[redacted]

625-211, Appendix E, Rev. A

Sept., 1983

LIBRARY COPY

NOV 21 1984

LEWIS LIBRARY, NASA
CLEVELAND, OHIO

Galileo

Orbiter Parts, Materials, and Process Requirements

Appendix E. Electronic Parts Mechanical Leadform and Footprint Configuration Data

(NASA-CR-176433) PROJECT GALILEO ORBITER PARTS, MATERIALS, AND PROCESS REQUIREMENTS. ELECTRONIC PARTS MECHANICAL LEADFORM AND FOOTPRINT CONFIGURATION DATA. APPENDIX E, REVISION A (Jet Propulsion Lab.) 41 p N86-71142

Unclas 00/18 03424

JAN 1985
RECEIVED
NASA STI FACILITY
ACCESS DEPT.

National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

JPL D-355, App. E

1 of 41

625-211, APPENDIX E, REV. A

PROJECT GALILEO ORBITER PARTS, MATERIALS, AND PROCESS REQUIREMENTS

ELECTRONIC PARTS MECHANICAL LEADFORM AND FOOTPRINT CONFIGURATION DATA

PD 625-211 Sept. 1983

THIS DOCUMENT CONTAINS ONLY APPENDIX E TO THE PARTS, MATERIALS, AND PROCESS REQUIREMENTS DOCUMENT. IT IS PUBLISHED UNDER SEPARATE COVER IN ORDER TO MORE EASILY ACCOMMODATE REVISIONS AND TO DISSEMINATE UNIQUE USEFUL INFORMATION.

R. A. Bennett

Concurrence: R. F. Draper

JET PROPULSION LABORATORY
CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA, CALIFORNIA

JPL D-355

Distribution List for 200

Aardahl, C.	171-301	Gindorf, T. E.	144-218
Acord, A. L.	179-104	Goldfine, M. T.	179-104
Albrecht, V.	264-119	Goldyn, E.	114-129
Alcorn, D.	506-209	Goliak, T.	185-3
Allen, R.	198-112	Goudy, J.	180-801
Ames, H. O.	156-142	Greenfield, M.	157-102
Amundson, U.	233-307	Griffith, D. E.	233-307
Aptaker, I. M.	11-116	Gurrola, M.	144-218
Arakaki, G.	158-224	Haga, R.	198-112
Bastow, J.	144-218	Hayes, D.	158-224
Beck, A.	144-218	Hess, D. S.	157-205
Becker, R. A.	157-102	Hine, M. G. (25)	169-427
Bell, D.	198-112	Holmes, K. G.	198-326
Bennett, R.	158-224	Horttor, R.	161-228
Billitti, J.	158-224	Howard, D. A.	126-300
Birnbaum, M. M.	185-3	Imai, S.	190-207
Bondi, J. E.	171-301	Ivanoff, R.	233-307
Boyle, K.	233-307	Jaivin, G. I.	T-1201
Brace, R.	161-213	Jenkins, G.	11-116
Breidenthal, J.	161-228	Johnson, D. R.	156-142
Brejcha, A.	180-604	Johnson, H. L.	198-220
Bridgeforth, A. O.	198-220	Johnson, S. A.	144-218
Bunker, R. L.	198-112	Jones, S. G.	169-427
Campbell, R. W.	277-102	Kapell, G.	158-224
Cannova, R.	233-103	Katzmann, S.	80-1
Carpenter, D. G.	198-326	Keeler, L.	161-213
Charlan, W. D.	198-112	Kellum, E.	264-521
Cherniack, A. E.	198-112	Kern, D.	144-218
Clarke, T. C.	156-217	Kievit, J. C.	158-224
Clary, M. C.	168-222	Kindt, D. H.	169-427
Coppock, C. J.	233-307	King, C. R.	158-224
Coyle, G. G.	158-224	Kinman, P.	161-228
Cunningham, G.	233-307	Kloezeman, W.	158-224
Curry, K.	158-224	Kloss, C.	233-307
Dawe, R.	158-224	Koch, E. F.	251
DeJong, J.	156-142	Kohl, W. H.	156-142
Detweiler, H.	161-213	Koprowski, E. F.	157-102
Dolinsky, S.	161-228	LaBaw, C.	11-116
Drogosz, D. W.	161-228	Landano, M. R.	233-307
Dumas, L.	158-224	Lane, F.	158-224
Ervin, G. F.	186-134	Layman, W. E.	157-205
Eyenly, H.	233-307	Linick, T. D.	233-208
Fawcett, W. G.	169-427	Locatell, R. F.	158-224
Franzon, A. O.	157-103	Locke, J.	168-222
Garrison, G. W.	161-228	Lord, D.	161-137
Garwood, R.	233-307	Maag, C.	157-507
Gatti, M.	161-213	Mann, B.	233-307
Gavin, T. R.	169-427	Marian, E.	144-218
Gershman, R.	156-217	Marnoch, I.	72-101
Gin, W.	125-224	Martin, B.	180-601

3

Distribution List for 200

Maxfield, D.	72-101
Mayne, R.	158-224
McGlinchey, L.	198-326
McQuarie, D.	72-101
Miller, J. K.	264-647
Montgomery, L. C.	180-402
Moore, W.	179-104
Newby, C.	18-106
Nichols, D.	T-1180
O'Neil, W. J.	169-427
Ohtakay, H.	198-326
Osborn, F.	198-112
Ott, F.	161-213
Pace, G. D.	198-226
Parrish, R.	233-307
Pierce, W.	57-1
Ploszaj, R. A.	169-519
Price, R.	158-224
Purves, R.	125-138
Putnam, L.	277-102
Quinn, J.	233-103
Ragsdale, G.	T-1180
Randolph, F.	144-218
Rasmussen, R. D.	198-112
Rathcke, R. F.	198-112
Read, W.	158-224
Robinson, P.	144-218
Ross, B.	158-224
Rotter, R. A.	179-104
Schlue, J.	144-218
Scott, W.	T-1180
Shaw, L. T.	233-307
Shipley, W. S.	180-601
Shrake, R.	198-112
Sicol, R.	201-225
Silliman, A.	114-129
Sirpilla, R.	72-112
Sleigh, W.	11-116
Smith, J. R.	157-102
Smith, R.	198-220
Smyth, D.	T-1180
Sohus, A. M.	111-100
Sola, F. L.	233-103
Stanton, R.	185
Stoller, R.	233-307
Stone, E.	161-213
Stultz, J.	157-102
Summers, R. H.	198-112
Tarsala, J.	198-112
Taylor, F. H. J.	161-228
Timpe, C.	161-228
Trubert, M. R.	157-410
Tyler, W. H.	233-103
Vescelus, F.	168-227
Von Deldon, H.	157-103
Wada, B.	157-507
Ward, R.	198-112
White, R. H.	169-506
Whittlesey, A.	144-218
Williamson, R. E.	185
Wolfe, A. E.	169-427
Wright, F.	11-116
Wright, L.	158-205
Yarnell, N. J.	233-307
Yee, K.	158-224

Pfeiffer, K.
DFVLR
5 Koln 90
Linder Hohe Postfach 90 60 58
FEDERAL REPUBLIC OF GERMANY

Sperans, J.
NASA/Ames Research Center
MS 244-14
Moffett Field, CA 94035

DOCUMENT CHANGE LOG

Status	Date	Effectivity	Comments
Original	Sep 1981	All	
Rev. A	Sep 1983	All	

5

LEAD BEND TOOLING, LEADFORM, AND FOOTPRINT MECHANICAL CONFIGURATION DATA

6

APPENDIX E

1.0 INTRODUCTION

1.1 This appendix defines the requirements and control information for the lead bend tooling and footprint patterns required to support Project Galileo.

1.2 This appendix lists only those flatpack and Dual-In-Line (DIP) devices requiring leadform at the date of publication. This appendix does not list all flatpack or DIP parts utilized on Project Galileo.

1.3 Section 514 (Electronics Parts Engineering) generates the master index of parts requiring leadform tooling and finger patterns, and furnishes this index to Section 352 (Space Program Engineering) for implementation. Section 352 provides the tooling, finger pattern drawing, and part carriers or holders and information (where applicable). New requirements identified after the date of this published appendix will be posted in the next revision.

1.4 This appendix is organized into three (3) distinct sections:

Section I - LEAD FORM TOOLING CONTROL CHART

Section II - LEAD FORM PARTS MASTER MECHANICAL CONFIGURATION DESCRIPTION AND REFERENCE INDEX BY MANUFACTURER

Section III - FOOTPRINT PATTERNS MECHANICAL CONFIGURATION DESCRIPTION

Each of the above sections is discussed separately as follows:

2.0 SECTION I - LEAD FORM TOOLING CONTROL CHART

2.1 Table I-1 is offered for information only.

2.2 Table I-1 is utilized by Section 514, Section 352, and JPL Quality Assurance to identify and control the leadform tooling configuration required for utilization on a specific part type identified in Section II, Table II-2, by manufacturer.

2.3 As additional tool configurations are required, they will be added to this master chart. Items not contained herein should be discussed with Section 514 and 352 representatives.

3.0 SECTION II - LEADFORM PARTS MASTER MECHANICAL CONFIGURATION DESCRIPTION AND REFERENCE INDEX BY MANUFACTURER

3.1 Table II-1 Manufacturer Lookup Index

3.1.1 Table II-1 tabulates the three alpha manufacturer code, the corresponding manufacturer name, and the respective page number where the part can be found in Table II-2.

3.2 Table II-2 Leadform Parts Matrix

3.2.1 Table II-2 is organized in alphabetical order by part type manufacturer to facilitate lookup and reference.

3.2.2 Table II-2 consists of the following major elements.

3.2.2.1 MFG P/N REF - Represents the common generic part name, part number, or "street" name. In some cases, the JPL part number (part physical marking) is offered for reference.

3.2.2.2 DEVICE DESCRIPTION - Represents the common device description or function.

3.2.2.3 PART IDENTIFICATION CONTROL SPECIFICATION - Represents the JPL PT, ST, or CS specification that controls the part electrical and mechanical constraints specified for the acquisition activity at the supplier. Where a PT, ST, or CS designation is absent, the part may have been procured to a Military Specification/slash-sheet and/or a custom negotiated exhibit to the purchase order or contract.

3.2.2.4 SPECIFICATION REVISION - Represents the current revision to the JPL PT, ST or CS specification, where applicable or available. In some cases, the applicable specification may be a manufacturers catalog, manufacturers data book, or Military Specification/slash sheet, or manufacturers drawing.

3.2.2.5 PKG DWG OR TYPE - Represents the controlling device mechanical description or configuration figure in the JPL PT, ST, or CS, or the package type description furnished in the manufacturers control drawing.

3.2.2.6 NUMBER OF LEADS - Represents the number of mechanical leads attached to the device when delivered (includes those that exhibit no electrical connection).

3.2.2.7 TOOL CONFIGURATION - Represents the JPL ST number assigned by Section 352 to control the leadform and overall package dimensions established by JPL Drawing 10045621. References Section I, Table I-1.

Note: Table II-2 lists current tool assignments. At an earlier date, another tool may have been used to fabricate a device.

3.2.2.8 FOOTPRINT PATTERN DRAWING - Represents the footprint pattern drawing letter assigned by Section 352 to accommodate the lead form part on the printed circuit board cover layer design.

3.2.2.9 LEADFORM CARRIER TYPE - Represents the part carrier or holder required after leadform to protect the formed device and maintain dimensional configuration control to the footprint pattern and part control specification.

3.2.3 As stated previously, many of the specifications referenced represent the current specification status, not the specification status and control documentation available and utilized at the time the leadform tooling was designed and fabricated, and when parts were procured. Questions or conflicts in this regard should be discussed with Section 514 and 352 representatives.

