turret	5120-00-016-7582
M22520/1-05	615712	Universal Positioner	5120-00-165-3911
M22520/1-06	615713	Positioner	5120-00-016-7647
M22520/1-07	615714	Positioner	5120-00-016-7651
M22520/1-08	615715	Turret	5120-00-016-7654
M22520/1-09	615821	Positioner	5120-00-132-5039
M22520/1-10	615822	Positioner	5120-00-132-5095
M22520/1-11	616406	Positioner	5120-01-127-5231
M22520/1-12	616407	Turret	5120-01-036-9220
M22520/1-13	616408	Turret	5120-01-036-9221
M22520/1-14	616409	Turret	5120-01-036-9222
M22520/1-15	616410	Positioner	5120-01-036-9223
M22520/1-16	620172	Positioner	5120-01-075-8138
M22520/1-17	620537	Positioner	

Turret and Positioner Selection Charts for MIL-C-39029/AS39029 Contacts on page 9.



Miniature Step Adjustable Crimp Tool 615717 (M22520/2-01)



PRODUCT LISTINGS

- 8 indent crimp
- Dial selectable
- Uses bayonet positioners
- Cycle controlled ratchet

The MIL-DTL-22520/2 qualified **Astro 615717** miniature 8-step adjustable hand crimping tool's 8-indent crimp configuration provides excellent results on contacts sizes 20-28 and wire sizes 20-32 AWG.

A wide variety of MS and proprietary contacts and wire compositions can be crimped by simply attaching a positioner in the bayonet-type socket and adjusting the selector to one of the eight preselected settings. The tool is equipped with a positive ratchet that requires the completion of the crimp cycle to ensure the integrity of each crimp.

Astro offers a wide variety of positioners to accommodate various mil-spec and proprietary contacts. Each positioner has a data plate which provides the correct crimp depth setting for the contact and wire combination. Astro also offers two adjustable positioners (615179 & 615179-1) that allow you to adjust the crimp location according to your specific needs. Custom positioners are available upon request.

Astro recommends the periodic gaging of all its tools. A gage (615716, M22520/3-1) is available for this purpose.

The **615717** is 7½ inches long and weighs 11 ounces.

The **615717** is available in a pneumatic version, P/N 621100, on page 26.

For ultra precise crimps on miniature and subminiature contacts with very thin wire barrel dimensions, Astro offers the 620613. This tool is built from the same tool frame as the 615717 (M22520/2-01) and utilizes the same positioners.

A wide variety of Positioners are available, in addition to those listed. Please contact factory for additional information.

MS #.	ASTRO TOOL #.	DESCRIPTION	NSN
M22520/2-01	615717	Tool Frame	5120-00-165-3910
M22520/2-02	615718	Positioner	5120-00-165-3913
M22520/2-03	615719	Positioner	5120-00-016-7657
M22520/2-04	615720	Positioner	5120-00-017-3640
M22520/2-05	615721	Positioner	5120-00-017-3742
M22520/2-06	615722	Positioner	5120-00-017-3809
M22520/2-07	615723	Positioner	5120-00-017-3827
M22520/2-08	615724	Positioner	5120-00-017-3921
M22520/2-09	615725	Positioner	5120-00-017-3927
M22520/2-10	615726	Positioner	5120-00-017-3932
M22520/2-11	615727	Positioner	5120-00-017-3934
M22520/2-12	615729	Positioner	5120-00-017-3935
M22520/2-13	616031	Positioner	5120-00-132-6939
M22520/2-14	616032	Positioner	5120-00-132-6962
M22520/2-15	616033	Positioner	5120-00-132-6978
M22520/2-16	616034	Positioner	5120-00-132-7868
M22520/2-17	616035	Positioner	5120-00-132-7893
M22520/2-18	616036	Positioner	5120-00-132-7894
M22520/2-19	616037	Positioner	5120-00-132-7872
M22520/2-20	616038	Positioner	5120-00-132-9004
M22520/2-21	616039	Positioner	5120-00-133-0029
M22520/2-22	615448	Positioner	5120-01-106-3737
M22520/2-23	616191	Positioner	5120-01-117-3905
M22520/2-24	616260	Positioner	5120-00-348-7531
M22520/2-25	616411	Positioner	5120-00-132-6932
M22520/2-26	616412	Positioner	5120-00-133-3263
M22520/2-27	616413	Positioner	
M22520/2-28	616414	Positioner	5120-00-124-3678
M22520/2-29	616415	Positioner	5120-00-124-3682
M22520/2-30	616416	Positioner	5120-01-117-3905
M22520/2-31	616417	Positioner	
M22520/2-32	620261	Positioner	
M22520/2-33	615257	Positioner	
M22520/2-34	620499	Positioner	
M22520/2-35	620517	Positioner	
M22520/2-36	616429	Positioner	

[Positioner Selection Charts for MIL-C-39029/AS39029 Contacts on page 9.](#)



Intermediate Step Adjustable Tool 616336 (M22520/7-01)



- 8 indent crimp
- Dial selectable
- Cycle controlled ratchet
- Lightweight and easy to use
- Uses bayonet positioners

The **Astro 616336** is qualified to MIL-DTL-22520/7.

This tool is an 8-Step Selectable with varying applications within the wire barrel sizes 16-22 and wire sizes 16-28 AWG.

The **616336** produces an 8 indent crimp configuration, which provides excellent results on MS and proprietary contacts and wire of various compositions.

The **616336** tool is designed to be used with a positioner that features easy attachment with a bayonet socket mount. A data plate is permanently attached to each positioner. This data plate provides the correct selector setting to be used for each contact and wire combinations. This helps to eliminate error in choosing the proper crimp depth.

Astro recommends that all of its tools be gaged periodically to assure accurate calibration. A gage 616337 (M22520/3-3) is available for this purpose. See page 9.

The **616336** tool is 7¼ inches long and weighs approximately 11 ounces.

The **616336** is available in a pneumatic version, P/N 621101, on page 26.

An adjustable positioner is available P/N 642020.

A wide variety of Positioners are available, in addition to those listed. Please contact factory for additional information.

MS #.	ASTRO TOOL #	USAGE/DESCRIPTION	NSN.
M22520/7-01	616336	Tool Frame	5120-00-133-1747
M22520/7-02	616327	Positioner	5120-00-133-1769
M22520/7-03	616328	Positioner	5120-00-133-1770
M22520/7-04	616329	Positioner	5120-00-133-1772
M22520/7-05	616330	Positioner	5120-00-133-1778
M22520/7-06	616331	Positioner	5120-00-133-1781
M22520/7-07	616332	Positioner	5120-00-133-1782
M22520/7-08	616333	Positioner	5120-00-133-1785
M22520/7-09	616334	Positioner	5120-00-133-1790
M22520/7-10	616335	Positioner	5120-00-133-1792
M22520/7-11	620083	Positioner	5120-01-122-1201
M22520/7-12	620084	Positioner	5120-01-112-2925
M22520/7-13	620085	Positioner	5120-01-110-4472
M22520/3-3	616337	Gage	5220-00-338-0378

Positioner Selection Charts for MIL-C-39029/AS39029 Contacts on page 9.



Turret and Positioner Selection Charts for MIL-C-39029 / AS39029 Contacts

For M22520/1-01, M22520/2-01, M22520/7-01 Crimp Tools

Contacts for Connector Family: MIL-C-5015 (MS 3450 Series/rear-release Type) and MIL-C-83723 Series II								
Military Part #	BIN Code	Supersedes Military Part #	Positioner/ Turret Part #	Astro Tool #	Style	Mating End Size	Wire Barrel Size	Type/ Class
M39029/30-165-16	217	MS3163-16S-16 M83723-30T17	M22520/1-02	615709	SKT	16S	16	A/B
M39029/29-16-16	212	MS3162-16-16 M83723-29T16	M22520/1-02	615709	PIN	16	16	A/B
M39029/30-16-16	218	MS3163-16-16 M83723-30T16	M22520/1-02	615709	SKT	16	16	A/B
M39029/29-12-12	213	MS3162-12-12 M83723-29T12	M22520/1-02	615709	PIN	12	12	A/B
M39029/30-12-12	219	MS3163-12-12 M83723-30T12	M22520/1-02	615709	SKT	12	12	A/B

