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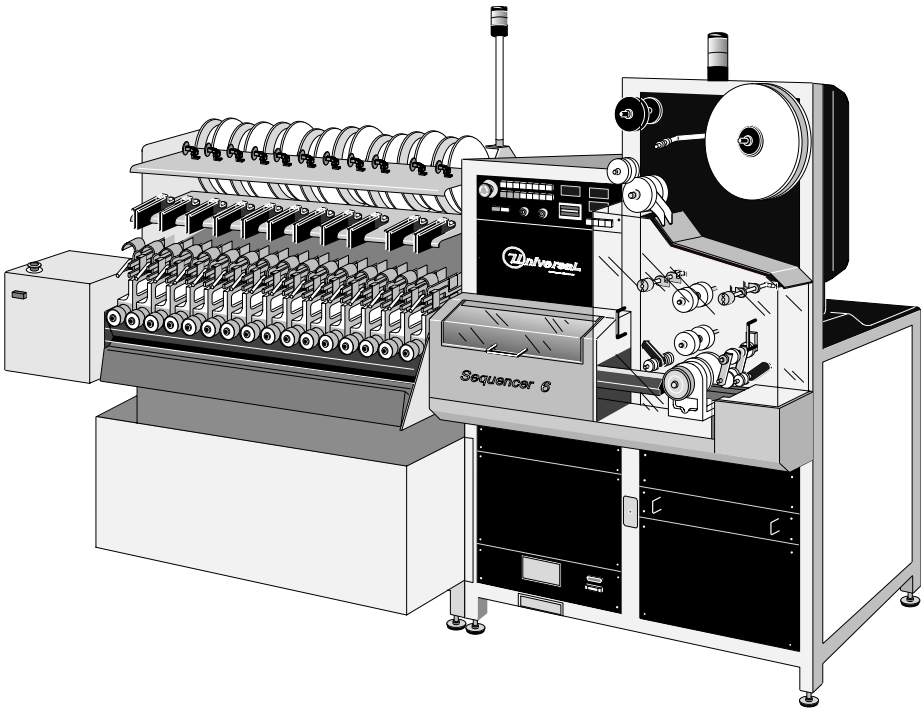
Sequencer 6
(2596C)

CE

Universal®

Insertion Machine Division
Product Line

Sequencer 6
Model 2596C



Expandable Component Sequencer Features

- Processing rates up to 25,000 components per hour
- Expandable to 200 input stations
- Low profile provides easy operator access for loading input components
- Low Part Sensing provides automatic notification of low parts before parts are depleted
- CE-marked for operator safety

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All specifications are subject to periodic review and may be changed without notice.

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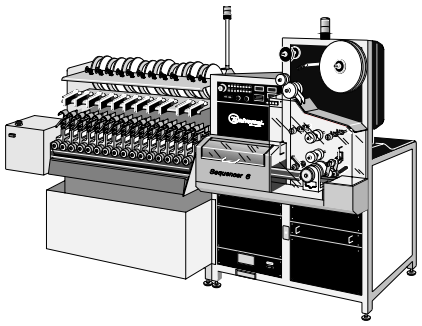
Indicates a change to the document from the previous edition.

Introduction

The Sequencer 6 (Model 2596C) is a modular axial component sequencing system which utilizes rotary dispensing heads, a component centering assembly, and a component taping assembly. It is controlled by a Universal Instruments Control Processor (UICP) and is capable of processing a variety of axial components at rates up to 25,000 per hour (22,500 per hour with the optional expanded range verifier). The minimum configuration consists of a control module and one 20-station add-on module (20 dispensing stations). It is expandable up to 200 dispensing stations for up to 200 discrete component values.

In consideration of essential health and safety requirements, the Sequencer 6 is CE-marked.

Machine Concept



The Expandable Component Sequencer inputs unsequenced, taped axial components mounted on reel holders or in ammo packs. These are fed to the dispensing heads where the component is cut from the tape and placed on a conveyor chain in a sequence predetermined by a pattern program. The component then passes through a part sensing station, where a sensor verifies component presence.

The component then moves to the component centering device, which accurately centers it as it enters the axial lead taping unit. The axial taping head raises the component into pitch wheels, where the component leads are placed between two sets of adhesive tape and wound on a reel or layered into an ammo-pack holder.