4.0 SECTION III - FOOTPRINT PATTERNS MECHANICAL CONFIGURATION DESCRIPTION

4.1 Table III-1 Footprint Patterns with Letter Assignment

4.1.1 Table III-1 depicts the footprint patterns in alphabetical order referenced in Table II-2 for printed circuit board cover layer design and formed/sheared part compatibility.

4.1.2 All dimensions in Table III-1 are depicted in inches. Table III-2 provides a conversion index for inches to millimeters.

SPECIAL CAUTION NOTE (Ref. Para. 3.2.2.3, 3.2.2.4, and 3.2.3)

The intent of this appendix is to identify and control the mechanical configuration of the respective parts as they were procured for Galileo. As a consequence, the reader will note that in many instances the mechanical configuration is governed by a MIL Specification JAN Slash Sheet OR the respective Manufacturers Data Book or Catalog current at the time of acquisition. The JPL CS, PT, or ST (although available) was not imposed or available. Also, the part utilized may/may not conform to the JPL PT, ST, CS specification.

SECTION I

LEAD FORM TOOLING CONTROL CHART

Table I-1. Lead Bending Control Chart

Ref. JPL Dwg. 10045621 JPL Tool Parts

JPL TOOL	BLADE	BASE	ANVIL	HOLDER
ST 1744	110	114	121	136
ST 1778	112	116	123	180, +
ST 1847	112	116	123	178, 179, 180, 181
ST 1908		116		137
ST 1909	112	116	126	139, 179
ST 1910	111	115	122	137, 167
ST 1911	112	116	124	138, 139
ST 1912	112	116	123	181

SECTION II

LEAD FORM PARTS MASTER MECHANICAL CONFIGURATION DESCRIPTION AND REFERENCE INDEX BY MANUFACTURER

12

Table I-1. Manufacturer Lookup Index

Vendor I.D. Code	Manufacturer	Page
ADI	Analog Devices	E-9
AMD	Advanced Micro Devices	E-9
DAL	Dale Electronics	E-10
EXR	Exar Integrated Systems	E-10
FAS	Fairchild Semiconductor	E-10
HAR	Harris Semiconductor	E-10
JPL	Jet Propulsion Laboratory	E-11
MAG	Magnetek Corporation	E-11
MOT	Motorola Semiconductor	E-11
NSC	National Semiconductor	E-12
RCA	Radio Corp of America	E-14
SGN	Signetics Corp.	E-18
SIL	Siliconix, Inc.	E-20
SNL	Sandia National Laboratories	E-13 (RCA)
TIX	Texas Instruments	E-21

Table II-2. Leadform Parts Matrix

MFG: ADI (Analog Devices Inc.)

Mfg. P/N Ref	Device Description	Part Iden. Control Spec.	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	Tool Configuration	Footprint Pattern Drawing	Leadform Carrier Type
AD571K	10-Bit A/DC	CS512404	CS512404-C	Fig. 3	18	ST-2006, nest A	N	

MFG: AMD (Advanced Micro Devices)

25LS169A*	Counter	PT40743-1§	PT40743-A	Fig. 1:B	16	ST-2014	B	
25LS169A*	Counter	PT40743-1§	PT40743-A	Fig. 1:B	16	ST-1911	U	
25LS374*	Flip-Flop	PT40747-1§	PT40747-A	Fig. 1 (F-20-1)	20	ST-2015 with nest insert	C	
25LS374*	Flip-Flop	PT40747-1§	PT40747-A	F-20-1	20	ST-2022	C	
27S29*	Bipolar PROM	AMD 2900 Data Bk 1978		D-20-2	20	ST-2006, nest A	H	
LM111F	Comparator	AMD 2900 Data Bk 1978		F-10-2	10	ST-2011, 2012 ST-1911	W	
LM119F	Comparator	PT40350-1	PT40350-C	Fig. 1:B	10	ST-2011, 2012 ST-1911	W	
LM139F	Quad Comparator	ST11869-139FR	ST11869-C	Fig. 2	14	ST-2011, 2012 ST-1911	V	
LM139AFR	Quad Comparator Low Offset Voltage	ST11869-139AFR	ST11869-C	Fig. 2	14	ST-2011, 2012 ST-1911	V	
2901B*	Micro-processor	AMD 2900 1978 Data Book	AMD 2900 Data Bk 1978	Fig. B-7, F-42-1	42	ST-2010	G	
2902A*	Carry Generator	AMD 2900 Data Bk 1978		Fig. B-7, F-16-1	16	ST-2014	B	
2902A*	Carry Generator	AMD 2900 Data Bk		F-16-1	16	ST-1911	U	
2909*	Sequencer	AMD 2900 Data Bk 1978		Fig. B-7, F-28-1	28	ST-2016	F	
2914*	Controller	AMD 2900 Data Bk 1978		Fig. B-7, F-42-1	42	ST-2010	G	

§ = The Specification was developed after the part had already been procured.
* = Special Lead Form for ATC

Table II-2. Leadform Parts Matrix (Continued)

MFG: DAL (Dale Electronics)

Mfg. P/N Ref	Device Description	Part Iden. Control Spec.	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	Tool Configuration	Footprint Pattern Drawing	Leadform Carrier Type
TKR217	Resistor Network	ST11542	ST11542-B	Fig. 1	14	ST-1744	V	
TKR220	Resistor Network	ST11872-1	ST11872-A	Fig. 1	14	ST-1744	V	
TKR221	Resistor Network	ST11830	ST11830-D	Fig. 1	14	ST-1744	V	
TKR178	Resistor Network	ST11541	ST11541-C	Fig. 1	14	ST-1744	V	

MFG: EXR (Exar Integrated Systems, Inc.)

XR-215	Dual In-Line Phase Lock Loop	PT40425-1	PT40425-C	Fig. 1	16	ST-2006, nest B	M	

MFG: FAS (Fairchild Semiconductor)

9407DM*	Data Access Register	CS512716	Original	6Y	24	ST-2007	J	

MFG: HAR (Harris Semiconductor)

HA9-245-2	Interface Transmitter	ST11498-245	ST11498-C	Fig. 1:B	14	ST-1911 ST-2011, 2012	V	
HA9-246-2	Interface Receiver	ST11498-246	ST11498-C	Fig. 1:B	14	ST-1911 ST-2011, 2012	V	
HA9-2520-2	Operational Amplifier	ST11498-2520-9	ST11498-C	Fig. 1:B	14	ST-1911 ST-2011, 2012	V	
HA9-2600-2	Low Power, High Gain Amp	ST11498-2600-9	ST11498-C	Fig. 2:B	10	ST-1911 ST-2011, 2012	W	
HA9-2700-2	Dual Hi-Speed Amplifier	ST11498-2700-9	ST11498-C	Fig. 2:B	14	ST-1911 ST-2011, 2012	V	
HM-6611	256X4 CMOS PROM			Fig. 8B, Harris CMOS Manual	16	ST-2022	AA	

* = Special Lead Form For ATC

Table II-2. Leadform Parts Matrix (Continued)

MFG: JPL/MAG (JPL/Magnetek)

Mfg. P/N Ref	Device Description	Part Iden. Control Spec.	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	Tool Configuration	Footprint Pattern Drawing	Leadform Carrier Type
T1	CDS Interface Transformer	10090222	10090222-C	Module	16	ST-2023	R	
T2	"	10090223	10090223-C	Module	16	ST-2023	R	
T3	"	10090224	10090224-C	Module	16	ST-2023	R	
T4	"	10090225	10090225-D	Module	16	ST-2023	R	
T5	"	10090226	10090226-C	Module	16	ST-2023	R	
T6	"	10090227	10090227-D	Module	16	ST-2023	R	
T7	"	10090228	10090228-C	Module	16	ST-2023	R	
T8	"	10090404	10090404-C	Module	16	ST-2023	R	
T9	"	10099732	10099732-B	Module	16	ST-2023	R	
T10	"	10099730	10099730-B	Module	16	ST-2023	R	
T11	"	10099731	10099731-B	Module	16	ST-2023	R	
T12	"	10099729	10099729-D	Module	16	ST-2023	R	
T13	"	10099999	10099999-B	Module	16	ST-2023	R	

MFG: MOT (Motorola Semiconductor)

Mfg. P/N Ref	Device Description	Part Iden. Control Spec.	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	Tool Configuration	Footprint Pattern Drawing	Leadform Carrier Type
MQ2905A	Quad Transistor	PT40674	PT40674-A	Fig. 1	14	ST-1911 ST-2011, 2012	V	
MQ2219A	Quad Transistor	PT40673	PT40673-A	Fig. 1	14	ST-1911 ST-2011, 2012	V	

MFG: NSC (National Semiconductor Corp.)

Table II-2. Leadform Parts Matrix (Continued)

Mfg. P/N Ref	Device Description	Part Iden. Control Spec.	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	T-ol Configuration	Footprint Pattern Drawing	Leadform Carrier Type
DS1630F	Hex, CMOS Compatible Buffer	NSC Data Book PGS. 11-22		F-14-C	14	ST-1847, 1911 ST-2011, 2012	V	
MM54C906	Hex Buffer			F-14-C	14	ST-1847, 1911 ST-2011, 2012	V	
54LS169 (DM54LS169N)	Counter	G.E. SP No. 22247-A			16	ST-1847, 1911	U	
LM101AF	Operational Amplifier	ST11499-101FA	ST11499-H	Fig. 2:B	10	ST-1847, 1911	W	
LM102F	Voltage Follower	ST11499-102FA	ST11499-H	Fig. 2:B	10	ST-1847, 1911	W	
LM105F	Regulator	ST11499-105FA	ST11499-H	Fig. 2:B	10	ST-1847, 1911	W	
LM106F	Voltage Comparator/ Buffer	ST11502-106A	ST11502-D	Fig. 1:B	14	ST-1847, 1911	V	
LM108F	Operational Amplifier	ST11499-108-FAR	ST11499-H	Fig. 2:B	10	ST-1847, 1911	W	
LM108AF	Operational Amplifier	ST11499-108-AFAR	ST11499-H	Fig. 2:B	10	ST-1847, 1911	W	
DS55114F	Dual, Differential Line Driver	Boeing Spec. 280-25026	Rev. C-101	F Pkg.	16	ST-1847, 1911 ST-2011, 2012	U	
DS55115F	Dual, Differential Line Receiver	Boeing Spec. 280-2506	Rev. C-102	F Pkg.	16	ST-1847, 1911 ST-2011, 2012	U	
DS7820	Dual Line Rec.				14	ST-1847, 1911	V	
DS78L12	Interface Inverter	PT40756-1§	PT40756-A	Fig. 1:B	14	ST-1847, 1911	V	

§ = The Specification was developed after the part had already been procured.