Contacts for Connector Families: MIL-C-26482 Series II, MIL-C-81703 Series III, MIL-C-83723 Series III, MIL-C-83733								
Military Part #	BIN Code	Supersedes Military Part #	Positioner/ Turret Part #	Astro Tool #	Style	Mating End Size	Wire Barrel Size	Type/ Class
M39029/4-20-20	110	M83723-33B20	M22520/2-02 M22520/1-02	615718 615709	PIN	20	20	A/B
M39029/5-20-20	115	M83723-34B20	M22520/2-02 M22520/1-02	615718 615709	SKT	20	20	A/B
M39029/4-16-16	111	M83723-33B16	M22520/1-02	615709	PIN	16	16	A/B
M39029/5-16-16	116	M83723-34B16	M22520/1-02	615709	SKT	16	16	A/B
M39029/4-16-20	112	-	M22520/1-02	615709	PIN	16	20	A/B
M39029/5-16-20	117	-	M22520/1-02	615709	SKT	16	20	A/B
M39029/4-12-12	113	M83723-34B12	M22520/1-02	615709	PIN	12	12	A/B
M39029/5-12-12	118	-	M22520/1-02	615709	SKT	12	16	A/B
M39029/4-12-16	111	-	M22520/1-02	615709	PIN	12	16	A/B
M39029/5-12-16	119	M83723-34B16	M22520/1-02	615709	SKT	12	16	A/B

Contacts for Connector Family: MIL-C-26500								
Military Part #	BIN Code	Supersedes Military Part #	Positioner/ Turret Part #	Astro Tool #	Style	Mating End Size	Wire Barrel Size	Type/ Class
M39029/31-241	241	MS24254-20P	M22520/2-02 M22520/1-02	615718 615709	PIN	20	20	A/B
M39029/32-260	260	MS24255-20S	M22520/2-02 M22520/1-02	615718 615709	SKT	20	20	A/B
M39029/31-229	229	MS24253-16P	M22520/1-02	615709	PIN	16	16	A/B
M39029/32-248	248	MS24255-16S	M22520/1-02	615709	SKT	16	16	A/B
M39029/31-235	235	MS24254-12P	M22520/1-02	615709	PIN	12	12	A/B
M39029/32-254	254	MS24255-12S	M22520/1-02	615709	SKT	12	12	A/B



Turret and Positioner Selection Charts for MIL-C-39029 / AS39029 Contacts

For M22520/1-01, M22520/2-01, M22520/7-01 Crimp Tools

Contacts for Connector Family: MIL-C-24308

Military Part #	BIN Code	Supersedes Military Part #	Positioner/ Turret Part #	Astro Tool #	Style	Mating End Size	Wire Barrel Size	Type/ Class
M39029/64-369	369	M24308/11-1	M22520/2-08	615724	PIN	20	20	A/A
M39029/63-368	368	M24308/10-1	M22520/2-08	615724	SKT	20	20	A/A

Contacts for Connector Family: MIL-C-5015 (MS3400 Series/Front-Release Type)

Military Part #	BIN Code	Supersedes Military Part #	Positioner/ Turret Part #	Astro Tool #	Style	Mating End Size	Wire Barrel Size	Type/ Class
M39029/44-288	288	MS90453-16-16	M22520/1-02	615709	PIN	16	16	A/B
M39029/45-295	295	MS90454-16-16	M22520/1-02	615709	SKT	16	16	A/B
M39029/44-287	287	MS90453-16-22	M22520/1-02	615709	PIN	16	22	A/B
M39029/45-294	294	MS90454-16-22	M22520/1-02	615709	SKT	16	22	A/B
M39029/44-290	290	MS90453-12-12	M22520/1-02	615709	PIN	12	12	A/B
M39029/45-297	297	MS90454-12-12	M22520/1-02	615709	SKT	12	12	A/B
M39029/44-289	289	MS90453-12-16	M22520/1-02	615709	PIN	12	16	A/B
M39029/45-296	296	MS90454-12-16	M22520/1-02	615709	SKT	12	16	A/B

Contacts for Connector Family: MIL-C-38999 Series I, III, IV

Military Part #	BIN Code	Supersedes Military Part #	Positioner/ Turret Part #	Astro Tool #	Style	Mating End Size	Wire Barrel Size	Type/ Class
M39029/56-348	348	MS27655-22D MS27490-22D	M22520/2-07	615723	SKT	22	22D	A/B
M39029/56-349	349	MS27490-22M	M22520/2-07	615723	SKT	22	22M	A/B
M39029/56-350	350	MS27490-22	M22520/2-07	615723	SKT	22	22	A/B
M39029/56-351	351	MS27655-20 MS27490-20	M22520/2-10 M22520/1-04	615726 615711	SKT	20	20	A/B
M39029/56-352	352	MS27655-16 MS27490-16	M22520/1-04	615711	SKT	16	16	A/B
M39029/56-353	353	MS27655-12 MS27490-12	M22520/1-04	615711	SKT	12	12	A/B

Contacts for Connector Family: MIL-C-26482 Series I

Military Part #	BIN Code	Supersedes Military Part #	Positioner/ Turret Part #	Astro Tool #	Style	Mating End Size	Wire Barrel Size	Type/ Class
M39029/31-240	240	MS3192A20-20A	M22520/2-02 M22520/1-02	615718 615709	PIN	20	20	A/A
M39029/32-259	259	MS3193A20-20A	M22520/2-02 M22520/1-02	615718 615709	SKT	20	20	A/A
M39029/31-228	228	MS3192-16-16A	M22520/1-02	615709	PIN	16	16	A/A
M39029/32-247	247	MS3193-16-16A	M22520/1-02	615709	SKT	16	16	A/A
M39029/31-234	234	MS3192-12-12A	M22520/1-02	615709	PIN	12	12	A/A
M39029/32-253	253	MS3193-12-12A	M22520/1-02	615709	SKT	12	12	A/A



Turret and Positioner Selection Charts for MIL-C-39029 / AS39029 Contacts

For M22520/1-01, M22520/2-01, M22520/7-01 Crimp Tools

Contacts for Connector Family: MIL-C-28840								
Military Part #	BIN Code	Supersedes Military Part #	Positioner/ Turret Part #	Astro Tool #	Style	Mating End Size	Wire Barrel Size	Type/ Class
M39029/83-450	450	M39029/83-20-22	M22520/34-02	620636	PIN	20	22	A/B
M39029/83-451	451	M39029/83-20-28	M22520/34-02	620636	PIN	20	28	A/B
M39029/84-452	452	M39029/84-20-22	M22520/34-02	620636	SKT	20	22	A/B
M39029/84-453	453	M39029/84-20-28	M22520/34-02	620636	SKT	20	28	A/B

Contacts for Connector Families: MIL-C-38999 Series I, II, III, IV, MIL-C-83733, MIL-C-24308, and MIL-C-55302/68/69/71/72/75								
Military Part #	BIN Code	Supersedes Military Part #	Positioner/ Turret Part #	Astro Tool #	Style	Mating End Size	Wire Barrel Size	Type/ Class
M39029/58-360	360	MS27494-22D MS27493-22D M24308/13-1	M22520/2-09	615725	PIN	22	22D	A/B
M39029/57-354	354	MS27492-22D MS27491-22D M24308/12-1	M22520/2-06	615722	SKT	22	22D	A/B
M39029/58-361	361	MS27494-22M MS27493-22M	M22520/2-09	615725	PIN	22	22M	A/B
M39029/57-355	355	MS27492-22M MS27491-22M	M22520/2-06	615722	SKT	22	22M	A/B
M39029/58-362	362	MS27494-22 MS27493-22	M22520/2-09	615725	PIN	22	22	A/B
M39029/57-356	356	MS27492-22 MS27491-22	M22520/2-06	615722	SKT	22	22	A/B
M39029/58-363	363	MS27494-20 MS27493-20	M22520/2-10 M22520/1-04	615726 615711	PIN	20	20	A/B
M39029/57-357	357	MS27492-20 MS27491-20	M22520/2-10 M22520/1-04	615726 615711	SKT	20	20	A/B
M39029/58-364	364	MS27494-16 MS27493-16	M22520/1-04	615711	PIN	16	16	A/B
M39029/57-358	358	MS27492-16 MS27491-16	M22520/1-04	615711	SKT	16	16	A/B
M39029/58-365	365	MS27494-12 MS27493-12	M22520/1-04	615711	PIN	12	12	A/B
M39029/57-359	359	MS27492-12 MS27491-12	M22520/1-04	615711	SKT	12	12	A/B

BIN (Basic identification number) code color bands, reading in sequence from wire barrel end of the contact. Each digit of the BIN code shall be designated on the contact by a color band in accordance with the following:

0-Black 2-Red 4-Yellow 6-Blue 8-Gray
1-Brown 3-Orange 5-Green 7-Violet 9-White

For contacts not listed above, please consult factory for proper tooling.