Once the components are retaped in sequential order and wound on a reel / ammo-pack, they are ready for insertion into PC boards by a Variable Center Distance (VCD) insertion machine.

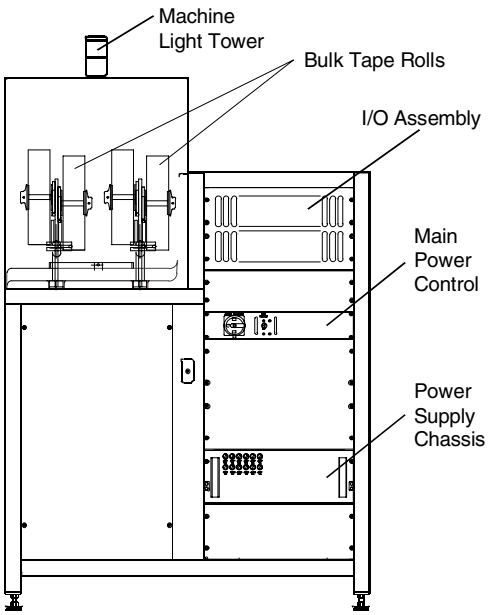
Functional Description

A pattern program is first generated to define component sequence and location on the machine. Components are individually routed through dispense heads and sequences can be randomly selected among all existing dispense heads.

Once a machine sequence is programmed and loaded into the UICP, automatic sequencing can begin. Parts are cut from input tape in the individual dispense heads and placed on the conveyor chain in the sequenced order. The chain advances the components through the Missing Part Detector and into the taping head assembly, where each part is accurately centered before both leads are pressed between two layers of tape.

Standard Features

Control Cabinet (Back View)



Control Cabinet

The control cabinet is a single frame assembly which encloses the electrical assemblies, the drive, and taping head.

Machine Light Tower

The machine light tower indicates the status of machine operation with the following color lights.

- Red — out of jumper wire
- Yellow — flashing: stopped machine problem
  non-flashing: operator has stopped the machine

Input/Output (I/O) Assembly

The input/output (I/O) assembly contains the circuitry necessary for interfacing the controller with the machine. It is contained on a slide-out rack within the electrical cabinet.

Controller

A series 8220 Universal Instruments Control Processor (UICP) Assembly, Machine Self Diagnostics, and Universal Instruments Control Software (UICS®) are standard with the base machine. These provide a pattern program library, management information display, full on-line editing, and a diagnostic display. The series 8220 is the standard UICP which is described in GS-072.

The controller is mounted behind the I/O assembly.

Power Supply Chassis

The power supply chassis contains AC and DC power supplies, relays, and circuit protection fuses.

Missing Part Detector

A photo-optic sensing unit monitors the conveyor chain for the presence of sequenced components prior to lead taping. A missing part halts processing, allowing the operator to replace the missing component on the conveyor prior to the taping operation.

Drive Unit

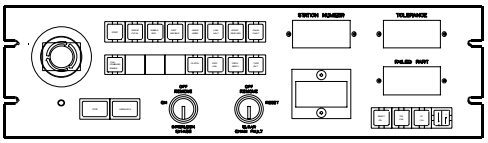
A high-torque, brushless DC motor with a harmonic drive transmission drives the conveyor chain and taping unit. System timing is accomplished through a microprocessor controlled servo system.

Taping Head Assembly

The taping head assembly is designed to provide long operating periods between tape replenishment. It also provides easy setup and maintenance. The taping unit accepts bulk 1828m (2000 yard) rolls of tape. Tape is monitored for breakage and runout by an interlock switch and indicator light.

The take-up reel holder is a quick change, spring-secured assembly.

Control Panel



The control panel is positioned for operator ease. The control panel contains operating controls and indicators necessary for efficient machine operation.

Readout display: Provides continuous display identifying the dispensing station of the programmed component to be in the part sensing station at the time of readout.

Controls and indicators for the optional Model 2862B on-line Expanded Range Verifier (ERV) are also positioned on the control panel for ease of operation.