MFG: RCA/SNL (SNL on LSI Only)

Table II-2. Leadform Parts Matrix (Continued)

Mfg. P/N Ref	Device Description	Part Iden. Control Spec.	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	Tool Configuration	Footprint Pattern Drawing	Leadform Carrier Type
TCC244K* (G244KR)	256 x 4 Bit CMOS RAM	CS512299	CS512299-C	RCA AM359A 412-010	28	ST-2009 ST-2019 ST-2021	E	
CD1802D	COSMAC Micro-processor			Ceramic DIP	40	ST-2008, with shims	P	
CD1834K* (G1834KR)	1024 x 8 Bit CMOS ROM	CS512296	CS512296-B	AM368A Fig. 1	24	ST-2009 ST-2019 ST-2021	L	
CD1852K	8-Bit Input/ Output Port (CMOS)	CS512297	CS512297-D	AM368A Fig. 1	24	ST-2009 ST-2019 ST-2021	L	
CD1856K (G1856KR)	CMOS 4-Bit Buffer/ Separator	CS512298	CS512298-C	AM385A 412-010	16	ST-1778, 1909, 1912	U	
TA10559 (89159)	Bipolar, Dielectrically Isolated Operational Amplifier	ST11963-1	ST11963-D	Fig. 1:B	10	ST-2023	W	
CD4001B	CMOS Quad 2 Input NOR Gate	PT40703-1	PT40703-C	Fig. 1:B	14	ST-1778, ST-1909, 1912 ST-2011, 2012	V	
CD4001UB	CMOS Quad 2 Input NOR Gate	PT40719-1	PT40719-B	Fig. 1:B	14	ST-1778, ST-1909, 1912 ST-2011, 2012	V	
CD4006B	CMOS 18-Stage Static Shift Register	PT40717-1	PT40717-B	Fig. 1:B	14	ST-1778, ST-1909, 1912 ST-2011, 2012		
CD4008B	CMOS 4-BIT Full Adder	PT40735-1	PT40735-B	Fig. 1:B	16	ST-1778, 1909 ST-1912	U	
CD4011B	CMOS Quad 2-Input NAND	PT40700-1	PT40700-C	Fig. 1:B	14	ST-1778, ST-1909, 1912 ST-2011, 2012	V	

* = Special Lead Form for ATAC

MFG: RCA

Table II-2. Leadform Parts Matrix (Continued)

Mfg. P/N Ref	Device Description	Part Iden. Control Spec.	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	Tool Configuration	Footprint Pattern Drawing	Leadform Carrier Type
CD4012B	CMOS 4-Input NAND	PT40718-1	PT40718-B	Fig. 1:B	14	ST-1778, ST-1909, 1912, ST-2011, 2012	V	
CD4013B	CMOS Quad Dual D Flip-Flop	PT40701-1	PT40701-C	Fig. 1:B	14	ST-1778, ST-1909, 1912 ST-2011, 2012	V	
CD4014B	CMOS 8-Stage Static Shift Register	PT40716-1	PT40716-1	Fig. 1:B	16	ST-1778, ST-1909, 1912	U	
CD4015B	CMOS Dual 4-Bit Static Register	PT40716-2	PT40716-C	Fig. 1:B	16	Δ	U	
CD4017B	CMOS Decade Counter	PT40706-1	PT40706-D	Fig. 1:B	16	Δ	U	
CD4018B	CMOS Preset Div/N Counter	PT40706-1	PT40706-D	Fig. 1:B	16	Δ	U	
CD4019B	CMOS Quad AND/OR Select Gate	PT40704-1	PT40704-D	Fig. 1:B	16	Δ	U	
CD4023B	CMOS Triple 3-Input NAND Gate	PT40700-2	PT40700-C	Fig. 1:B	14	ΔΔ	V	
CD4024B	CMOS 7-Stage Counter	PT40706-3	PT40706-D	Fig. 2:B	14	ΔΔ	V	
CD4025B	CMOS Triple 3-Input NOR Gate	PT40703-2	PT40703-C	Fig. 1:B	14	ΔΔ	V	
CD4027B	CMOS Dual J-K Flip-Flop	PT40701-2	PT40701-C	Fig. 2:B	16	Δ	U	

Δ = Use Tool ST-1778, 1909, or 1912
ΔΔ = Use Tool ST-1778, 1909, 1912, 2011, or 2012

MFG: RCA

Table II-2. Leadform Parts Matrix (Continued)

Mfg. P/N Ref	Device Description	Part Iden. Control Spec.	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	Tool Configuration	Footprint Pattern Drawing	Leadform Carrier Type
CD4028B	CMOS BCD/ Decimal Decoder	PT40709-1	PT40709-E	Fig. 1:B	16	Δ	U	
CD4029B	CMOS Pre-set Up/Down Counter	PT40707-1	PT40707-C	Fig. 1:B	16	Δ	U	
CD4031B	CMOS 64-Stage Static Shift Reg.	PT40708-1	PT40708-D	Fig. 1:B	16	Δ	U	
CD4034B	CMOS 8-Stage In/Out Bus Register	PT40708-2	PT40708-D	Fig. 2:B	24	ST-2009 ST-2019 ST-2021	L	
CD4035B	CMOS 4-Stage Shift Register	PT40708-3	PT40708-D	Fig. 1:B	16	Δ	U	
CD4040B	CMOS 12 Stage Binary Counter	PT40725-1	PT40725-C	Fig. 1:B	16	Δ	U	
CD4041UB	CMOS Buffer	PT40720-1	PT40720-C	Fig. 1:B	14	ΔΔ	V	
CD4042B	CMOS Quad Clocked "D" Latch	PT40702-1	PT40702-C	Fig. 1:B	16	Δ	U	
CD4043B	CMOS Quad NOR RS Latch	PT40721-1	PT40721-B	Fig. 1:B	16	Δ	U	
CD4046B	CMOS Phase Locked Loop	PT40726-1	PT40726-C	Fig. 1:B	16	Δ	U	
CD4047B	CMOS Multi-Vibrator	PT40727-1	PT40727-B	Fig. 1:B	14	ΔΔ	V	
CD4049UB	CMOS Buffer Hex Inverter	PT40705-1	PT40705-D	Fig. 1:B	16	Δ	U	

Δ = Use Tool ST-1778, 1909, or 1912
ΔΔ = Use Tool ST-1778, 1909, 1912, 2011, or 2012

MFG: RCA

Table II-2. Leadform Parts Matrix (Continued)

Mfg. P/N Ref	Device Description	Part Iden. Control Spec.	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	Tool Configuration	Footpring Pattern Drawing	Leadform Carrier Type
CD4050B	CMOS Buffer Hex Inverter	PT40705-2	PT40705-D	Fig. 1:B	16	Δ	U	
CD4051B	CMOS 8-Channel Multiplexer	PT40728-1	PT40728-D	Fig. 1:B	16	Δ	U	
CD4052B	CMOS Diff. 4-Channel MUX	PT40728-2	PT40728-D	Fig. 1:B	16	Δ	U	
CD4053B	CMOS Triple 2-Channel MUX	PT40728-3	PT40728-D	Fig. 1:B	16	Δ	U	
CD4063B	CMOS 4-Bit Mag Comparator	PT40736-1	PT40736-A	Fig. 1:B	16	Δ	U	
CD4066B	CMOS Quad Bilateral Switch	PT40731-1	PT40731-B	Fig. 1:B	14	ΔΔ	V	
CD4070B	CMOS Quad 2-In Exc. OR Gate	PT40712-1	PT40712-C	Fig. 1:B	14	ΔΔ	V	
CD4071B	CMOS Quad 2-In OR Gate	PT40711-1	PT40711-C	Fig. 1:B	14	ΔΔ	V	
CD4073B	CMOS Buffer 3-In NAND Gate	PT40710	PT40710-C	Fig. 1:B	14	ΔΔ	V	
CD4075B	CMOS Buffer 3-In Or Gate	PT40711-2	PT40711-C	Fig. 1:B	14	ΔΔ	V	
CD4076B	CMOS Quad D Flip-Flop	PT40713-1	PT40713-C	Fig. 1:B	16	Δ	U	
CD4081B	CMOS 2-Input AND Gate	PT40710-1	PT40710-C	Fig. 1:B	14	ΔΔ	V	
CD4093B	CMOS NAND Schmitt Trigger	PT40737-1	PT40737-A	Fig. 1:B	14	ΔΔ	V	

Δ = Use Tool ST-1778, 1909, or 1912
ΔΔ = Use Tool ST-1778, 1909, 1912, 2011, or 2012

MFG: RCA

Table II-2. Leadform Parts Matrix (Continued)

Mfg. P/N Ref	Device Description	Part Iden. Control Spec	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	Tool Configuration	Footprint Pattern Drawing	Leadform Carrier Type
CD4099B	CMOS 8-Bit Address Latch	PT40714-1	PT40714-C	Fig. 1:B	16	Δ	U	
CD40101B	CMOS 9-Bit Parity Checker	PT40739-1	PT40739-B	Fig. 1:B	14	ΔΔ	V	
CD40192B	CMOS Pre-Set Up/Down Counter	PT40702-2	PT40707-C	Fig. 1:B	16	Δ	U	
CD40193B	CMOS 4-Bit Up/Down Binary Counter	PT40704-3	PT40707-C	Fig. 1:B	16	Δ	U	
CD4510B	CMOS BCD Up/Down Converter	PT40707-4	PT40707-C	Fig. 1:B	16	Δ	U	
CD4512B	CMOS 8-Channel Data Selector	PT40738-1	PT40738-A	Fig. 1:B	16	Δ	U	
CD4514B	CMOS 4-Bit Latch 4-16 Line Decoder	PT40734-1	PT40734-A		24	ST-2009 ST-2019 ST-2021	L	
CD4516B	CMOS Binary Up/Down Converter	PT40707-5	PT40707-C	Fig. 1:B	16	Δ	U	
CD4518B	CMOS BCD/ Sync-Up Counter	PT40707-6	PT40707-C	Fig. 1:B	16	Δ	U	
CD4520B	CMOS Binary/ Sync-Up Counter	PT40707-7	PT40707-C	Fig. 1:B	16	Δ	U	

Δ = Use Tool ST-1778, 1909, or 1912
ΔΔ = Use Tool ST-1778, 1909, 1912, 2011, or 2012

MFG: SGN (Signetics Corporation)

Table II-2. Leadform Parts Matrix (Continued)

Mfg. P/N Ref	Device Description	Part Iden. Control Spec.	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	Tool Configuration	Footprint Pattern Drawing	Leadform Carrier Type
5400	Quad Dual NAND Gate	PT40759-4§	PT40759-A	Fig. 1:B	14	ST-1910, 1911, 2011, 2012	V	
5404	Hex Inverter	PT40759-5	PT40759-A	Fig. 1:B	14	ST-1910, 1911, 2011, 2012	V	
5406	Hex Inverter	PT40760-1§	PT40760-B	Fig. 1:B	14	ST-1910, 1911 2011, 2012	V	
5420	Dual Four NAND Gate	PT40759-2§	PT40759-A	Fig. 1:B	14	ST-1910, 1911, 2011, 2012	V	
5426	Quad Dual NAND Gates	PT40760-2§	PT40760-B	Fig. 1:B	14	ST-1910, 1911, 2011, 2012	V	
5473	Dual J/K M/S Flip-Flop	ST11495-73§	ST11495-G	Fig. 1	14	ST-1910, 1911, 2011, 2012	V	
54S00*	NAND Gate	PT40784-1§	PT40784-B	WH	14	ST-2013	A	
54S00*	NAND Gate	PT40784-1§	PT40784-B	WH	14	ST-1910, 1911, 2011, 2012	V	
54S08*	AND Gate	PT40786-1§	PT40786-A	Fig. 1	14	ST-2013	A	
54S08*	AND Gate	PT40786-1§	PT40786-A	Fig. 1	14	ST-1910, 1911, 2011, 2012	V	
54S10	Triple 3-Input NAND Gate	PT40784-3§	PT40784-B	WH	14	ST-1910, 1911, 2011, 2012	V	
54S112*	Flip-Flop	PT40788-1§	PT40788-B	Fig. 1:B	16	ST-2014	B	
54S112	Flip-Flop	PT40788-1§	PT40788-B	Fig. 1:B	16	ST-1910, 1911	U	
54LS00	Gates	PT40764-1§	PT40764-A	Fig. 1:B	14	ST-1910, 1911, 2011, 2012	V	
54LS02	Gates	PT40766-1§	PT40766-A	Fig. 1:B	14	ST-1910, 1911, 2011, 2012	V	

§ = The Specification was developed after the part had already been procured.
* = Special Lead Form Configuration for ATAC

MFG: SGN (Signetics Corporation)

Table II-2. Leadform Parts Matrix (Continued)