Heavy Duty Pneumatic Crimp Tool AMT23B (M22520/23-01)



- 8 indent crimp configuration
- Designed with safety in mind
- Meets all MIL-DTL-22520/23 requirements
- No extra booster required for large contacts
- Interchangeable dies and locators

The **AMT23B** takes all the work out of crimping those large contacts. Using interchangeable dies and locators, this tool crimps contact sizes 8 through 0000. The steady, uniform crimp force, provided by the air logic function delay, crimps even the largest of these contacts without cracking them. Unlike similar tools, **Astro's AMT23B** crimps its full range without using a booster adapter.

The **AMT23B** is designed with operator safety in mind. The air logic function delay allows adequate time to remove fingers from the crimp area before crimping begins.

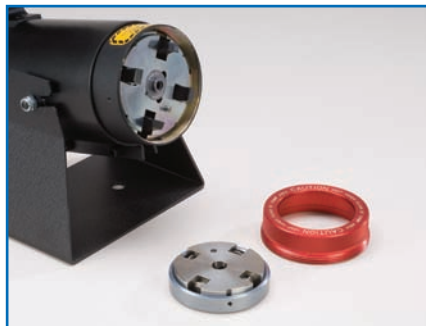
This tool is easily portable and weighs less than 19 pounds. It operates on 80-120 P.S.I. and requires a regulated, filtered and lubricated air supply for optimal function. Astro offers the 11413 air regulator for this purpose. The tool comes with a ½ inch diameter air coupler for convenient quick disconnect.

NOTE: ASTRO WILL CUSTOM DESIGN DIES AND LOCATORS FOR YOUR SPECIAL REQUIREMENTS. WE ALSO OFFER A WIDE RANGE OF GAGES FOR USE WITH THIS TOOL. PLEASE CONSULT THE FACTORY FOR FURTHER DETAILS.

CHANGING DIES AND LOCATORS



1. Unscrew Retainer Ring.



2. Pull off Indenter Die Assembly by hand.



3. Pull out the Locator by hand.

AMT23B (M22520/23-01) Die & Locator Selection Chart

M22520/23-01 INTERCHANGEABLE DIES AND LOCATORS		
MIL #	DESCRIPTION	ASTRO #
M22520/23-01	Crimp Tool	AMT23B
M22520/23-02	Die Assy. #8	AMT23002DA
M22520/23-03	Die Assy. #6	AMT23003DA
M22520/23-04	Die Assy. #4	AMT23004DA
M22520/23-05	Die Assy. #1/0	AMT23005DA
M22520/23-06	Die Assy. #2/0	AMT23006DA
M22520/23-07	Die Assy. #4/0	AMT23007DA
M22520/23-09	Locator #8	AMT23009L
M22520/23-10	Locator #6	AMT23010L
M22520/23-11	Locator #4	AMT23011L
M22520/23-12	Locator #4,4N,4G	AMT23012L
M22520/23-13	Locator #1/0	AMT23013L
M22520/23-14	Locator #1/0,1/0N	AMT23014L
M22520/23-15	Locator #2/0,2/0N	AMT23015L
M22520/23-16	Locator #4/0,4/0N	AMT23016L

DIE ASSEMBLY GAGING LIMITS			
Part #	Contact Size	Die Gaging Limits	
		GO	NO GO
AMT23002DA	8	.130	.136
AMT23003DA	6	.171	.178
AMT23004DA	4	.195	.202
AMT23005DA	0	.325	.332
AMT23006DA	00	.351	.358
AMT23007DA	0000	.425	.432

GAGES	
GAGE #	DIE ASSEMBLY
AMTG2302	AMT23002DA
AMTG2303	AMT23003DA
AMTG2304	AMT23004DA
AMTG2305	AMT23005DA
AMTG2306	AMT23006DA
AMTG2307	AMT23007DA

CONTACT LOCATORS				
Part #	Contact Size	MS Contact #		
AMT23009L	8	M39029/29-8-8	M39029/29-214	
		M39029/30-8-8	M39029/30-220	
		MS90453-8-8	M39029/44-291	
		MS90454-8-8	M39029/45-298	
AMT23010L	6	MS90559-11	M39029/48-317	
		6N	MS90559-12	M39029/48-318
		6G	MS90559-14	M39029/48-319
		6	MS90560-7	M39029/49-329
		6G	MS90560-8	M39029/49-330
AMT23011L	4	M39029/29-4-4	M39029/29-215	
		M39029/30-4-4	M39029/30-221	
		MS90453-4-4	M39029/44-292	
		MS90454-4-4	M39029/45-299	
AMT23012L	4	MS90559-8	M39029/48-320	
		4N	MS90559-9	M39029/48-321
		4G	MS90559-13	M39029/48-322
		4	MS90560-5	M39029/49-331
		4G	MS90560-9	M39029/49-332
AMT23013L	1/0	M39029/29-0-0	M39029/29-216	
		M39029/30-0-0	M39029/30-222	
		MS90453-0-0	M39029/44-293	
AMT23014L	1/0	MS90454-0-0	M39029/45-300	
		MS90559-5	M39029/48-323	
		1/0N	MS90559-6	M39029/48-324
AMT23015L	2/0	MS90560-3	M39029/49-333	
		MS90559-3	M39029/48-325	
		MS90559-4	M39029/48-326	
AMT23016L	4/0	MS90560-2	M39029/49-334	
		MS90559-1	M39029/48-327	
		MS90559-2	M39029/48-328	
	4/0	MS90560-1	M39029/49-335	



Miniature Adjustable Crimp Tool 612596 (MS3198-1)

- 8 indent crimp
- Dial selectable
- Uses bayonet-style positioners
- Cycle controlled

The **Astro 612596** meets performance requirements for MS3198-1 and M22520/34-01. This lightweight compact tool uses MS3198, M22520/34, M22520/2 and proprietary bayonet-style positioners to crimp most pin and socket contacts smaller than size 20 to wires size 20 AWG and smaller.

The **612596** is step-adjustable to eight preselected crimp depths. The correct crimp depth is determined by using the data plate located on each positioner. This tool utilizes the same positive ratchet found on other Astro crimpers, which requires the completion of a crimp cycle before the handles will return to their open position. This feature ensures the integrity of every crimp.

Astro recommends the periodic gaging of all its crimping tools. For this purpose Astro offers the M22520/3-1 (615716) gage with the tool in the number 8 selector position. For use on M22520/34-01 applications Astro recommends using the M22520/35 (621064) gage with the crimp depth selector set on the number 6 setting.



For contacts not listed, please consult factory for proper tooling.

Contacts for Connector Families: MIL-C-26482 Series II, MIL-C-81703 Series III, MIL-C-83723 Series III, MIL-C-83733

Military Part #	BIN Code	Supersedes Military Part #	Style: Pin or Socket	Mating End Size	Wire Barrel Size	Positioner/Turret Part #	Astro Positioner #
M39029/4-110	110	M83723-33B20 M39029/4-20-20	PIN	20	20		
M39029/5-115	115	M83723-34B20 M39029/5-20-20	SKT	20	20	M22520/2-02	615718
M39029/9-132 THRU M39029/9-136	132 THRU 136	M39029/9-20-20C1 THRU M39029/9-20-20C5	PIN	20	20	MS3198-1P MS3198-1PA	612759 613382
M39029/10-138 THRU M39029/10-142	138 THRU 142	M39029/9-20-20C1 THRU M39029/10-20-20C5	SKT	20	20		

Contacts for Connector Family: MIL-C-28840

Military Part #	BIN Code	Supersedes Military Part #	Style: Pin or Socket	Mating End Size	Wire Barrel Size	Positioner/Turret Part #	Astro Positioner #
M39029/83-450	450	M39029/83-20-22	PIN	20	22	M22520/34-02	620636
M39029/83-451	451	M39029/83-20-28	PIN	20	28	M22520/34-02	620636
M39029/84-452	452	M39029/84-20-22	SKT	20	22	M22520/34-02	620636
M39029/64-453	453	M39029/84-20-28	SKT	20	28	M22520/34-02	620636

Contacts for Connector Family: MIL-C-21097

Military Part #	BIN Code	Supersedes Military Part #	Style: Pin or Socket	Mating End Size	Wire Barrel Size	Positioner/Turret Part #	Astro Positioner #
M39029/9-01	--	----	SKT	20	20	MS3196-4P	613023