Component Body Centering

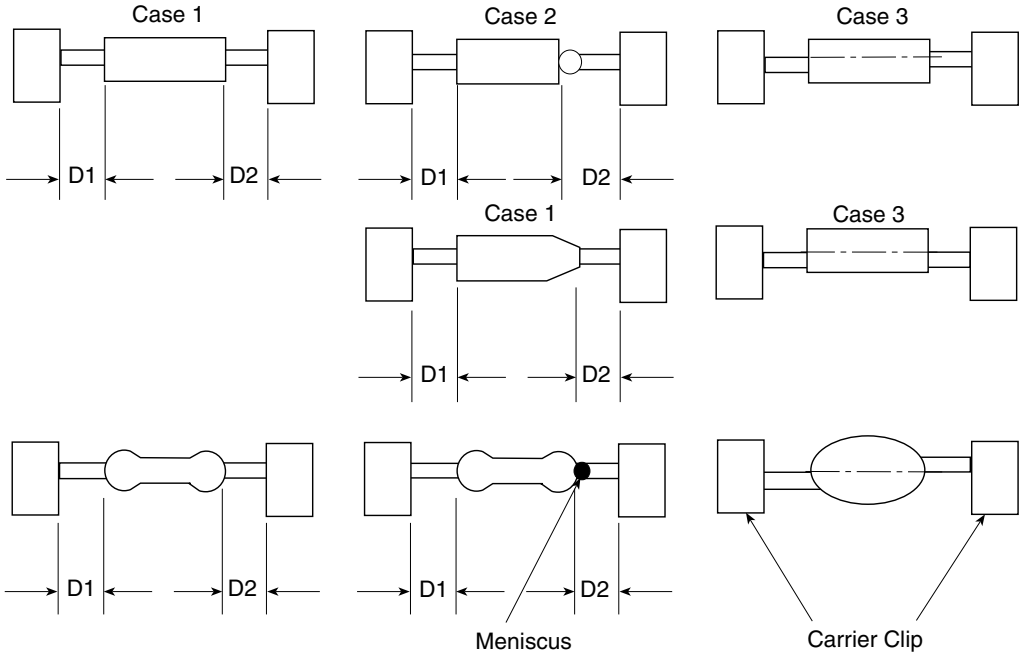
To ensure proper component centering on standard sequencers, a centering device assembly is used which centers and holds the component in fingers before and during taping. The centering capabilities depend on the physical configuration of components as stated below and shown in Component Case Specifications for Insertion.

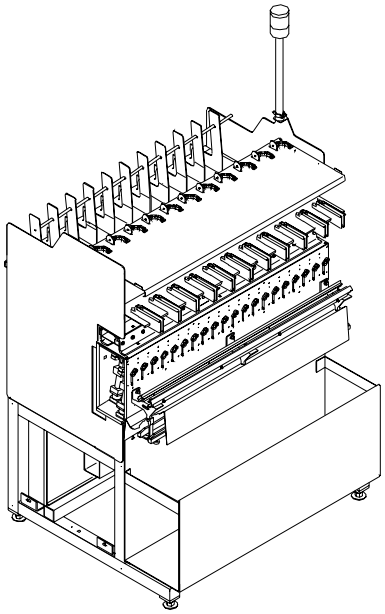
(1) Symmetrically shaped components (case 1) are centered within 0.25mm (0.010"). This is measured from the inner tape edge to the component body on each side and then subtracting the two measurements (D1 minus D2) to determine the specified results. Case 1 = D1 – D2 ±0.25mm (0.010").

(2) Non-symmetrically shaped components (case 2), those having dissimilar body diameters at opposite ends or those having an undefined point where the body ends and the lead begins (meniscus), are centered within 0.69mm (0.027"). Because the centering fingers use a 1.17mm (0.046") diameter for centering , any component with a meniscus exceeding the 0.046" diameter will degrade centering accuracy.
Case 2 = D1 – D2 ±0.69mm (0.027").

(3) Components which do not maintain leads on a centerline axis, or otherwise do not meet the specifications of case 1 or case 2, are designated as case 3. These components cannot be guaranteed proper component centering.

Component Case Specifications for Insertion





Sequencer Add-On Module

The capacity of each module is 20 dispensing heads for processing 20 discrete component types or values.