Mfg. P/N Ref	Device Description	Part Iden. Control Spec.	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	Tool Configuration	Footprint Pattern Drawing	Leadform Carrier Type
54LS04	Inverters/ Buffers	PT40764-2§	PT40764-A	Fig. 1:B	14	ST-1910, 1911, 2011, 2012	V	
54LS08	Quad Dual AND	PT40768-1§	PT40768-A	Fig. 1:B	14	ST-1910, 1911, 2011, 2012	V	
54LS10	Triple 3-Input Positive NAND	PT40764-4§	PT40764-A	Fig. 1:B	14	ST-1910, 1911, 2011, 2012	V	
54LS20	Gates	PT40764-5§	PT40764-A	Fig. 1:B	14	ST-1910, 1911, 2011, 2012	V	
54LS26	Quad Dual NAND Gates	PT40777-1§	PT40777-A	Fig. 1	14	ST-1910, 1911, 2011, 2012	V	
54LS51*	AND-OR Inverter	PT40779-1§	PT40779-A	Fig. 1:B	14	ST-2013	A	
54LS51	AND-OR Inverter	PT40779-1§	PT40779-A	Fig. 1:B	14	ST-1910, 1911, 2011, 2012	V	
54LS73A	Flip-Flop	PT40780-1§	PT40780-B	Fig. 1:B	14	ST-1910, 1911, 2011, 2012	V	
54LS74A	Flip-Flop	PT40780-1§	PT40780-B	Fig. 1:B	14	ST-1910, 1911, 2011, 2012	V	
54LS76	Flip-Flop	PT40780-4§	PT40780-B	Fig. 2	16	ST-1910, 1911,	U	
54LS125*	Quad Bus Buffer Gate	PT40771-1§	PT40771-A	QHA	14	ST-2013	A	
54LS125*	Quad Bus Buffer Gate	PT40771-1§	PT40771-A	QHA	14	ST-1910, 1911, 2011, 2012	V	
54LS158*	Multiplexer	PT40745-1§	PT40745-A	Fig. 1:B	16	ST-2014	B	
54LS158*	Multiplexer	PT40745-1§	PT40745-A	Fig. 1:B	16	ST-1910, 1911	U	
54LS175*	Flip-Flop	PT40780-3	PT40780-B	Fig. 2	16	ST-2014	B	
54LS175*	Flip-Flop	PT40780-3	PT40780-B	Fig. 2	16	ST-1910, 1911	U	
54LS393	Binary Counter	MIL, JAN SLASH SHEET		QHA	14	ST-1910, 1911, 2011, 2012	V	

§ = The Specification was developed after the part had already been procured.
* = Special Lead Form Configuration for ATAC

MFG: SGN (Signetics Corporation)

Table II-2. Leadform Parts Matrix (Continued)

Mfg. P/N Ref	Device Description	Part Iden. Control Spec.	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	Tool Configuration	Footprint Pattern Drawing	Leadform Carrier Type
54LS395*	Shift Register	PT40778-1§	PT40778-A	Fig. 1	16	ST-2014	B	
54LS395*	Shift Register	PT40778-1§	PT40778-A	Fig. 1	16	ST-1910, 1911	U	
82S100	Field Programmable Logic Array	SGN Data Bk 1978		1Q	28	ST-2008	K	
54LS78	Dual J-K Flip-Flop	PT40780-5	PT40780-B	Fig. 1A	14	ST-1910, 1911, 2011, 2012	V	
54LS85	4-Bit Comparator	PT40767-1	PT40767-A	Fig. 1:B	16	ST-1910, 1911	U	
54LS95B	4-Bit Parallel Access Shift Register	PT40761-1	PT40761-A	Fig. 1A	14	ST-1910, 1911, 2011, 2012	V	
54LS257*	Multiplexer	PT40745-2	PT40745-A		16	ST-1910, 1911	U	
54LS257*	Multiplexer	PT40745-2	PT40745-A		16	ST-2014	B	

MFG: SIL (Siliconix Corporation)

DG129	DPST 2-Channel Switch	ST11496-4B	ST11496-K	Fig. 1:D	14	ST-1847	V	
DG133	SPST 2-Channel Switch	ST11496-5B	ST11496-K	Fig. 1:B	14	ST-1911	V	
DG141	SPST 2-Channel Switch	ST11496-6B	ST11496-K	Fig. 1:B	14	ST-1911	V	
DG181	SPST 2-Channel Switch	ST11496-9B	ST11496-K	Fig. 1:B	14	ST-1911	V	

§ = The Specification was developed after the part had already been procured.
* = Special Lead Form Configuration for ATAC

MFG: TIX (Texas Instruments)

Table II-2. Leadform Parts Matrix (Continued)

Mfg. P/N Ref	Device Description	Part Iden. Control Spec.	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	Tool Configuration	Footprint Pattern Drawing	Leadform Carrier Type
5414*	Inverter	PT40793-1§	PT40793-A	Fig. 1	14	ST-2013	A	
5414*	Inverter	PT40793-1§	PT40793-A	Fig. 1	14	ST-1911, 2011, 2012	V	
54173*	Register	PT40755-1§	PT40755-B		16	ST-2014	B	
54173*	Register	PT40755-1§	PT40755-B		16	ST-1911, 2011, 2012	U	
54273*	Flip-Flop	PT40754-1§	PT40754-A	Fig. 1:B, 1:C	20	ST-2015	C	
54273*	Flip-Flop	PT40754-1§	PT40754-A	Fig. 1:B, 1:C	20	ST-2022	C	
54S04	Hex Inverter	PT40784-2§	PT40784-B	Fig. 1:A	14	ST-1911, 2011, 2012	V	
54S113	Dual J-K Neg. Edge Triggered Flip-Flop	PT40788-2§	PT40788-B	Fig. 2A	14	ST-1911, 2011, 2012	V	
54S240*	Buffer/Driver Receiver	PT40749-1§	PT40749-B	Fig. 1:B, 1:C	20	ST-2015	C	
54S240*	Buffer/Driver Receiver	PT40749-1§	PT40749-B	Fig. 1:B, 1:C	20	ST-2022	C	
54S257*	Multiplexer	PT40790-1§	PT40790-A	Fig. 1	16	ST-2014	B	
54S257	Multiplexer	PT40790-1§	PT40790-A	Fig. 1	16	ST-1911, 2011, 2012	U	
54S374*	Flip-Flop	PT40748-1§	PT40748-B	Fig. 1:B, 1:C	20	ST-2015	C	
54S374*	Flip-Flop	PT40748-1§	PT40748-B	Fig. 1:B, 1:C	20	ST-2022	C	
54LS01	Gates	PT40765-1§	PT40765-B	Fig. 1:A	14	ST-1911, 2011 2012	V	

§ = The specification was developed after the part had already been procured.
* = Special Lead Form for ATAC

MFG: TIX (Texas Instruments)

Table II-2. Leadform Parts Matrix (Continued)

Mfg. P/N Ref	Device Description	Part Iden. Control Spec.	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	Tool Configuration	Footprint Pattern Drawing	Leadform Carrier Type
54LS26	Gates	PT40777-1§	PT40777-A	Fig. 1	14	ST-1911, 2011, 2012	V	
54LS78A	Flip-Flop	PT40780-5§	PT40780-B	Fig. 1:A	14	ST-1911, 2011, 2012	V	
54LS86*	Gates	PT40783-1§	PT40783-A	Fig. 1:A	14	ST-2013	A	
54LS86*	Gates	PT40783-1§	PT40783-A	Fig. 1:A	14	ST-1911, 2011, 2012	V	
54LS91	Shift Reg.	PT40741-1§	PT40741-B	Fig. 1	14	ST-1911, 2011, 2012	V	
54LS122	Vibrator				14	ST-1911, 2011, 2012	V	
54LS125*	Quad Bus Buffer Gate	PT40771-1§	PT40771-A		14	ST-1911, 2011, 2012	V	
54LS125	Quad Bus Buffer Gate	PT40771-1§	PT40771-A	QHA	14	ST-2013	A	
54LS241*	Line Drivers/ Receivers	PT40742-1§	PT40742-A	Fig. 1:B, 1:C	20	ST-2015	C	
54LS241*	Line Driver/ Receiver	PT40742-1§	PT40742-A	Fig. 1:B, 1:C	20	ST-2022	C	
54LS257*	Multiplexer	PT40745-2§	PT40745-A	Fig. 1:B	16	ST-2014	B	
54LS257	Multiplexer	PT40745-2§	PT40745-A	Fig. 1:B	16	ST-1911, 2011, 2012		
54LS298*	Multiplexer	PT40745-3§	PT40745-A	Fig. 1:B	16	ST-2014	B	
54LS298*	Multiplexer	PT40745-3§	PT40745-A	Fig. 1:B	16	ST-1911, 2011, 2012	U	
54LS373	Octal D-Type Latch			DIP	20	ST-2006, nest B	H	

§ = The specification was developed after the part had already been procured.
* = Special Lead Form for ATAC

MFG: TIX (Texas Instruments)

Table II-2. Leadform Parts Matrix (Continued)

Mfg. P/N Ref.	Device Description	Part Iden. Control Spec.	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	Tool Configuration	Footprint Pattern Drawing	Leadform Carrier Type
54L00	NAND Gate	ST11494-1	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
54L02	NOR Gate	ST11494-3	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
54L04	Hex Inverter	ST11494-4	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
54L10	NAND Gates	ST11494-5	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
54L20	NAND Gates	ST11494-6	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
54L73	Dual J-K Master Slave Flip-Flop	ST11494-12	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
54L74	Dual D-Type Positive Edge Triggered Flip-Flop	ST11494-13	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
54L86	Quad 2-Input Exclusive OR Gate	ST11494-15	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
54L95	L-Shift Register	ST11494-19	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
54L01	Quad 2-Input NAND Gate	ST11494-2	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
54L30	8-Input NAND Gate	ST11494-7	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
54L51	Dual 2-Wide A-O-I Gate	ST11494-8	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
54L54	4-Wide A-O-I Input Gate	ST11494-9	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	

MFG: TIX (Texas Instruments)

Table II-2. Leadform Parts Matrix (Continued)

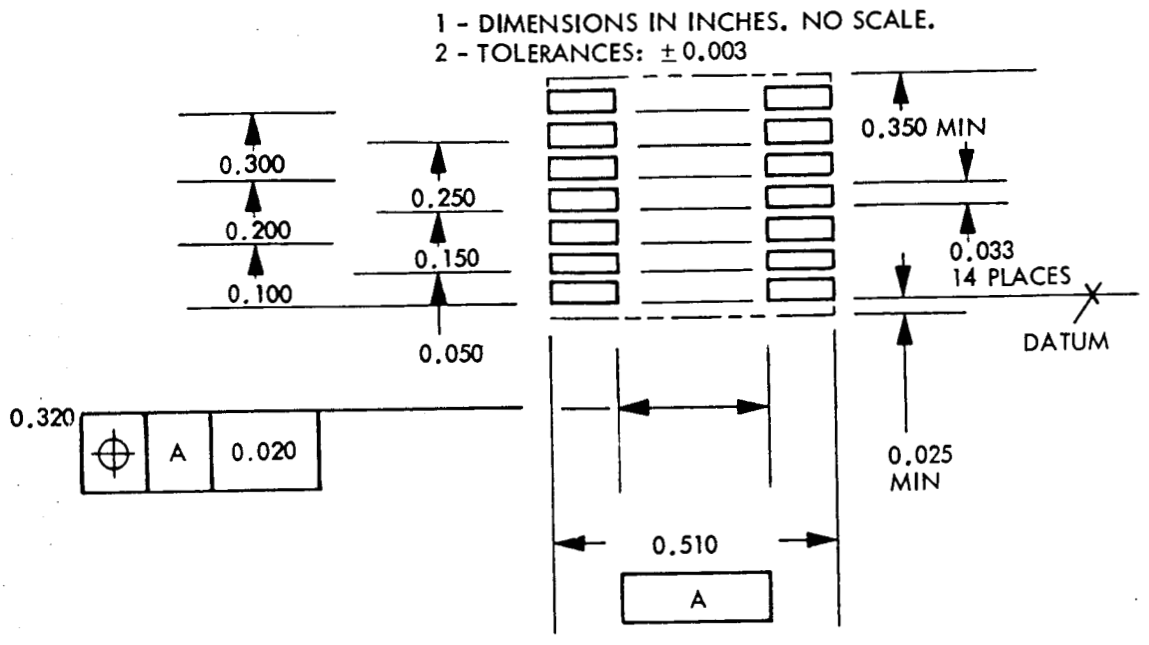
Mfg. P/N Ref.	Device Description	Part Iden. Control Spec.	Specification Revision	Pkg. Dwg. or Type	No. Of Leads	Tool Configuration	Footprint Pattern Drawing	Leadform Carrier Type
54L72	J-K Master Slave Flip Flop	ST11494-11	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
54L91	8-Bit Shift Register	ST11494-17	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
54L93	4-Bit Binary Counter	ST11494-18	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
54L122	Retriggerable Monostable Multivibrator	ST11494-20	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
54L164	8-Bit Parallel Shift Register	ST11494-22	ST11494-C	Fig. 1A	14	ST-1911, 2011, 2012	V	
BC1042-2	Diode Network	ST11881	ST11881-A	Fig. 1:B	10	ST-1911, 2011, 2012	W	
BC997	Diode Network	ST11878-2	ST11878-A	Fig. 2	14	ST-1911, 2011, 2012	V	

Note: GLL parts were procured to TI Data Book or appropriate MIL Spec Slash Sheet and not to PT or ST specs shown.