612596 (MS3198-1) Positioner Selection Charts

Contacts for Connector Families: MIL-C-38999 Series I, II, III, IV, MIL-C-83733, MIL-C-24308 & MIL-C-55302/68/69/71/72/75							
Military Part #	BIN Code	Supersedes Military Part #	Style: Pin or Socket	Mating End Size	Wire Barrel Size	Positioner/Turret Part #	Astro Positioner #
M39029/58-360	360	MS27494-22D MS27493-22D M24308/13-1	PIN	22	22D	M22520/2-09	615725
M39029/58-361	361	MS27494-22M MS27493-22M	PIN	22	22M	MS3196-8P	613642
M39029/58-362	362	MS27494-22 MS27493-22	PIN	22	22		
M39029/57-354	354	MS27492-22D MS27491-22D M24308/12-1	SKT	22	22D	M22520/2-06	615722
M39029/57-355	355	MS27492-22M MS27491-22M	SKT	22	22M	MS3196-6P	613640
M39029/58-363	363	MS27494-20 MS27493-20	PIN	20	20	M22520/2-10 MS3196-9P	615726 613643
M39029/57-357	357	MS27492-20 MS27491-20	SKT	20	20	M22520/2-10 MS3196-9P	615726 613643

Contacts for Connector Family: MIL-C-38999 Series I, III, IV							
Military Part #	BIN Code	Supersedes Military Part #	Style: Pin or Socket	Mating End Size	Wire Barrel Size	Positioner/Turret Part #	Astro Positioner #
M39029/56-349	349	MS27490-22M	SKT	22	22M	M22520/2-07	615723
M39029/56-350	350	MS27490-22	SKT	22	22	MS3198-7P	613641
M39029/56-351	351	MS27655-30 MS27490-20	SKT	20	20	M22520/2-10 MS3196-9P	615726 613643

Contacts for Connector Family: MIL-C-81511 Series I & II							
Military Part #	BIN Code	Supersedes Military Part #	Style: Pin or Socket	Mating End Size	Wire Barrel Size	Positioner/Turret Part #	Astro Positioner #
M39029/46-303	303	MS90460 A23-22	PIN	23	22	MS3196-2PA	613381
M39029/46-304	304	MS90460 B23-22	SKT	23	22		
M39029/47-313	313	MS90461 A23-22	PIN	23	22	MS3196-2P	612760
M39029/47-314	314	MS90461 B23-22	SKT	23	22		

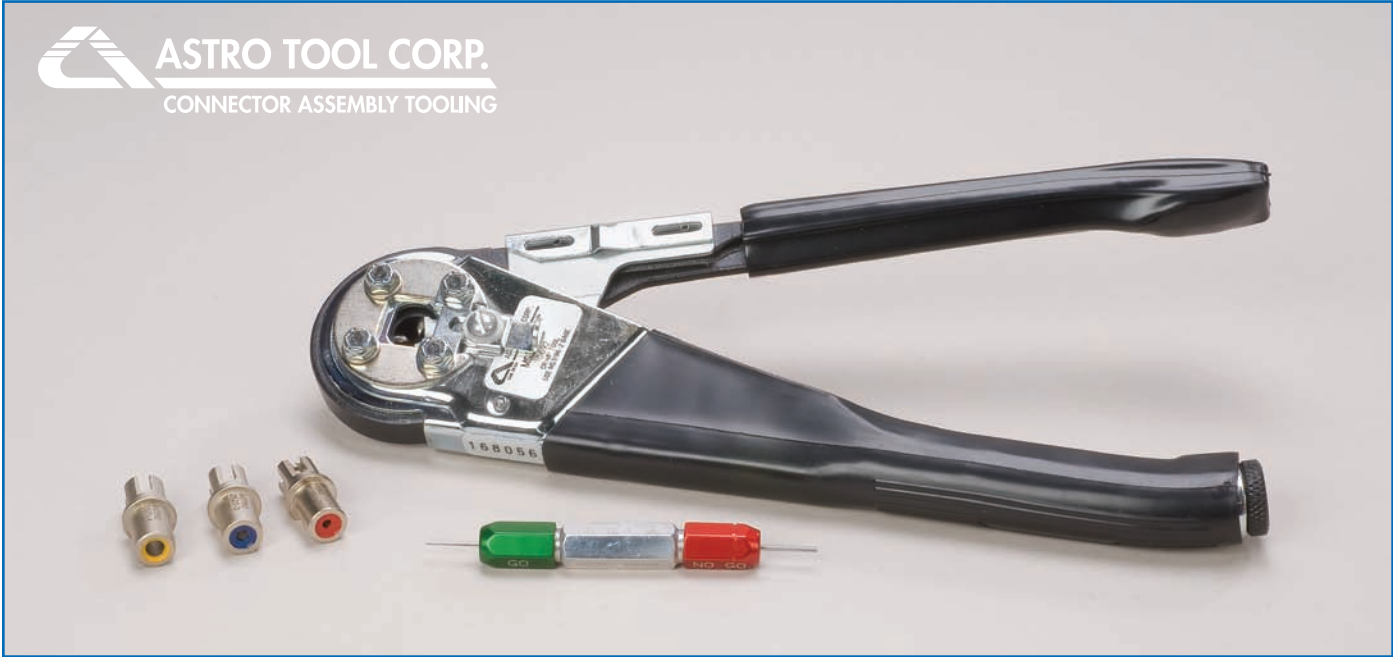
Contacts for Connector Family: MIL-C-26500							
Military Part #	BIN Code	Supersedes Military Part #	Style: Pin or Socket	Mating End Size	Wire Barrel Size	Positioner/Turret Part #	Astro Positioner #
M39029/31-241	241	MS24254-20P	PIN	20	20	M22520/2-02 MS3196-1P, MS3196-1PA	615718 612759, 613382
M39029/32-260	260	MS24255-20S	SKT	20	20	M22520/2-02 MS3198-1P, MS3198-1PA	615718 612759, 613382

BIN (Basic identification number) code color bands, reading in sequence from wire barrel end of the contact. Each digit of the BIN code shall be designated on the contact by a color band in accordance with the following:

- 0-Black 2-Red 4-Yellow 6-Blue 8-Gray
1-Brown 3-Orange 5-Green 7-Violet 9-White



Standard Self-Adjusting Crimp Tool MS3191



- 4 or 8 indent
- Cycle controlled ratchet
- No dial adjustment required

Description	MS Designation	Astro Cat. #
Frame Assembly	MS3191-A	11210
Crimp Tool	MS3191-1	10692
Crimp Tool	MS3191-2	11234
Positioner	MS3191-20A	11062
Positioner	MS3191-16A	2520-3
Positioner	MS3191-12A	2520-4
Positioner	MS3191-20B	10854-1
Positioner	MS3191-16B	10854-2

The **MS3191** series of tools still continue to set a standard of excellence for crimping tools. This series of crimping tools is one of the easiest to use. Simply selecting the proper positioner determines the crimp depth, crimp location and point of ratchet release.

The four or eight indent crimp provides a uniform displacement of wire and contact material, on contact sizes 12-20 and wire sizes 12-26 AWG.

As with all Astro pin and socket crimp tools, the **MS3191** series tools can be ordered with a variety of indenter configurations, including octadent (tool part number: 612600).

A large selection of positioners is available for this tool. If we do not have a positioner to meet your special needs, Astro will custom design and

manufacture positioners for you. Various tool-positioner combination packages are available. Extra positioners are conveniently stored in the tool handle. (See chart for details.)

A gage kit (part number ATK 6000 [MS3196-2]) is available for the recommended periodic gaging.

This tool weighs approximately 20 ounces and is 9½ inches long.

The following MS contacts can be crimped with the MS3191-A frame assembly when used with the positioners specified:

For Locators in addition to those listed please consult factory.

Crimp Tool Assembly Part No .	Consists of	
	Crimp Tool Frame	Positioners
MS3191-1 (10692)	MS3191-A (11210)	MS3191-20A MS3191-16A MS3191-12A
MS3191-2 (11234)	MS3191-A (11210)	MS3191-20B MS3191-16B

Astro Locator Part # .	Locator MS Designation
11062	MS3191-20A
2520-3	MS3191-16A
2520-4	MS3191-12A
10854-1	MS3191-20B
10854-2	MS3191-16B
3538-3	MS3191-20C
11045-1	MS3191-22D
11045-2	MS3191-16D



8-Step Adjustable Crimp Tool EUS309



- 8 indent crimp
- Dial selectable
- Cycle controlled ratchet
- Lightweight and easy to use
- Uses bayonet positioners

Gaging Information (Dimension in Inches)

Selector Setting #	Go Size .0001	No Go Size .0001
1	.0360	.0410
2	.0450	.0500
3	.0520	.0570
4	.0610	.0660
5	.0690	.0740
6	.0760	.0810
7	.0860	.0950
8	.1000	.1100

The **ASTRO EUS309** is used to crimp powered D sub contacts but is not limited to this function.