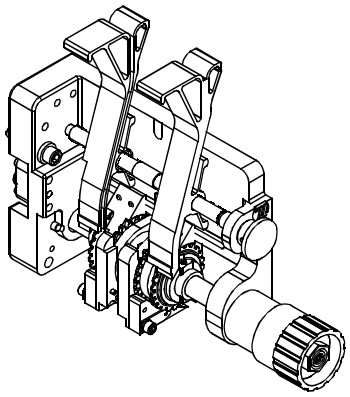
Dispensing Stations

Each sequencer module has 20 dispensing stations. Every programmed station being used must be equipped with a dispensing head. An unused dispensing station does not affect normal machine operation, but must contain a blank dispensing head.

Optical Refire Dispensing Heads

The Sequencer 6 uses rotary dispensing heads to cut and place components in sequence on the conveyor chain. Rotary dispensing heads are available in two models: 5mm (0.200") pitch and 9mm/10mm (0.375"/0.400") pitch, and with optical refire for each of the pitch variables.

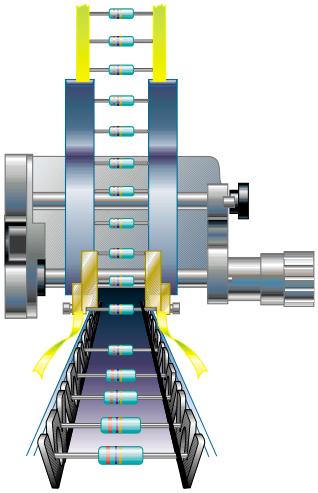
Dispensing heads are not included and must be ordered separately to meet individual machine requirements.



The rotary dispensing head has several unique features:

- High operating speed of 25,000 cycles/hour.
- Output taping class changeover requires two minutes using only a hexagonal wrench and setup gage. Input tape class changeover requires 30 seconds.
- One cut component is staged during component load, reducing scrap and simplifying changeover.
- Symmetrical cutter provides two cutting surfaces for a minimum of 6 million cuts per cutter.
- Tape guide setting with lead screw allows fine adjustment of tape guides.
- Detent provides a method of determining component position.

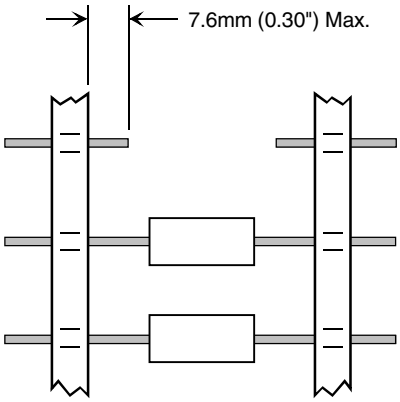
The optical refire circuit in the Sequencer Module 5mm (0.200") pitch senses a missing component from the input tape and recycles (refires) the dispensing head index mechanism to bring a component into position for programmed dispensing. Because of its ability to cycle through blank areas of the input tape, it reduces the need for operator attention, thus increasing the effective output rate. This



refire feature is most useful when processing pre-inspected component reels in which gaps are left because of the removal of test-failed components.

Each refire dispensing head is equipped with a light source and an optical light sensor. As a taped component is indexed into position for dispensing onto the conveyor chain, one of its leads interrupts the light beam.

If the light beam is not interrupted, a “part missing” signal is generated causing the dispensing head to automatically index on the next machine cycle. This “refire” action repeats until a component is detected at the dispensing position or a programmed maximum count is reached. Excessive missing components in the input tape will cause refiring of the dispensing head, reducing effective machine cycle rate.

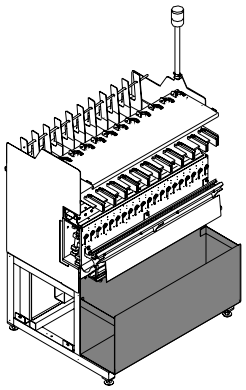


The refire dispensing head processes components that meet the specifications contained in GS-061. To prevent the sensor from giving a false indication by sensing a scrap lead end, component removal from the input tape should not leave a lead end after cutout that extends more than 7.6mm (0.30") beyond the inside tape edge.