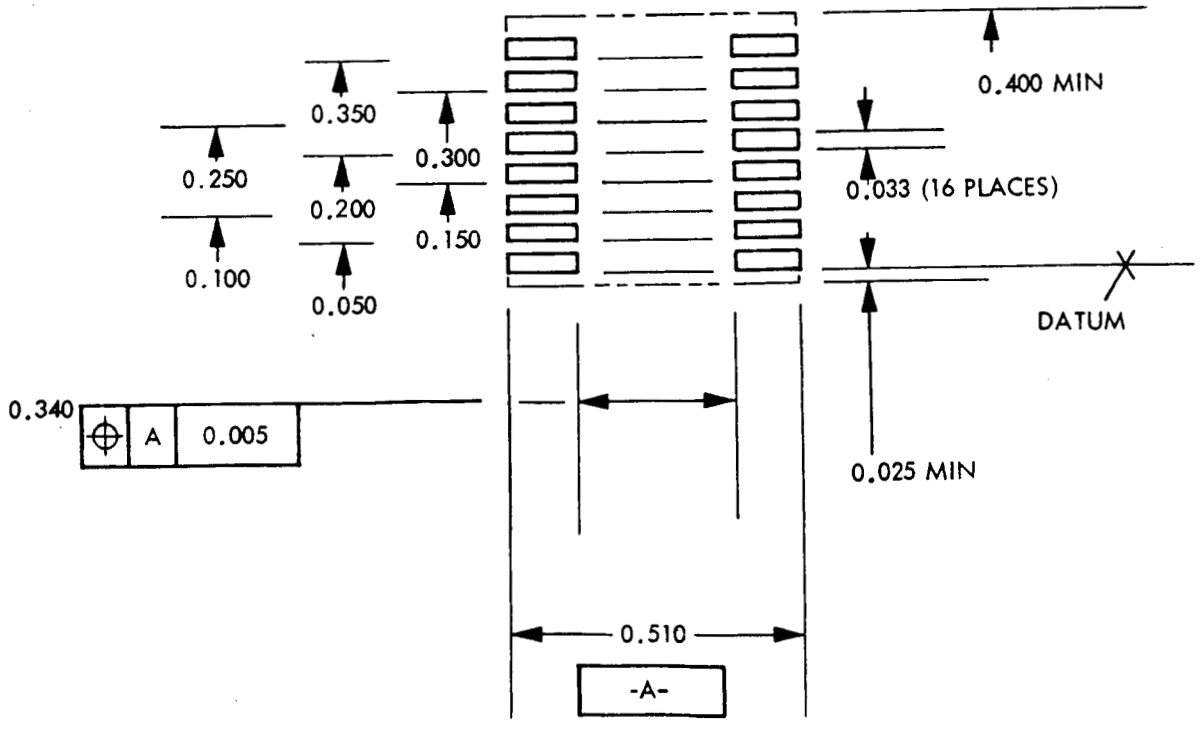
SECTION III

FOOTPRINT PATTERNS
MECHANICAL CONFIGURATION DESCRIPTION

Table III-1. Footprint Patterns With Letter Assignment

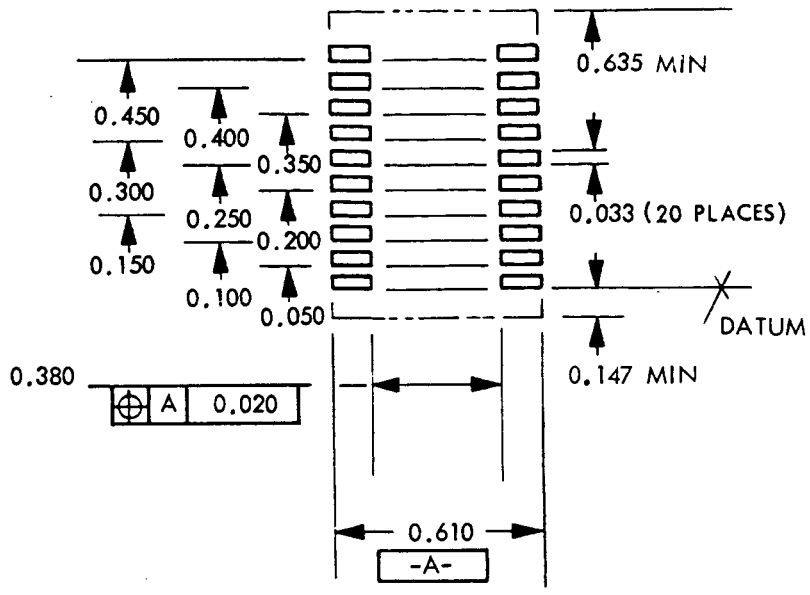


FOOTPRINT A

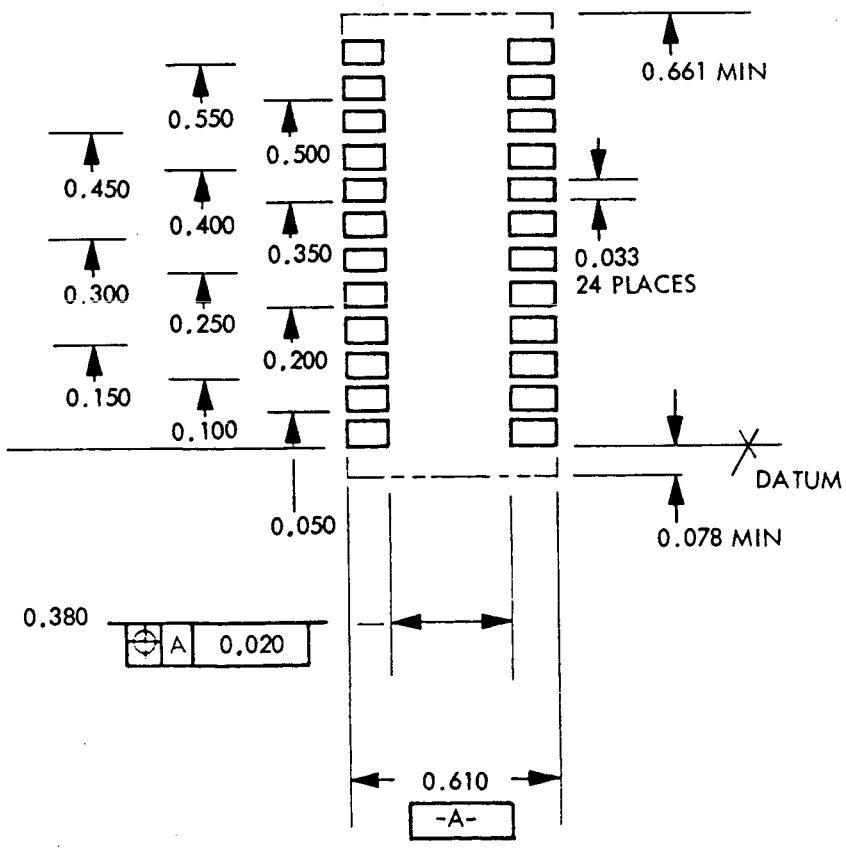


FOOTPRINT B

Table III-1. Footprint Patterns With Letter Assignment (Continued)



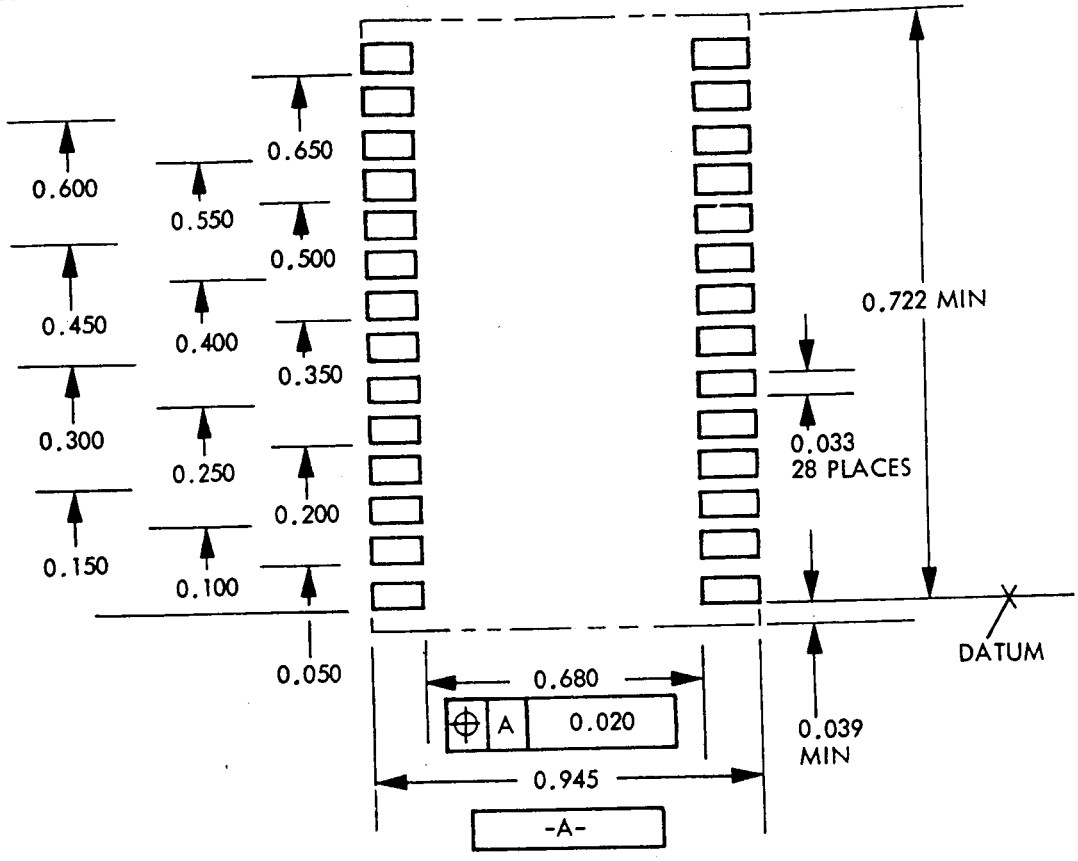
FOOTPRINT C



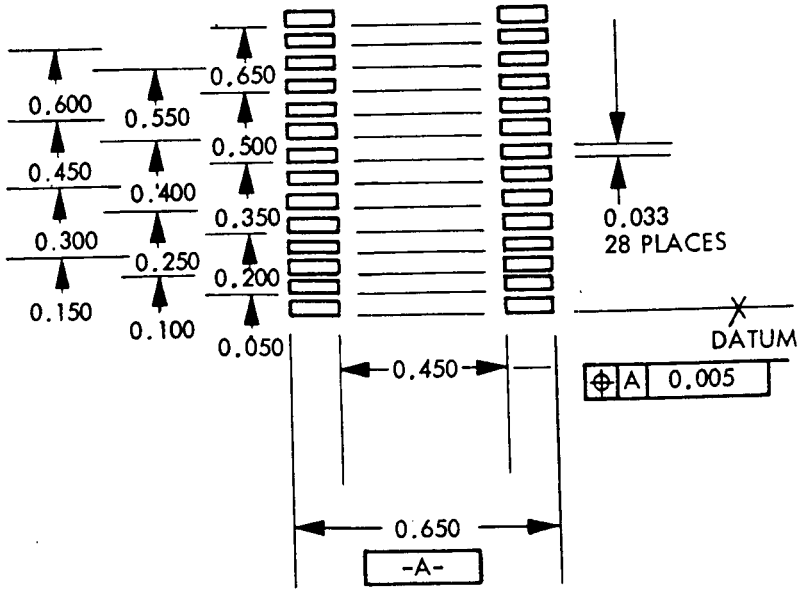
FOOTPRINT D

32

Table III-1. Footprint Patterns With Letter Assignment (Continued)