It is an 8 step adjustable crimp tool, cycled controlled and capable of crimping wire barrel sizes 12-20. Its crimp range is slightly larger than that of the 615708 (M22520/1-01) and utilizes the same basic components.

It has a distinctive red look and is the same size and weight as the 615708 (9¼ inches long, approximately 20 ounces).

Various turrets and single head positioners are available upon consulting the factory.

Astro recommends periodic gaging with a P/N EUS309-G.

Mil Spec Crimp Tool Selection Charts

VENDOR (CAGE) CONNECTOR SERIES AND TYPE	BASIC CONNECTOR PART #	CONTACT PART #	PIN OR SKT	COLOR BANDS			BIN CODE	CONTACT SIZE		WIRE RANGE OR CABLE	CONTACT GAGE	CRIMP TOOL	ACCESSORY	INSTALLATION TOOL	REMOVAL TOOL	REMOVAL TOOL (UNWIRED CONTACTS)
				1st	2nd	3rd		MATING END	WIRE BARREL							
MIL-C-5015 MS 3400" SERIES CIRCULAR THREADED COUPLING FRONT RELEASE CONTACTS	MS3400 ()	M39029/44-287	P	RED	GRA	VIO	287	16	22	22-26	AT 0016	615708 --OR 616336	615709 (BLUE)	ATML 1701	ATML 1901B	ATML 1901B
		M39029/45-294	S	RED	WHI	YEL	294	16	16	16-20						
	MS3401 ()	M39029/44-288	P	RED	GRA	GRA	288				12	16	16-20	AT 0012	615708	615709 (YELLOW)
		M39029/45-295	S	RED	WHI	GRN	295									
	MS3402 ()	M39029/44-289	P	RED	GRA	WHI	289	12	12	12-14	AT 0012	615708	615709 (YELLOW)	ATML 1702	ATML 1902B	ATML 1902B
		M39029/45-296	S	RED	WHI	BLU	296									
	MS3404 ()	M39029/44-290	P	RED	WHI	BLK	290	8	8	8-10	--	AMT23B	AMT23002DA AMT23009L	--	ATML 1903B	ATML 1903B
		M39029/45-297	S	RED	WHI	VIO	297									
	MS3406 ()	M39029/44-291	P	RED	WHI	BRN	291	4	4	4-6	--	AMT23B	AMT23004DA AMT23011L	--	ATML 1904B	ATML 1904B
		M39029/45-298	S	RED	WHI	GRA	298									
MS3408 ()	M39029/44-292	P	RED	WHI	RED	292	0	0	0-2	--	AMT23B	AMT23005DA AMT23013L	--	ATML 1905B	ATML 1905B	
	M39029/45-299	S	RED	WHI	WHI	299										
MS3409 ()	M39029/44-293	P	RED	WHI	ORN	293	16S	16	16-20	AT 0016	615708	615709 (BLUE)	ATML 08207B OR ATR 1105 OR M81969/14-03	ATML 08208B OR ATR 2112 OR M81969/14-03	M81969/30 HANDLE WITH ATML 3006	
	M39029/45-300	S	ORN	BLK	BLK	300										
MIL-C-5015 MS3450" SERIES CIRCULAR THREADED COUPLING REAR RELEASE CONTACTS	MS3450 ()	M39029/30-217	S	RED	BRN	VIO	217	16	16	16-20	AT 0016	615708	615709 (BLUE)	ATML 08207B OR ATR 1105 OR M81969/14-03	ATML 08208B OR ATR 2112 OR M81969/14-03	M81969/30 HANDLE WITH ATML 3006
		M39029/29-212	P	RED	BRN	RED	212									
	MS3451 ()	M39029/30-218	S	RED	BRN	GRA	218	12	12	12-14	AT 0012	615708	615709 (YELLOW)	ATR 1153 OR M81969/14-04 OR ATML 08209B	ATR 2160 OR M81969/14-04 OR ATML 08210B	M81969/30 HANDLE WITH ATML 3007
		M39029/29-213	P	RED	BRN	ORN	213									
	MS3452 ()	M39029/30-219	S	RED	BRN	WHI	219	8	8	8-10	--	AMT23B	AMT23002DA AMT23009L	--	ATML 1501 OR M81969/29-02	--
		M39029/29-214	P	RED	BRN	YEL	214									
	MS3454 ()	M39029/30-220	S	RED	RED	BLK	220	4	4	4-6	--	AMT23B	AMT23004DA AMT23011L	--	ATML 1502 M81969/29-03	--
		M39029/29-215	P	RED	BRN	GRN	215									
	MS3456 ()	M39029/30-221	S	RED	RED	BRN	221	0	0	0-2	--	AMT23B	AMT23005DA AMT23013L	--	ATML 1503 OR M81969/29-04	--
		M39029/29-216	P	RED	BRN	BLU	216									
MS3459 ()	M39029/30-222	S	RED	RED	RED	222										

BIN (Basic identification number) code color bands, reading in sequence from wire barrel end of the contact. Each digit of the BIN code shall be designated on the contact by a color band in accordance with the following:

0-Black 2-Red 4-Yellow 6-Blue 8-Gray
1-Brown 3-Orange 5-Green 7-Violet 9-White



VENDOR(CAGE) CONNECTOR SERIES AND TYPE	BASIC CONNECTOR PART #	CONTACT PART #	PIN OR SKT	COLOR BANDS			BIN CODE	CONTACT SIZE		WIRE RANGE OR CABLE	CONTACT GAGE	CRIMP TOOL	ACCESSORY	INSTALLATION TOOL	REMOVAL TOOL	REMOVAL TOOL (UNWIRED CONTACTS)	
				1st	2nd	3rd		MATING END	WIRE BARREL								
MIL-C-26482 SERIES I CIRCULAR BAYONET COUPLING FRONT RELEASE CONTACTS	MS3120 ()	M39029/31-240	P	RED	YEL	BLK	240	20	20	20-24	AT 0020	615708 OR	615709 (RED) ----- 615717 OR ----- 616336 616327	ATML 1703B	ATML 1906B	ATML 1906B	
	MS3128 ()																
	MS3121 ()	M39029/32-259	S	RED	GRN	WHI	259										
	MS3122 ()	M39029/31-228	P	RED	RED	GRA	228	16	16	16-20	AT 0016	615708 OR	615709 (BLUE) ----- 616336	ATML 1704B	ATML 1901B	ATML 1901B	
	MS3124 ()	M39029/32-247	S	RED	YEL	VIO	247										
	MS3126 ()	M39029/31-234	P	RED	ORN	YEL	234	12	12	12-14	AT 0012	615708	615709 (YELLOW)	ATML 1705B	ATML 1902B	ATML 1902B	
	MS3127 ()	M39029/32-253	S	RED	GRN	ORN	253										
	MS3128 ()																
MIL-C-26482 SERIES II CIRCULAR BAYONET COUPLING REAR RELEASE CONTACTS	MS3470 ()	M39029/4-110	P	BRN	BRN	BLK	110	20	20	20-24	AT 0020	615708 OR	615709 (RED) ----- 615717 OR ----- 616336 616327	ATR 1078 OR	ATR 2080 OR	M81969/30 HANDLE WITH ATML 3005 (RED)	
	MS3471 ()	M39029/5-115	S	BRN	BRN	GRN	115										
	MS3472 ()	M39029/4-111	P	BRN	BRN	BRN	111	16	16	16-20	AT 0016	615708 OR	615709 (BLUE) ----- 616336	ATML 08207B OR	ATR 1105 OR	ATML 08208B OR	M81969/30 HANDLE WITH ATML 3006 (BLUE)
	MS3474 ()	M39029/5-116	S	BRN	BRN	BLU	116										
	MS3475 ()	M39029/4-112	P	BRN	BRN	RED	112	16	20	20-24			616328	M81969/14-03 (BLUE)	M81969/14-03 (WHITE)		
	MS3476 ()	M39029/5-117	S	BRN	BRN	VIO	117										
		M39029/4-113	P	BRN	BRN	ORN	113	12	12	12-14	AT 0012	615708	615709 (YELLOW)	ATML 08209B OR	ATR 1153 OR	ATML 08210B OR	M81969/30 HANDLE WITH ATML 3007 (YELLOW)
		M39029/5-118	S	BRN	BRN	GRA	118										
		M39029/4-114	P	BRN	BRN	YEL	114	12	16	16-20							
		M39029/5-119	S	BRN	BRN	WHI	119										