Low Part Sensing/Display

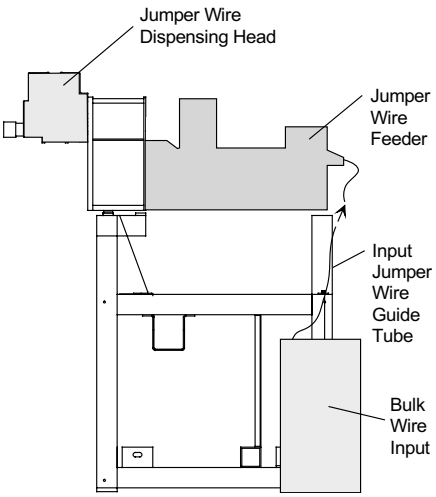
The low part sensing feature provides the operator with a visual alarm display whenever any input tape station nears empty within each add-on module. Each input station contains a roller-type sensor flag assembly that interrupts a light beam when the tape runs out. A single tower alarm light illuminates when a runout condition is sensed. The tower light is reset when a replacement role of tape is installed.

Scrap Bin



Standard equipment includes a scrap bin located below the conveyor and dispensing stations. As the components are cut from the input component tapes, the lead ends and tape fall into the scrap bin. The scrap bins are easily cleaned by sweeping scrap to one end of the machine for disposal.

Optional Features

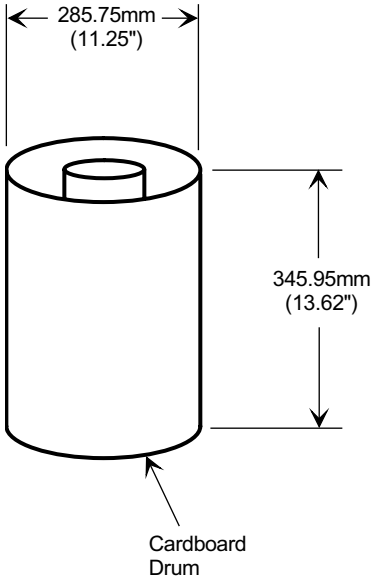


The Jumper Wire Dispenser System

A jumper wire dispensing head and feeder assembly included in this option processes jumper wires from a continuous spool of wire, eliminating dispensing from reels of previously taped and reeled jumper wires. It dispenses accurate lengths of cut wire and conveniently changes to various wire gages and lengths. It is available as a factory installed option and as a retrofit kit. **A maximum of two Jumper Wire Dispenser Systems install in any machine configuration.**

The Jumper Wire Dispenser System operates by drawing wire from a replaceable bulk reel; a cardboard drum package works best. The wire feeder assembly straightens and then feeds the wire to the dispensing head. Pattern program control cycles the dispensing head, cutting a length of wire from the continuous strand, and dispensing it on to the sequencer chain.

A stepper driver electrically drives the feeder, controlling the length of the wire fed for each machine cycle. The operator selects Class A output lengths with a push button and sets a rotary switch on the feeder for one of 16 wire lengths for A input class. The Class A input length adjustment is in 0.10mm (0.004") increments.



Wire input — Wire input is available in various package sizes. The preferred package is the cardboard drum, which measures 345.95mm (13.62") high by 285.75mm (11.25") in diameter.

The suggested source for wire input is Hitachi Cable America Inc. (White Plains, NY; 1-800-394-0234). The product is Solder Coated Copper Wire, ITPA 0.60 (SP-EM/SWP-191).

Reel packages containing smaller amounts of wire are also available, but they tend to jam and unreel unevenly. These provide adequate wire for shorter runs, but require more frequent changeover when performing extensive production runs. Consult your Universal Sales Engineer for details.

Cut wire length — Class A: 51.61mm ±0.33mm (2.032" ±0.013") with thumbwheel increments of 0.10mm (0.004").

Power requirements — 24 volts AC is furnished by the sequencer power supply.

Wire diameter — 0.6mm (0.024") solder coated copper wire is standard. The wire sizes below are tested with the expected results listed. Contact your Universal Sales Engineer for details.

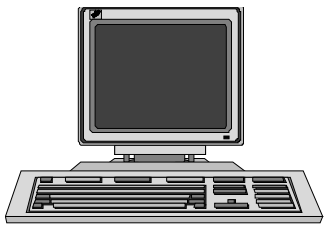
Wire Material Property

Wire Diameter	Tensile Strength	Elongation
0.5mm	27-35 kg/mm	4% maximum
0.6mm	27-35 kg/mm	
0.45mm	30 kg/mm	28% maximum
0.45mm	22-30 kg/mm	10-20%

Expanded Range Component Verifier

The optional Model 2862B on-line Expanded Range Component Verifier verifies sequenced components prior to lead taping. The installation of this option reduces cycle rate to a maximum of 22,500 components per hour. Detailed information about this optional feature is contained in GS-186.