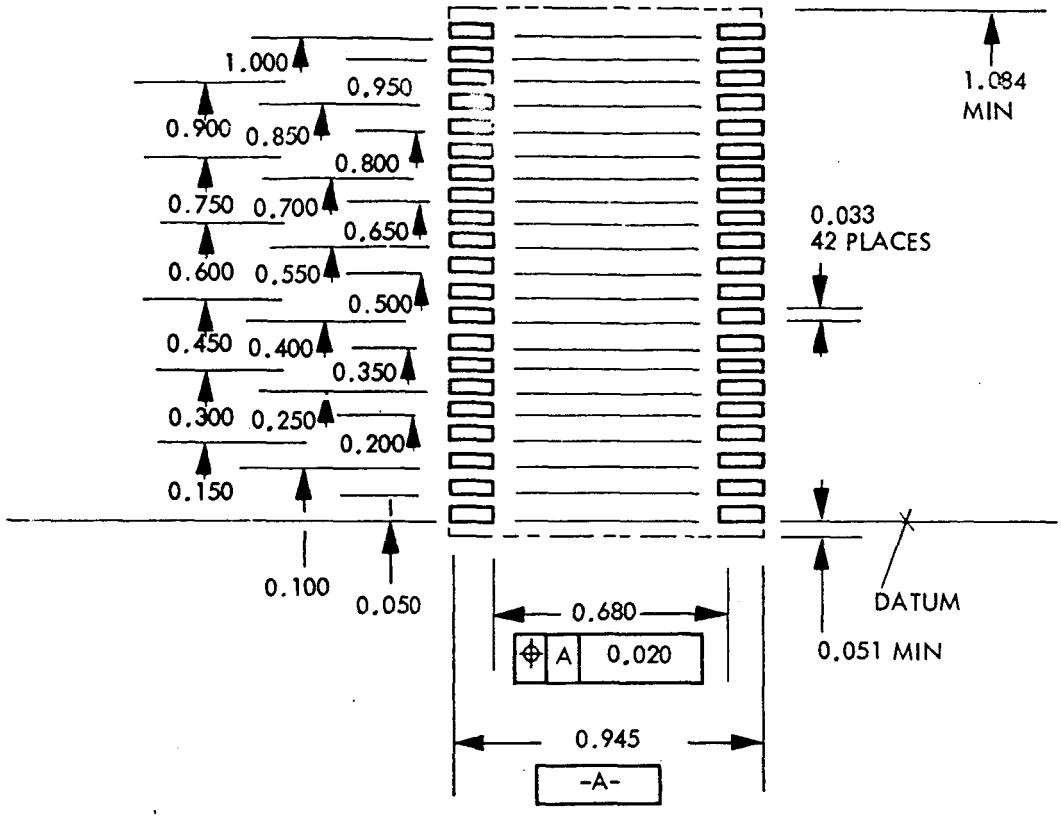


FOOTPRINT E

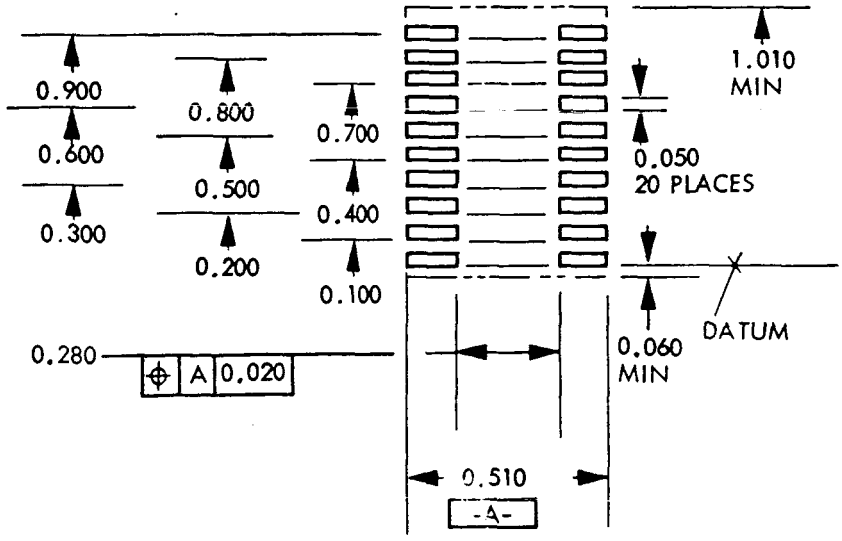


FOOTPRINT F

Table III-1. Footprint Patterns With Letter Assignment (Continued)



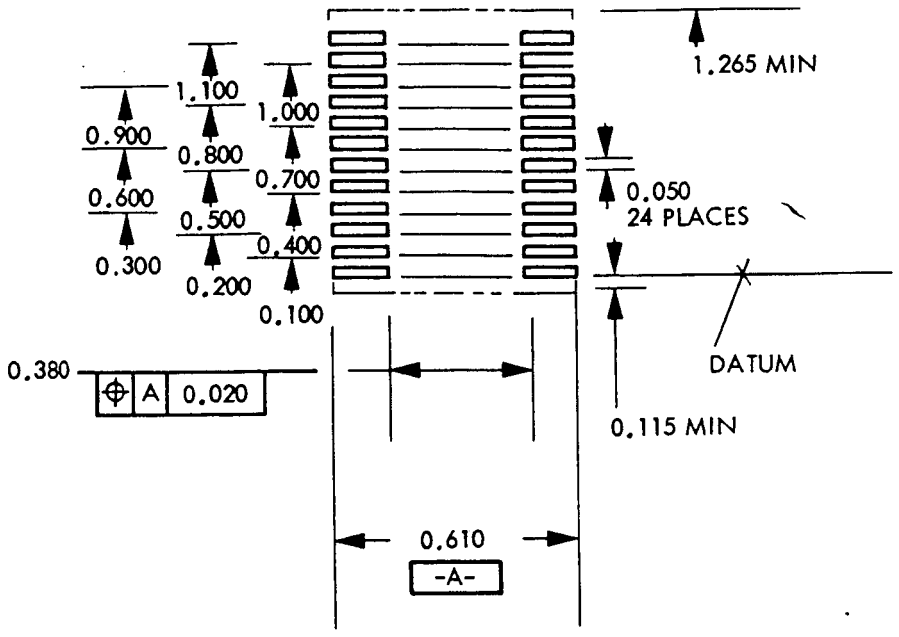
FOOTPRINT G



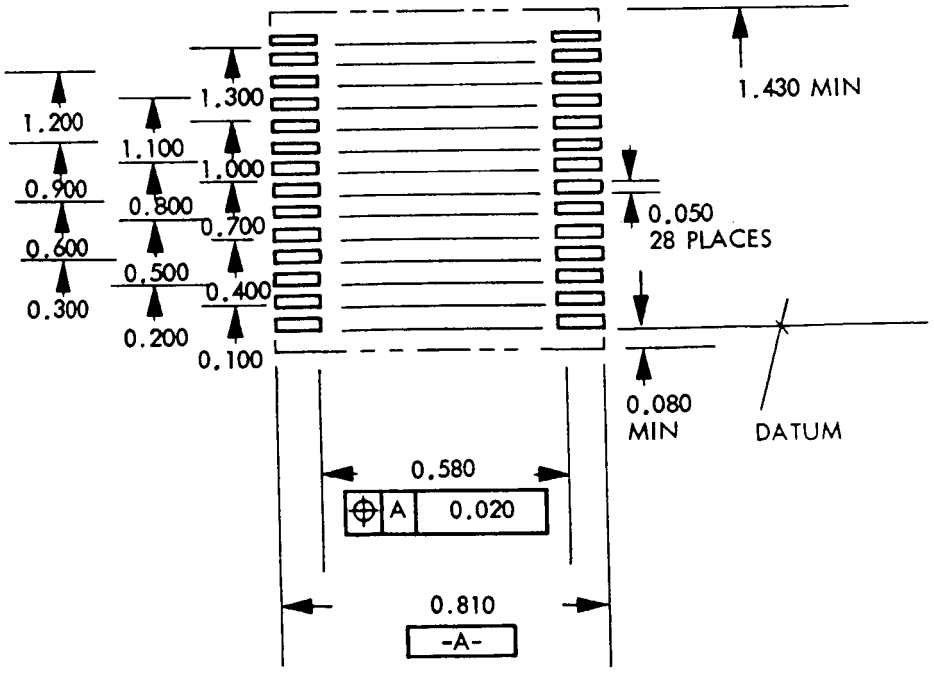
FOOTPRINT H

34

Table III-1. Footprint Patterns With Letter Assignment (Continued)