Mil Spec Crimp Tool Selection Charts

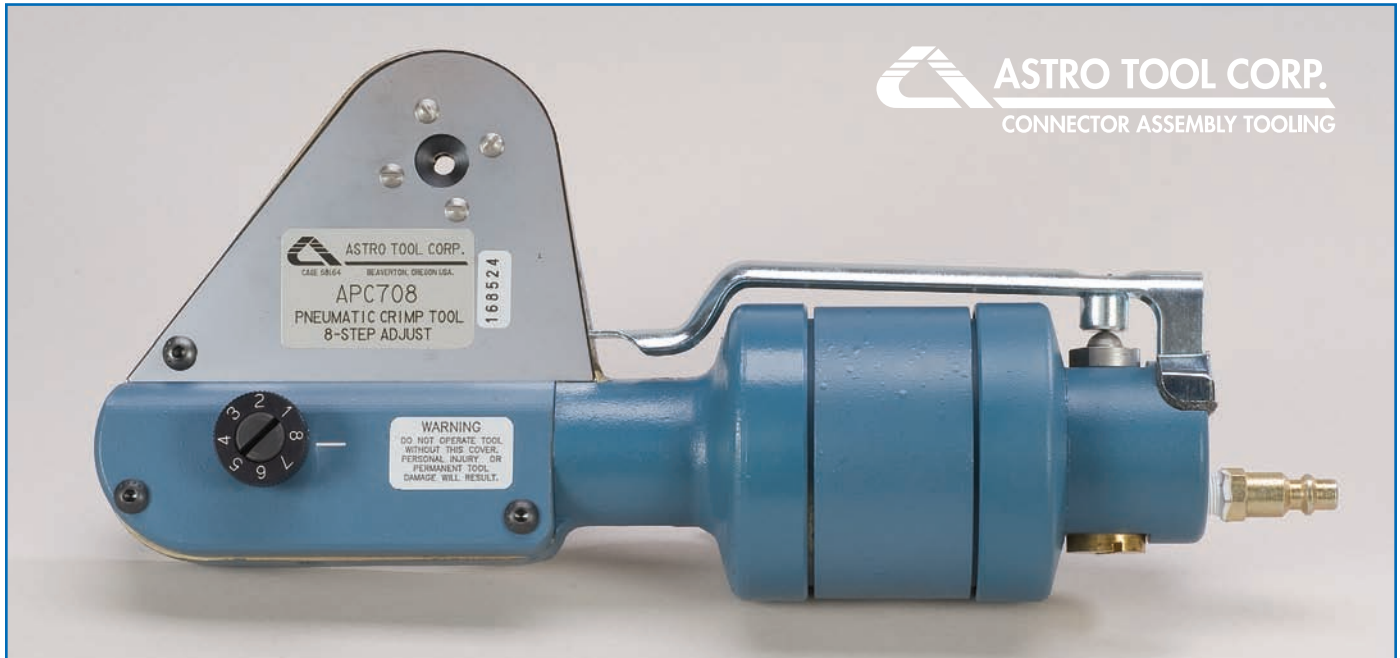
VENDOR (CAGE) CONNECTOR SERIES AND TYPE	BASIC CONNECTOR PART #	CONTACT PART #	PIN OR SKT	COLOR BANDS			BIN CODE	CONTACT SIZE		WIRE RANGE OR CABLE	CONTACT GAGE	CRIMP TOOL	ACCESSORY	INSTALLATION TOOL	REMOVAL TOOL	REMOVAL TOOL (UNWIRED CONTACTS)	
				1st	2nd	3rd		MATING END	WIRE BARREL								
MILITARY SPECS MIL-C-38999 CIRCULAR REAR RELEASE CONTACTS SERIES I SCOOP- PROOF BAYONET COUPLING	SERIES I MS27466 ()	M39029/58-360	P	ORN	BLU	BLK	360	22	22D	22-28	AT 0022	615717 or 616336	615725 or 616332	ATML 0801B OR M81969/14-01 (GREEN)	ATML 0802B OR M81969/14-01 (WHITE)	ATK 2005 WITH (BLACK) ATK2005-22D-1	
	MS27467 ()	M39029/56-348	LS	ORN	YEL	GRA	348					615717 or 616336	615723 or 616330				
	MS27468 ()																
	MS27496 ()																
	MS27498 ()	M39029/57-354	SS	ORN	GRN	YEL	354					615717 or 616336	615722 or 616331				
	MS27505 ()																
	MS27515 ()	M39029/58-361	P	ORN	BLU	BRN	361	22	22M	24-28			615717 or 616336	615725 or 616332			
	MS27652 ()																
	MS27653 ()	M39029/56-349	LS	ORN	YEL	WHI	349						615717 or 616336	615723 or 616330			
	MS27656 ()																
SERIES II LOW SILHOUETTE BAYONET COUPLING	SERIES II MS27661 ()	M39029/57-355	SS	ORN	GRN	GRN	355					615717 or 616336	615722 or 616331				
	MS27472 ()																
	MS27473 ()	M39029/58-362	P	ORN	BLU	RED	362	22	22	22-26		615717 or 616336	615725 or 616332	ATML 0803B	ATML 0804B	ATK 2005 WITH (BROWN) ATK 2005-22-1	
	MS27474 ()																
	MS27479 ()	M39029/56-350	LS	ORN	GRN	BLK	350					615717 or 616336	615723 or 616330				
	MS27480 ()																
	MS27481 ()																
	MS27484 ()																
	MS27497 ()	M39029/57-356	SS	ORN	GRN	BLU	356					615717 or 616336	615722 or 616331				
	MS27500 ()																
SERIES III THREADED COUPLING	SERIES III MS27504 ()	M39029/58-363	P	ORN	BLU	ORN	363	20	20	20-24	AT 0020	615708 or 615717 or 616336	615711 (RED) or 615726 or 616333	ATML 0805B OR M81969/14-10 (RED)	ATML 0806B OR M81969/14-10 (ORANGE)	ATK 2005 WITH (RED) ATK 2005-20-1	
	MS27508 ()	M39029/56-351	LS	ORN	GRN	BRN	351										
	MS27513 ()	M39029/57-357	SS	ORN	GRN	VIO	357										
	MS27664 ()																
	D38999/20 ()																
	D38999/24 ()	M39029/58-364	P	ORN	BLU	YEL	364	16	16	16-20	AT 0016	615708 or 616336	615711 (BLUE) or 616329	ATML 0807BB OR M81969/14-03 (BLUE)	ATML080B OR M81969/14-03 (WHITE)	ATK 2005 WITH (BLUE) ATK 2005-16-1	
	D38999/26 ()	M39029/56-352	LS	ORN	GRN	RED	352										
	D38999/29 ()	M39029/57-358	SS	ORN	GRN	GRA	358										
	D38999/30 ()																
	SERIES IV BREECH COUPLING	SERIES IV D38999/40 ()	M39029/58-365	P	ORN	BLU	GRN	365	12	12	12-14	AT 0012	615708	615711 (YELLOW)	ATML 0809B OR M81969/14-04 (YELLOW)	ATML 0810B OR M81969/14-04 (WHITE)	ATK 2005 WITH (YELLOW) ATK 2005-12-1
D38999/42 ()		M39029/56-353	LS	ORN	GRN	ORN	353										
D38999/44 ()		M39029/57-359	SS	ORN	GRN	WHI	359										
D38999/46 ()																	
D38999/47 ()																	
D38999/48 ()																	
D38999/49 ()																	