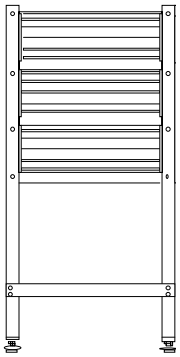
Universal Control Terminal (UCT)



The Universal Control Terminal (UCT) hardware/software package allows a Universal selected personal computer to be used as an intelligent terminal connected to a Universal machine control processor. The machine control processor software must be UICS (version 1.3 or higher) or Satellite (version 2E.3 or higher). Refer to GS-319-XX.

The UCT package includes a visual display terminal and keyboard, sufficient data storage, miscellaneous hardware, and manual.

Make-Up Trays



Modularized make-up trays are on a mobile installed rack assembly for easy location around the machine.

Input Specifications

The axial lead components prepared and taped to the requirements established in GS-061, which is an adaptation of EIA standard RS-296-E, can be processed by the Sequencer 6 (Model 2596C). The standard input for this machine is Class I.

Class II and III inputs may be located in a number of different stations in each add-on module, exclusive of the Jumper Wire option.

Output Specifications

Reel Output

The Model 2596C is tooled for standard output. Standard output pitch is 5mm (0.200") and 10mm (0.400") pitches. Refer to Input-to-Output Taping Classes in the Technical Specifications.

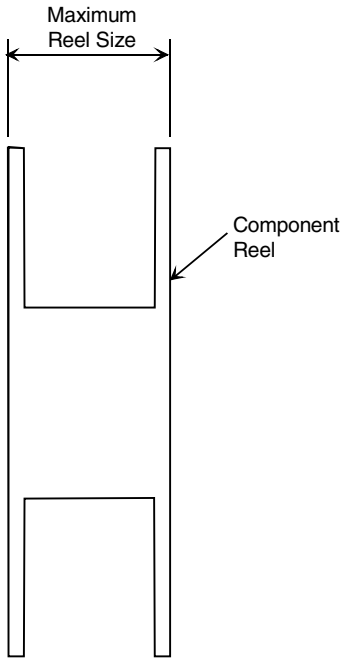
Ammo Pack Output

The ammo pack assembly folds the taped components in layers within an ammo pack container.

Supporting Documents

GS-061	Lead Tape Reel Packaging of Axial Lead Components, Series 2500
GS-072	Satellite Control® Systems, Series 8000
GS-186	Expanded Range On-Line Axial Lead Component Verifier, Model 2862B
GS-319-XX	Pattern Programming Utility (PPU) Model 86721

Maximum Size of Component Reels (Outer Edge-to-Outer Edge)



Component Class	Maximum Reel Size
I	68.58mm (2.7")
II	81.28mm (3.2")
III	93.98mm (3.7")

Sequencer Input Configuration: Location of Dispensing Stations by Component Class

Station	Class I	Class II	Class III	Notes
1	✓			
2	✓			
3	✓	✓	✓	Without Jumper Wire
3				With Jumper Wire
4	✓			
5	✓	✓	✓	If no Jumper Wire in Station 3
5	✓	✓		If Jumper Wire in Station 3
6	✓			
7	✓			
8	✓			
9	✓			
10	✓			
11	✓	✓		Any Combination
12	✓			
13	✓	✓		Any Combination
14	✓			
15	✓	✓		Any Combination
16	✓			
17	✓	✓		Any Combination
18	✓			
19	✓	✓		Any Combination
20	✓			
With Jumper Wire:		14 stations for Class I only 5 stations for Class I or II 1 station for Jumper Wire only		
Without Jumper Wire:		13 stations for Class I only 5 stations for Class I or II 2 stations for Class I, II, or III		

Technical Specifications

Cycle Rate

25,000 per hour. Reduced to 22,500 with optional on-line Expanded Range Verifier.

Machine Configuration

Up to 10 add-on modules with 20 dispensing stations (200 stations maximum). Optional Jumper Wire Dispensing Heads may be installed at only 2 stations per machine, and only at stations 3, 23, 43, 63, and so forth.