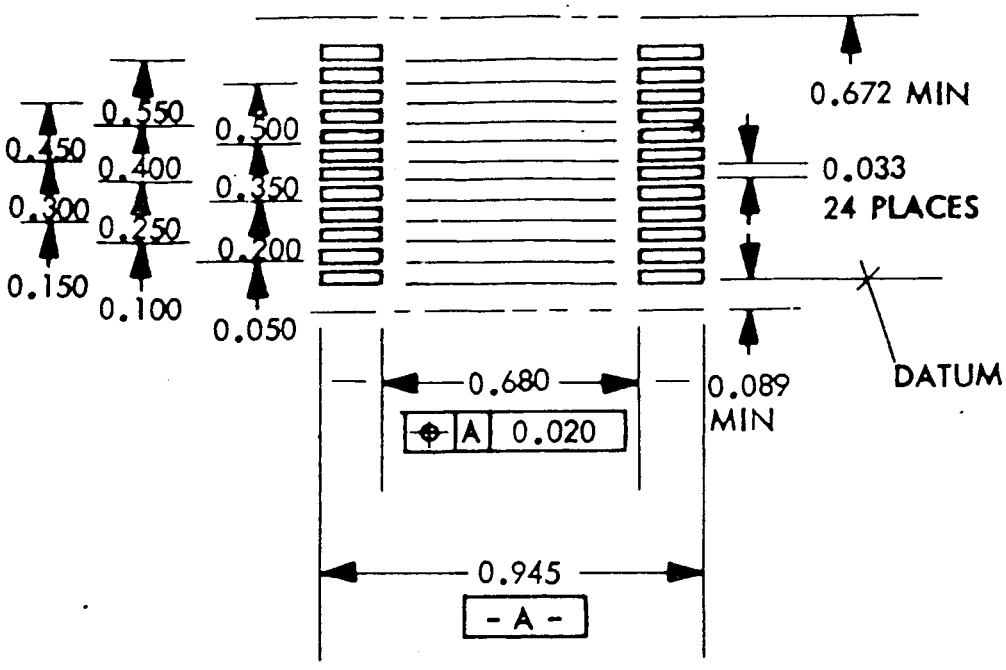


FOOTPRINT J

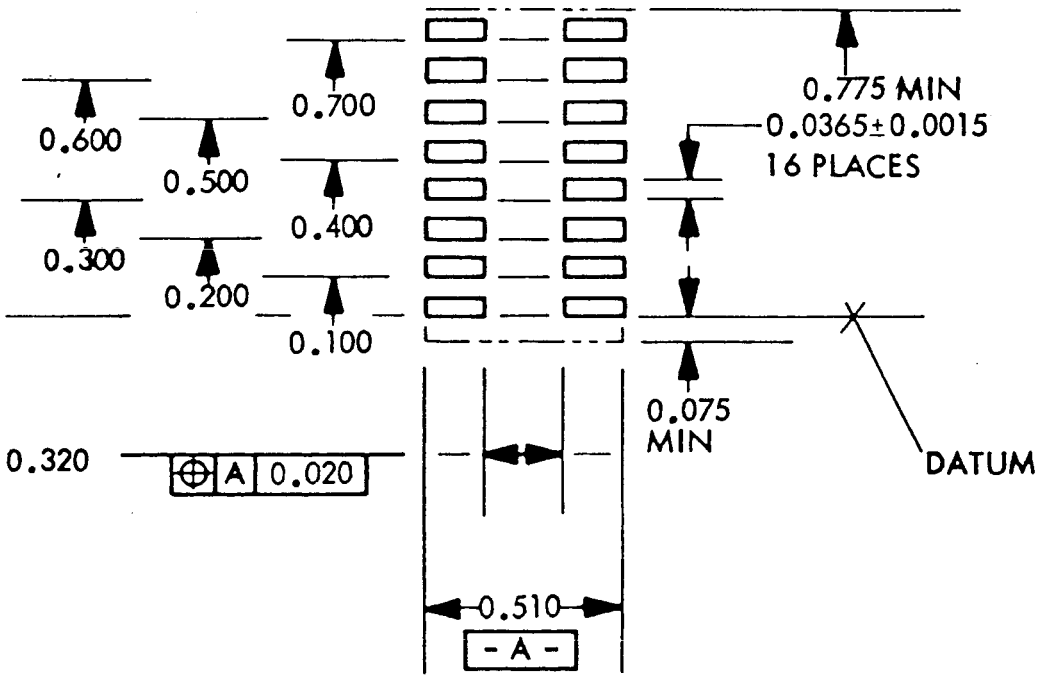


FOOTPRINT K

Table III-1. Footprint Patterns With Letter Assignment (Continued)

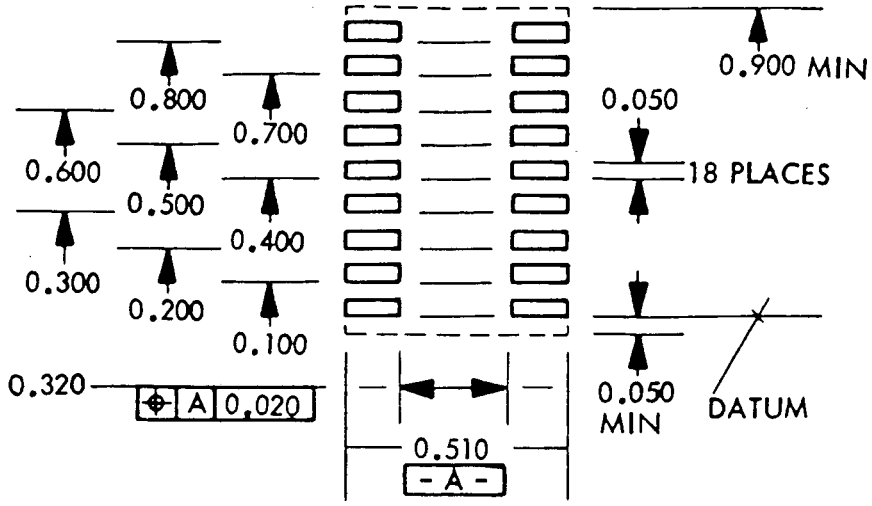


FOOTPRINT L

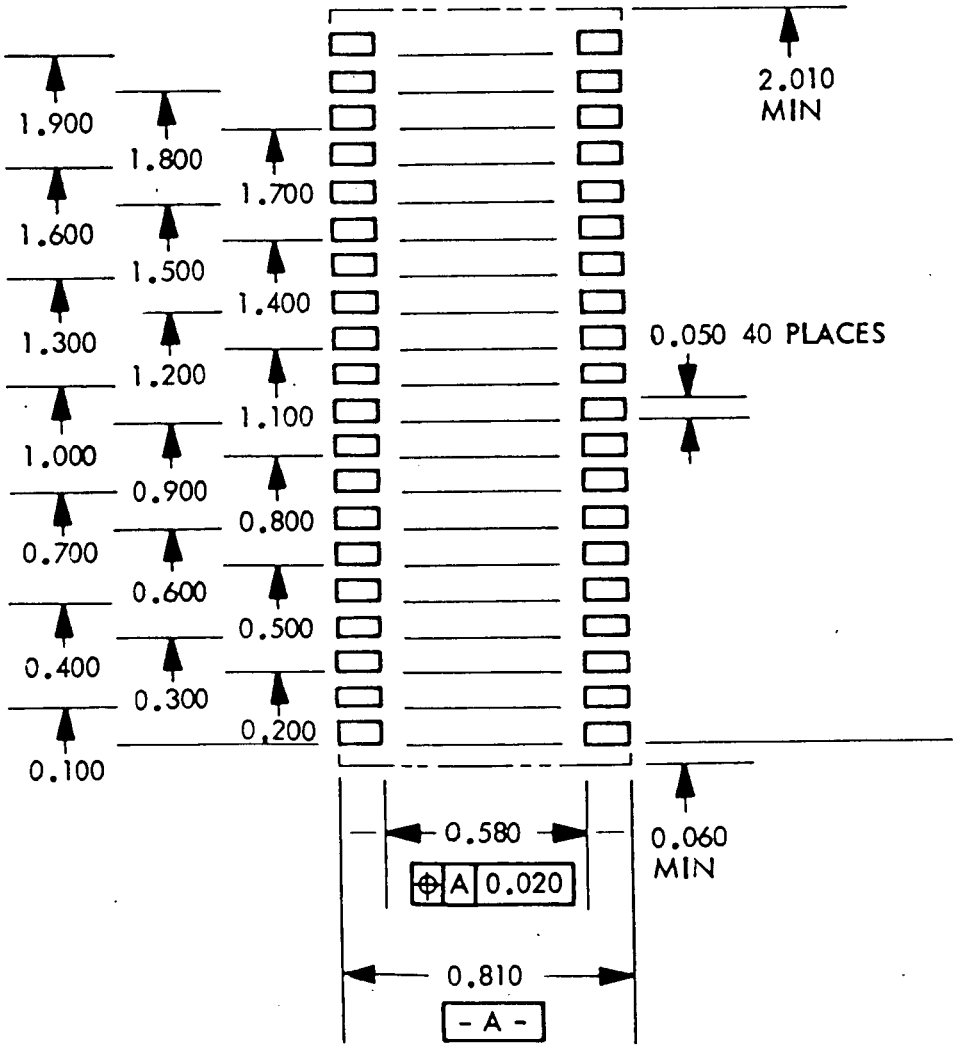


FOOTPRINT M

Table III-1. Footprint Patterns With Letter Assignment (Continued)

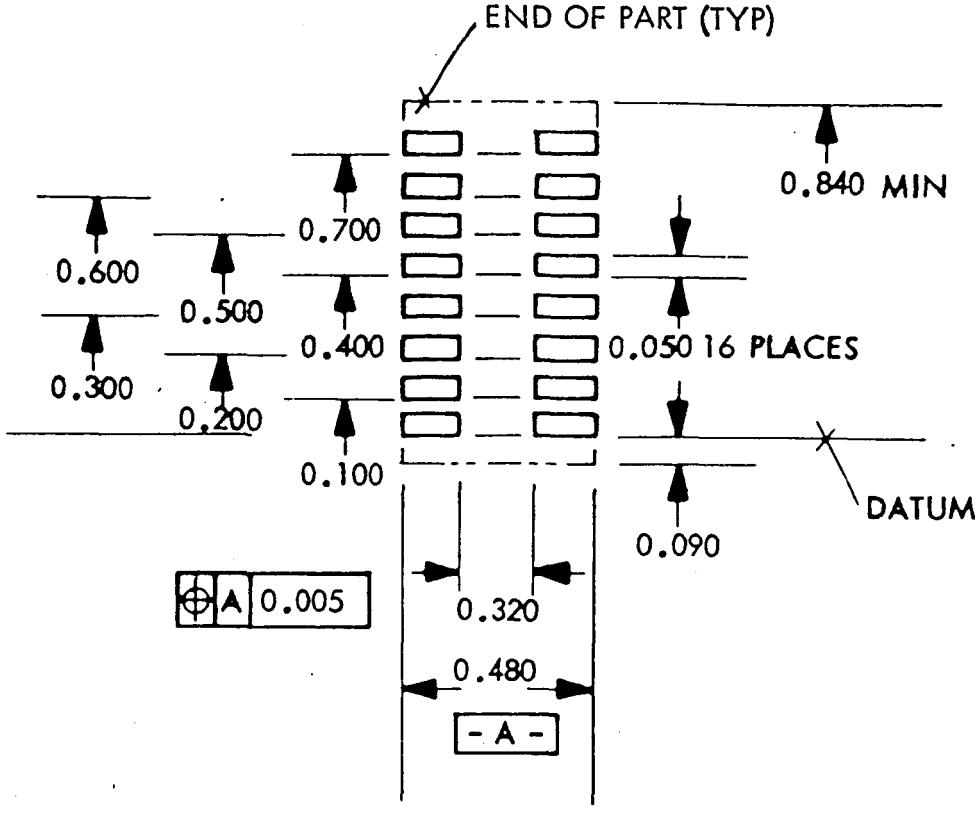


FOOTPRINT N

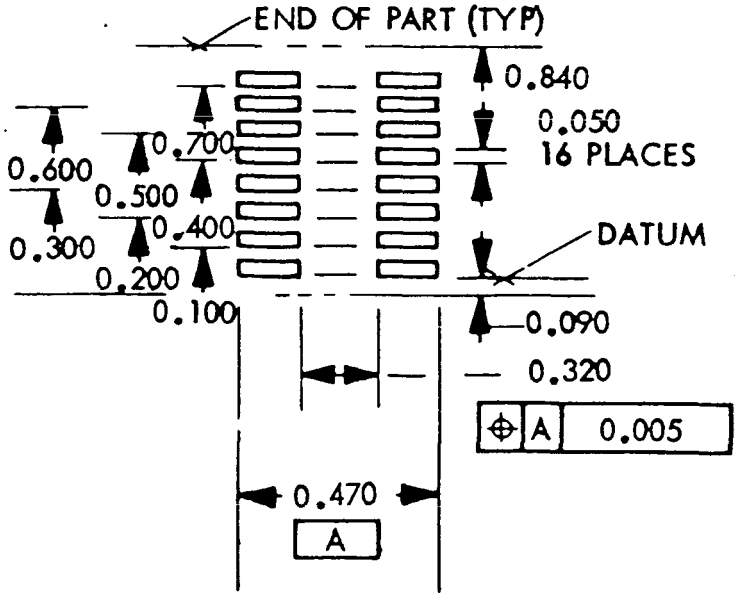


FOOTPRINT P

Table III-1. Footprint Patterns With Letter Assignment (Continued)