VENDOR (CAGE) CONNECTOR SERIES AND TYPE	BASIC CONNECTOR PART #	CONTACT PART #	PIN OR SKT	COLOR BANDS			BIN CODE	CONTACT SIZE		WIRE RANGE OR CABLE	CONTACT GAGE	CRIMP TOOL	ACCESSORY	INSTALLATION TOOL	REMOVAL TOOL	REMOVAL TOOL (UNWIRED CONTACTS)	
				1st	2nd	3rd		MATING END	WIRE BARREL								
MIL-C-83723 SERIES II CIRCULAR THREADED COUPLING REAR RELEASE CONTACTS	M83723/17 ()	M39029/29-212	P	RED	BRN	RED	212	16	16	16-20	AT 0016	615708	615709	ATML 08207B	ATML 08208B	M81969/30	
	M83723/18 ()	M39029/30-217	S	RED	BRN	VIO	217	16S						OR	OR	HANDLE	
	M83723/19 ()	M39029/30-218	S	RED	BRN	GRA	218	16						M81969/14-03	M81969/14-03	WITH	
	M83723/20 ()	M39029/85-454	P	YEL	GRN	YEL	454							OR	OR	ATML 3006	
	M83723/21 ()	M39029/85-455	P	YEL	GRN	GRN	455							ATR 1105	ATR 2112	(BLUE)	
	M83723/22 ()	M39029/85-456	P	YEL	GRN	BLU	456										
	M83723/23 ()	M39029/85-457	P	YEL	GRN	VIO	457										
	M83723/24 ()	M39029/86-462	S	YEL	BLU	RED	462										
	M83723/52 ()	M39029/86-463	S	YEL	BLU	ORN	463										
	M83723/53 ()	M39029/86-464	S	YEL	BLU	YEL	464										
		M39029/86-465	S	YEL	BLU	GRN	465										
		M39029/29-213	P	RED	BRN	ORN	213	12	12	12-14	AT 0012				ATML 08209B	ATML 08210B	M81969/30
		M39029/30-219	S	RED	BRN	WHI	219								OR	OR	HANDLE
		M39029/85-458	P	YEL	GRN	GRA	458								M81969/14-04	M81969/14-04	WITH
		M39029/85-459	P	YEL	GRN	WHI	459								OR	OR	ATML 3007
		M39029/85-460	P	YEL	BLU	BLK	460								ATR 1153	ATR 2160	(YELLOW)
		M39029/85-461	P	YEL	BLU	BRN	461										
		M39029/86-466	S	YEL	BLU	BLU	466										
		M39029/86-467	S	YEL	BLU	VIO	467										
		M39029/86-468	S	YEL	BLU	GRA	468										
		M39029/86-469	S	YEL	BLU	WHI	469										
		M39029/29-214	P	RED	BRN	YEL	214	8	8	8-10	--	AMT23B	AMT23002DA	NOT NEEDED	M81969/29-02		
		M39029/30-220	S	RED	RED	BLK	220					AMT23009L					
		M39029/29-215	P	RED	BRN	GRN	215	4	4	4-6	--		AMT23004DA		M81969/29-03		
		M39029/30-221	S	RED	RED	BRN	221						AMT23011L				
		M39029/29-216	P	RED	BRN	BLU	216	0	0	0-2	--		AMT23005DA		M81969/29-04		
		M39029/30-222	S	RED	RED	RED	222						AMT23013L				



Pneumatic Crimp Tool APC708 (Functional Equivalent to M22520/1-01)



MS #.	ASTRO TOOL #	USAGE/DESCRIPTION	NSN.
M22520/3-1	615716	Gage For /1-01 /2-01	5220-00-165-7604
M22520/1-02	615709	Turret	5120-00-016-6382
M22520/1-03	615710	Turret	5120-00-016-6554
M22520/1-04	615711	Turret	5120-00-016-7582
M22520/1-05	615712	Universal Positioner	5120-00-165-3911
M22520/1-06	615713	Positioner	5120-00-016-7647
M22520/1-07	615714	Positioner	5120-00-016-7651
M22520/1-08	615715	Turret	5120-00-016-7654
M22520/1-09	615821	Positioner	5120-00-132-5039
M22520/1-10	615822	Positioner	5120-00-132-5095
M22520/1-11	616406	Positioner	5120-01-127-5231
M22520/1-12	616407	Turret	5120-01-036-9220
M22520/1-13	616408	Turret	5120-01-036-9221
M22520/1-14	616409	Turret	5120-01-036-9222
M22520/1-15	616410	Positioner	5120-01-036-9223
M22520/1-16	620172	Positioner	5120-01-075-8138
M22520/1-17	620537	Positioner	

- Portable or bench-mounted
- Cycle controlled ratchet

8-Step Adjustable Manual Feed Pneumatic Crimping Tool APC708

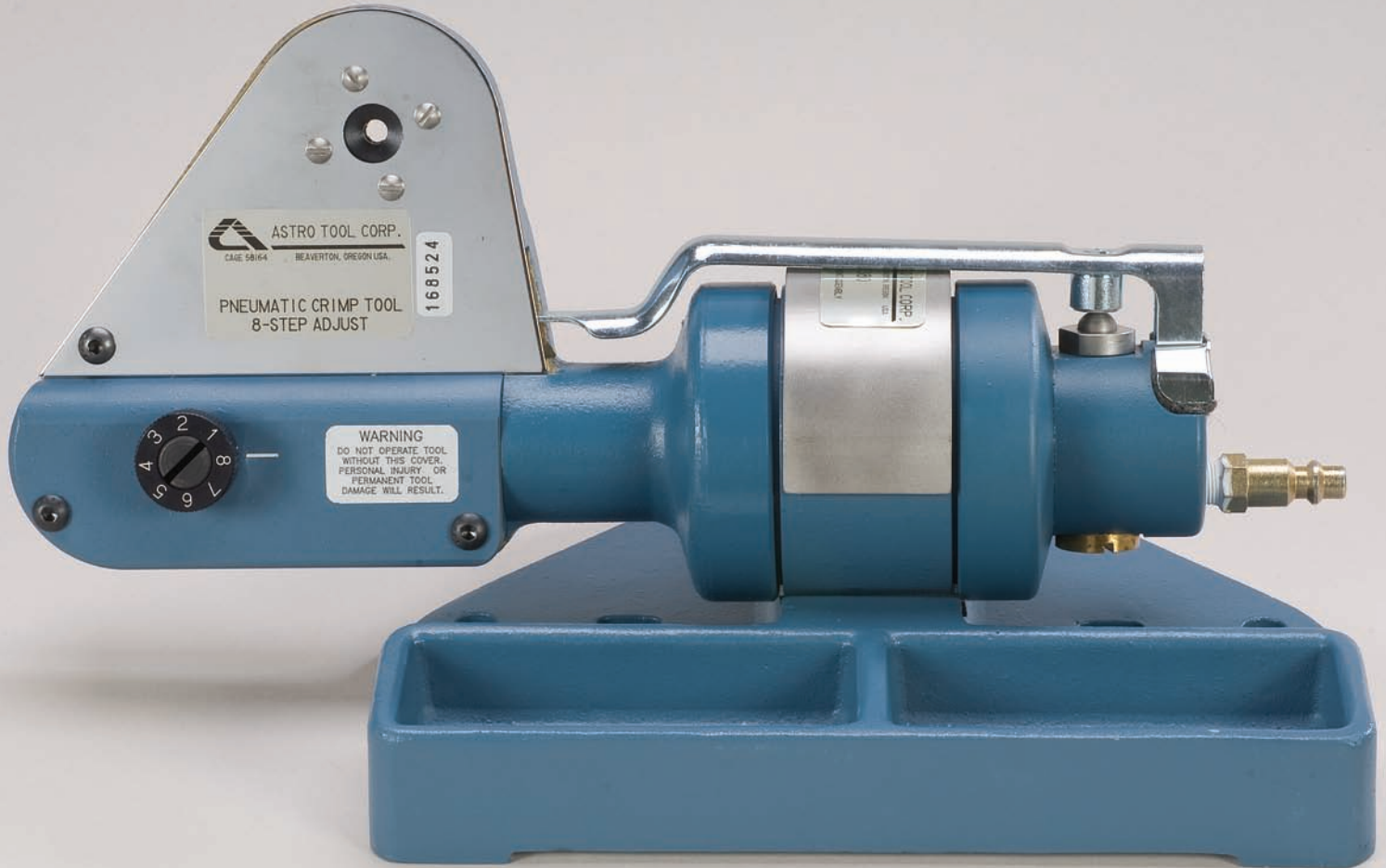
The **APC708**, 8-Step Adjustable Manual Feed Pneumatic Crimping Tool is a fast, versatile, pneumatically actuated four indenter tool for crimping MS style or proprietary circular contacts. This tool accommodates all turret head assemblies used with the M22520/1-01 crimping tool. The tool is capable of accommodating contact sizes 12 to 26 and wire sizes 12 to 30 AWG.

Astro manufactures the ATK6002 gaging kit with the gaging pin assemblies for each selector setting. Contact the factory for price and availability.