Dispensing Heads

Must be ordered separately; up to 20 units per Add-On Module.

Component Input

Component Wire Size	0.38mm to 0.97mm at 15.88mm body length (0.015" to 0.038" at 0.625")
	0.38mm to 1.07mm at 12.70mm body length (0.015" to 0.042" at 0.500")
Component Body Diameter	0.381mm to 5mm pitch head (0.015" to 0.197" for the 0.200")
	0.381mm to 10mm pitch head (0.015" to 0.394" for the 0.400")
Jumper Wire Diameter	0.45mm to 0.81mm (0.018" to 0.032")

Component Taping Output

5mm (0.200") pitch, standard with 44mm (1.72") between tapes.

Tape Rolls

1828 meters (2000 yards) bulk, standard.

Controller

A series 8220 UICP Assembly. UICS software and Machine Self Diagnostics are standard.

Input-to-Output Taping Classes

Sequencer Input

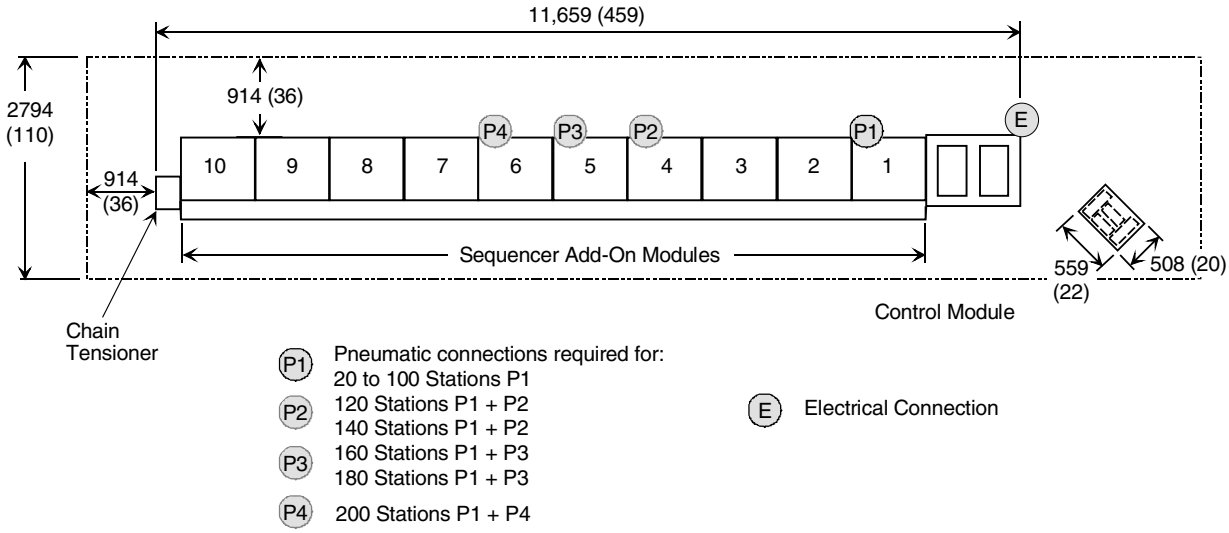
Input Class	Distance Between Tapes
I	52.4 ±1.5mm (2.063 ±.059"), standard
II	63.54 ±1.5mm (2.5 ±.059")
III	73 ±1.5mm (2.874 ±.059")

Sequencer Output

Output Class	Component Cut Length	Maximum Body Length	Maximum Insertion Hole Center Distance
Standard	50.8mm ±0.254mm (2.000" ±0.010")	15.7mm (0.620")	21.6mm (0.850")
Class B	Consult your Universal Sales Engineer		

Sequencer Module Configuration

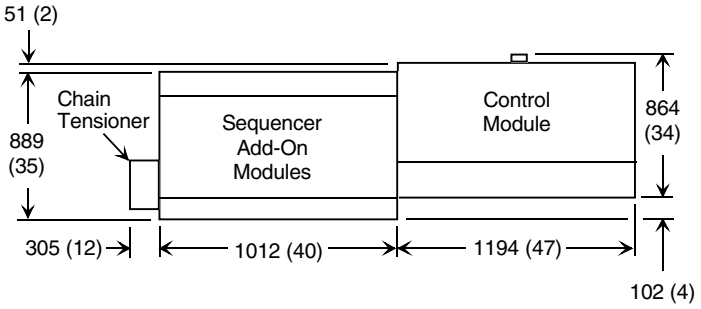
Dimensions are in millimeters;
inch equivalents are bracketed.