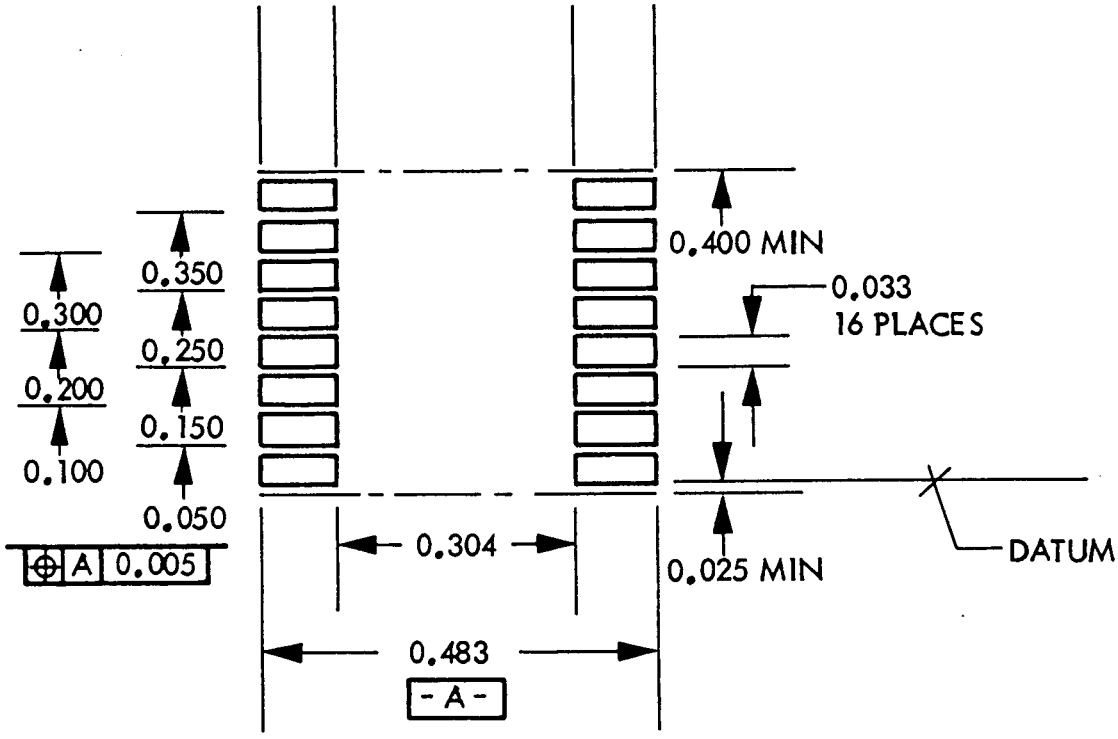


FOOTPRINT R

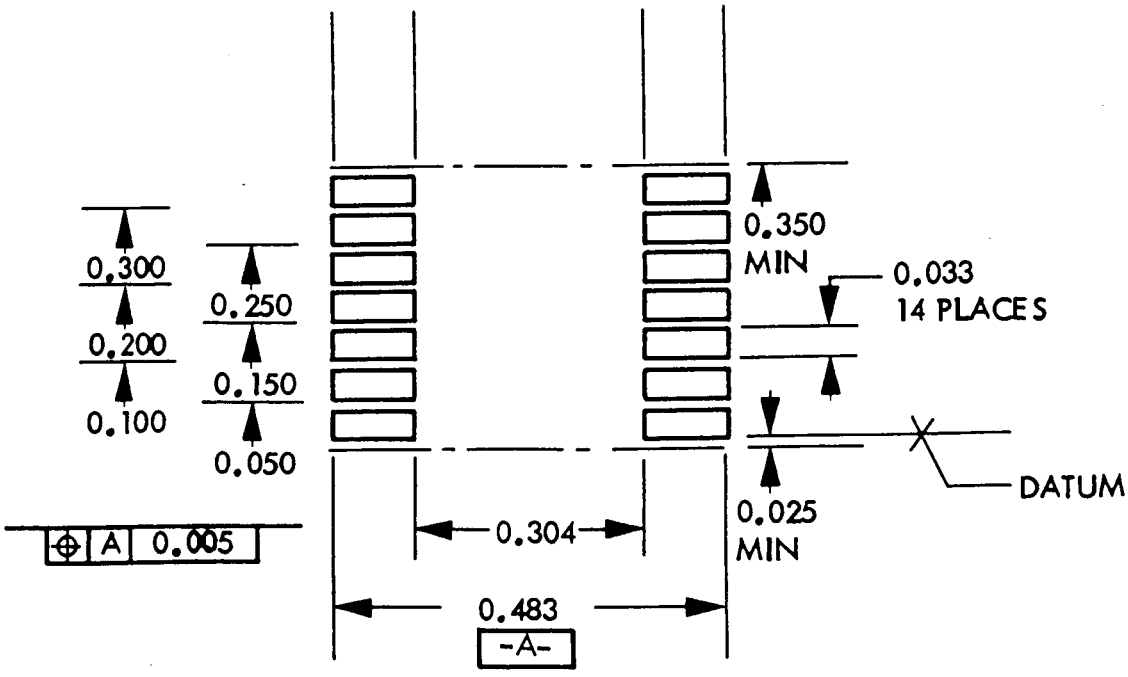


FOOTPRINT S

Table III-1. Footprint Patterns With Letter Assignment (Continued)

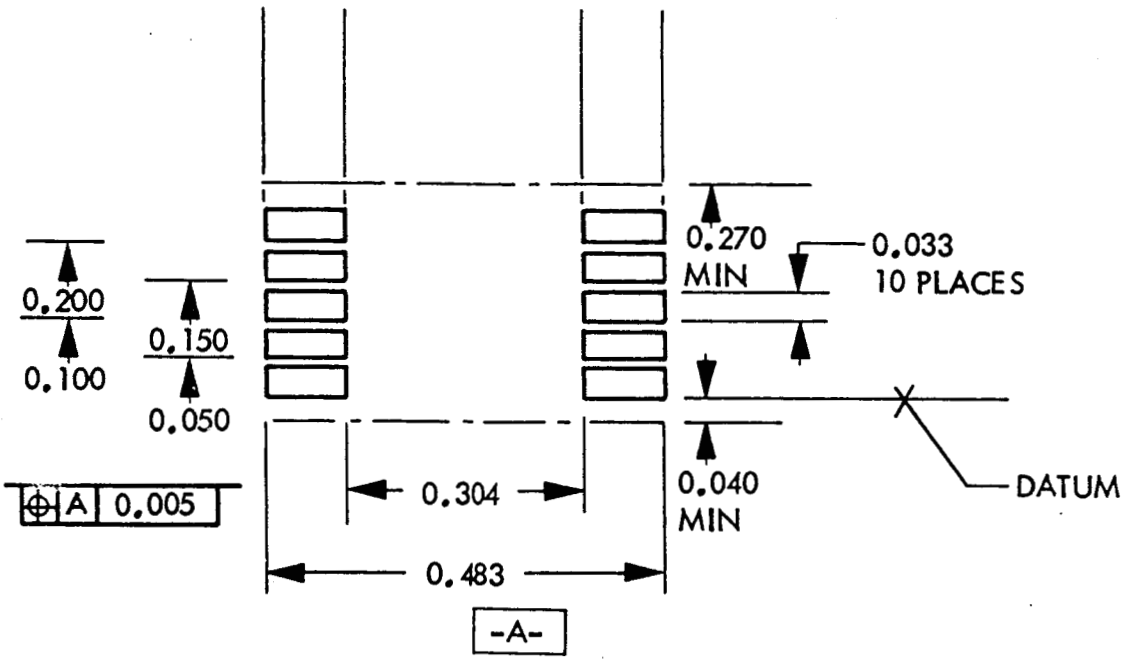


FOOTPRINT U



FOOTPRINT V

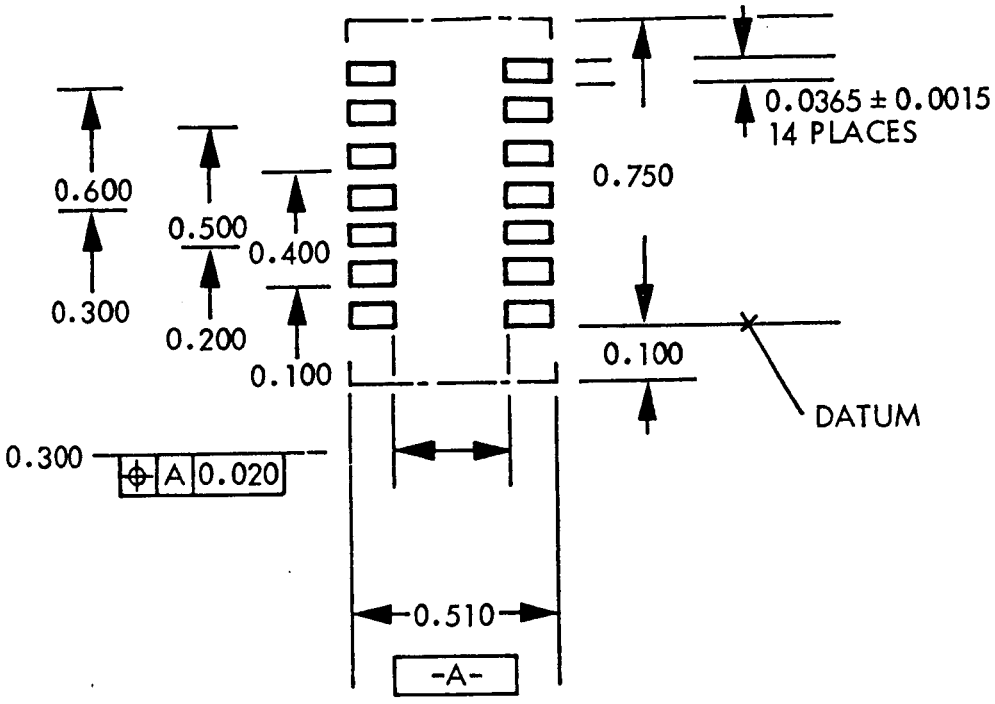
Table III-1. Footprint Patterns With Letter Assignment (Continued)



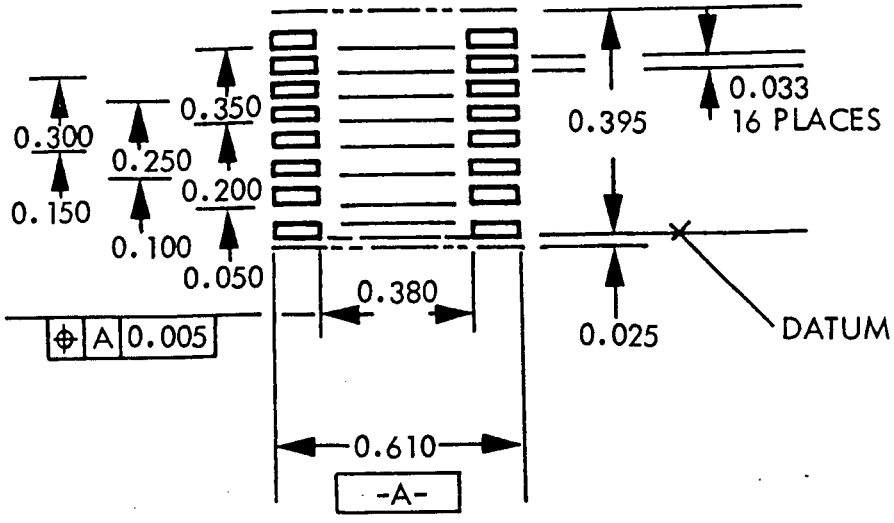
FOOTPRINT W

40

Table III-1. Footprint Patterns with Letter Assignment (Continued)



FOOTPRINT Z



FOOTPRINT AA