Tool can be either hand held or mounted on an optional bench mount (P/N 11380). The tool can be actuated by the tool trigger or a foot pedal assembly (P/N 11380-2). (The bench mount and foot pedal can be purchased together as P/N 11380-3). Using these accessories leaves the operator's hands free for inserting and removing contacts and wire.

This tool operates on 80-120 P.S.I. Astro recommends a filtered, regulated and lubricated air supply for optimal performance. Astro offers the 11413 air regulator for this purpose.

Pneumatic Crimp Tools for Circular Contacts



- Portable or bench-mounted
- Cycle controlled ratchet
- Foot pedal assembly available

Astro's line of **Pneumatic Crimp Tools** is designed for moderate volume production. These tools are available for a wide range of contact sizes, from 8 through 26 and wire sizes 8 through 30 AWG.

The externally and internally adjustable tools are just an example of what we can offer. The multi-function tool can also be equipped with D2 indenters for medical applications and specific crimp ranges.

Tool can be either hand held or mounted on an optional bench mount (P/N 11380). The tool can be actuated by the tool trigger or a foot pedal assembly (P/N 11380-2). (The bench mount and foot pedal can be purchased together as P/N 11380-3). Using these accessories leaves the operator's hands free for inserting and removing contacts and wire.

These tools operate on 80-120 P.S.I. Astro recommends a filtered, regulated and lubricated air supply for optimal performance. Astro offers the 11413 air regulator for this purpose.



Internally Adjusted

The internally adjusted line of crimp tools is designed for adjustments by qualified personnel only. This tool features an adjustment knob located inside the front cover plate of the tool. Once set by qualified personnel, the tool is not adjustable by the assembly line operator, thus helping to eliminate operator error. The tool operates with replaceable, single position locators. When using these locators, the internally adjustable tools can crimp a wire range of 8-30 AWG. The internally adjusted tools can be adapted to accept the MS3191-4 and M22520/1 turrets by ordering a 620754 turret adaptor assembly.

Standard internally adjustable tool: 612871

Mini tip tool: part number 612768.

4 indent style tool: part number 11221.

4 indent style tool with 3 locators: part number 10967.

3212 (20 GA.) 3213 (16 GA.) 3214 (12 GA.)

Externally Adjusted

The externally adjustable line of tools is designed to accept MS3191-4 and M22520/1 style turret head assemblies. These tools have a micrometer style adjustment knob which allows them to be adjusted and set to crimp depths ranging from .015 to .085 inches in increments of .001. The dial indicator on this style of tool has three sets of numbers. One set indicates crimp depth in thousandths of an inch. One set corresponds to the selector knob settings on the M22520/1-01 (615708) tool. The third set corresponds to the selector settings on the MS3191-4 (612179) tool. These multi-selector readings allow the tool to be used easily with the data for crimp settings located on all Mil-Spec turrets. In its turret-operated configuration these tools crimp contact sizes 12 through 26 and wire sizes 12 through 30 AWG.

Standard externally adjustable tool: 612141

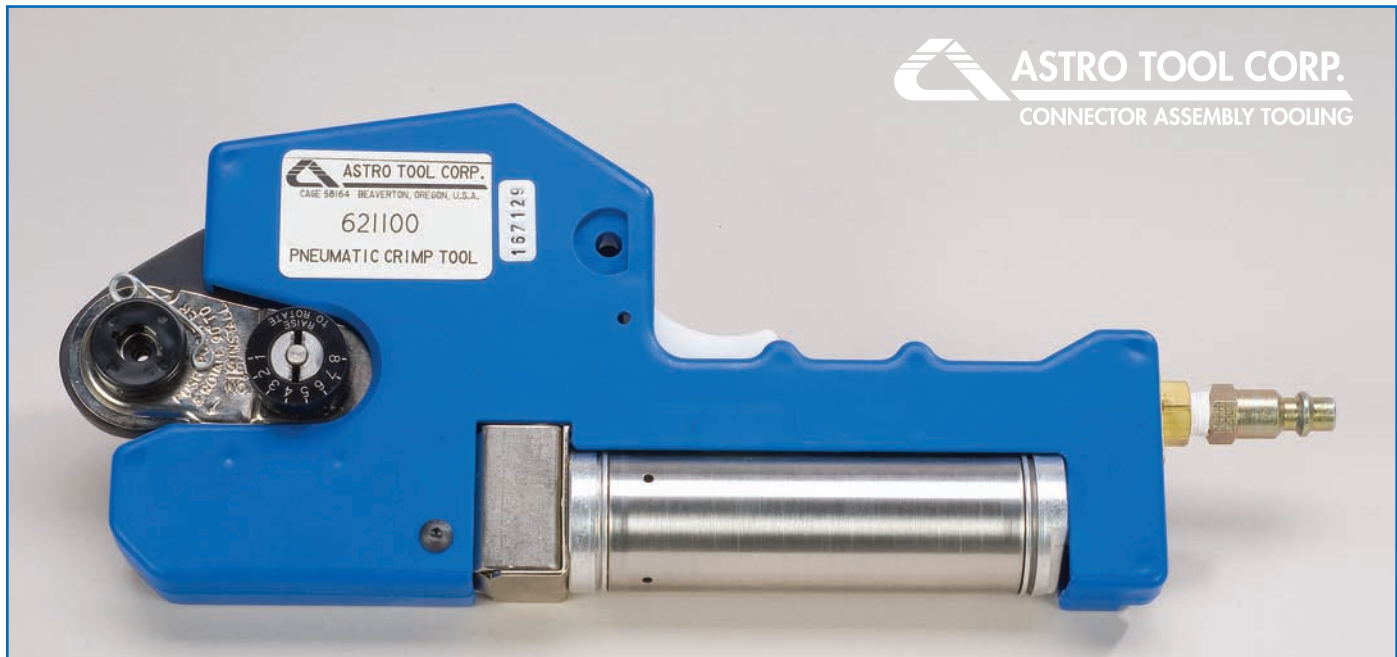
This tool can be adapted for use with locators by ordering the 615161 slide strap adaptor assembly.

A tool with a mini tip indenter is available under part number 615250.

Locators for MS Applications		
Contact Size	Locator Part #	Contacts Accommodated (Ref.)
20	3212	MS 3190 MS 24254
16	3213	MS 3192 MS 3193 MS 24225 NAS 1662 NAS 1663 MS 18134
12	3214	MS 18136 M39029/4 M39020/5
20	11568-1	MS 17803 MS 17807
16	11568-1	MS 17804 MS 17808 M39029/34 M39029/35
22	612507	MS 27491-22, 22D, 22M MS 27492-22, 22D, 22M MS 27493-22, 22D, 22M MS 27494-22, 22D, 22M M39029/57 M39029/58
	613264	M39029/56 MS 27490-22, 22D, 22M
20	7005626	M39029/56 M39029/57 M39029/58 MS 27490-20 MS27491-20 MS27492-20 MS27493-20 MS27494-20
16	7008289	M39029/58 MS 27493-16 MS 27494-16
	7008300	M39020/56 M39029/57 MS 27490-16 MS 27491-16 MS 27492-16
12	7008290	M39029/56 M39029/57 M39029/58 MS 27490-12 MS 27491-12 MS 27492-12 MS 27493-12 MS 27494-12



Portable Intermediate and Miniature Pneumatic Tools



- Conforms to performance requirements of MIL-DTL-22520
- Portable or bench-mounted operation
- Eliminates operator fatigue and reduces carpal tunnel syndrome problems

The intermediate and miniature portable pneumatic crimping tools, **621100** and **621101**, provide all the features of the M22520/2-01 and the M22520/7-01.

Reduced operator fatigue and reduced carpal tunnel syndrome occurrences make these tools ideal for assembly line operation. Both tools can be used as portable units or can be bench mounted (part number **621102**) and used with an optional foot pedal (part number **620372**). If both bench mount and foot pedal are desired, order part number **620925**.

The **621100** is color coded blue to match the M22520/2-01 and accepts all /2 positioners.

The **621101** uses the standard M22520/7 positioners and is color coded green to match the /7 tool.

Both tools feature the eight step adjustable selector found on the M22520 8-indent style crimping tools. Operating procedures for these tools are identical to the hand operated models.

Both the **621100** and **621101** operate at 80-120 PSI and require a lubricated, regulated and filtered air supply. Astro offers the 11413 regulator for this purpose.

We always recommend the periodic gaging of our tools. The gages for these tools are as follows:

621100: Use the 615716 (M22520/3-01) GAGE

621101: Use the 616337 (M22520/3-03) GAGE

These tools are each 10 ½ inches long and weigh approximately 32 ounces.