P1 Pneumatic connections required for:
20 to 100 Stations P1
P2 120 Stations P1 + P2
140 Stations P1 + P2
P3 160 Stations P1 + P3
180 Stations P1 + P3
P4 200 Stations P1 + P4

E Electrical Connection

Minimum Machine Configuration - 20 Stations



Installation Considerations

Dimensions for the 2596C

	Uncrated (no skid or crating material)		Air Ride Van (skidded and plastic covering banded over machine)	
	L X D X H[1]	**Weight[1, 2]**	**L X D X H[1]**	**Weight[1, 2]**
Control Module (crated by itself)	1194 x 864 x 1880[1] (47 x 34 x 74)	354 (780)		
Add-On Module [3] (each crated separately)	1016 x 889 x 1448 (40 x 35 x 57)	214 (473)	1193 x 1067 x 1600 (47 x 42 x 63)	256 (563)
Last Add-On Module (one per machine, has chain tensioner on end)	1346 x 889 x 1448 (53 x 35 x 57)	227 (500)	1727 x 1066 x 1600 (68 x 42 x 63)	272 (600)

	Air Crating (partial wood crating)		Ocean Crating (full wood crating)	
	L X D X H[1]	**Weight[1, 2]**	**L X D X H[1]**	**Weight[1, 2]**
Control Module (crated by itself)	1422 x 1168 x 1905 (56 x 46 x 75)	447 (985)		
Add-On Module [3] (each crated separately)	1219 x 1092 x 1676 (48 x 43 x 66)	286 (631)	1219 x 1092 x 1676 (48 x 43 x 66)	300 (660)
Last Add-On Module (one per machine, has chain tensioner on end)	1753 x 1092 x 1676 (69 x 43 x 66)	332 (732)	1753 x 1092 x 1676 (69 x 43 x 66)	390 (859)

Notes

1. Measurements and weights are in metric figures; inch and pound equivalents are bracketed.
2. Weight varies as a result of pallet construction and moisture content of wood.
3. Height dimension including low part alarm light is 1930mm (76"). Low part alarm light is removed for shipment.

Floor Space	A minimum clear area of one meter (or three feet) around the machine perimeter is recommended for machine operation and servicing.

Service Requirements

Electrical

Input Voltage	Input Breaker	Actual Current Draw (50/60 Hz)
100 VAC	15 amps	9 amps
110 VAC	15 amps	9 amps
120 VAC	15 amps	9 amps
200 VAC	15 amps	5 amps
210 VAC	15 amps	5 amps
220 VAC	15 amps	5 amps
230 VAC	15 amps	5 amps
240 VAC	15 amps	5 amps

Voltage and frequency requirements must be stated at time of order.

Allowable Input:
Voltage fluctuation ±10%
Frequency fluctuation ±2%

A point is provided for connection to protective earth. A 15 ampere / 6.25 ampere circuit breaker is the overcurrent protective device and the short circuit trip current rating is 2000 amperes.

Pneumatic

5 CFM at 70 psi
(142 liters/minute at 5 bar). Non-lubricated, dry air, maximum contamination particle size of 5 microns.

An additional air drop is required at different locations for 120 stations and up. See Sequencer Module Configuration on page 12.

Equipment is adequately protected against ingress of solid and liquid contaminants.

Environmental Requirements

Ambient Temperature	10° C to 35° C (50° F to 95° F)
Operating Humidity	10% to 90%, noncondensing
Operating Altitude	1000m. Consult your Universal Sales Engineer for installations above 1000m.
Storage Temperature	-25° C to 55° C (-13° F to 131° F); not exceeding 24 hours up to 70° C (158° F) Humidity range is 10 to 95%, noncondensing. Universal provides suitable means to prevent damage from humidity, vibration, stress and shock.
Noise	75 dbA in accordance with National Machine Toolbuilders Assoc. Standards.