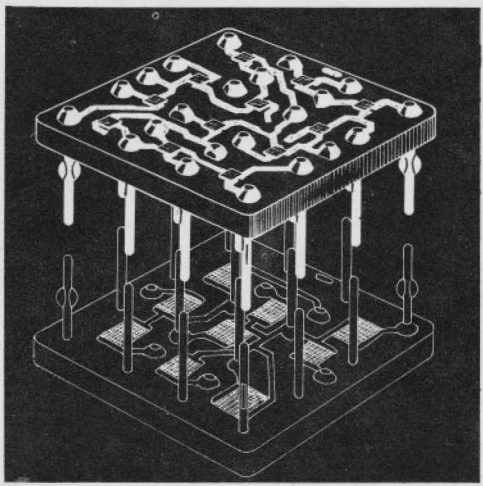
2-6201-H1 December, 1969

SLT/SLD Module Data

IBM



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SLT - SLD

Reference Book

INTRODUCTION

This pocket sized book has been published with the cooperation of Technology Information Center, Department 424 and Current Products, Department 121. It was conceived as an aid to circuit design engineers when condensed module and circuit information is desired. It is to be used for reference only. Detail design information must be obtained from the Latest Engineering Change Level of the individual specifications.

To obtain additional copies of this book, complete form M30-2526-0 and forward to:

IBM
Technology Information Center
Department 424 B/545-66
East Fishkill Facility, Route 52
Hopewell Junction, N.Y. 12533

Questions pertaining to contents should be addressed to:

Current Products Department
No. 121 B/320-32
East Fishkill Facility, Route 52
Hopewell Junction, N.Y. 12533

Be reminded, when not in use this book should be under cover.

All information contained is, **IBM Confidential**

SLT - 5ns	(AOI_{11} Family)	Pages 5 to 12
361408	AOI 11	
361409	AOX 11	
361410	AOI 11T	
361412	AOI 11B	
361413	AOI 11BT	
361414	FDD 11	
361447	FTX 11	

SLT - 10ns	(AOI_{10} Family)	Pages 13 to 24
361404	AOI 10T	
361405	AOX 10T	
361406	AOI 10B	
361407	AOI 10BT	
361468	AOI 10	
361469	AOX 10	
361482	FDD 10	

SLT - 30ns	(AOI_{30} Family)	Pages 25 to 66
361426	ID 40 MA	
361427	TLR 2	
361429	FTX 12V	
361431	ESD	
361433	FTX 8WX	
361435	MGTR	
361438	FTX EB 6	
361451	AI	
361453	AOI	
361454	DCI	
361455	AOX	
361456	AOXB	
361457	FTX 9V	
361459	FDD 30	
361473	API 3V	
361475	HPD	
361476	LSA	
361477	XOR	
361479	II	
361480	ID	
361481	FDD HVB	
361485	FDD 60/75	
361486	XORL	

SLT - 700ns (AOI_{700} Family) Pages 67 to 90

361415	TLR
361436	LST
361445	2-2AOI
361446	TLRB
361489	AOX 2
361492	API/AOPI
361493	AI/AOI
361494	II/DCI
361495	AOX_1
361496	$AOPX_1$
361497	FTX
361499	FDD

SLD - 30 Pages 91 to 124

361448	3A-301
361449	4II/DCI
361450	2-4 Way AI
361594	3-XOR
361595	3-3 Way AI
361596	2A-501
361597	2-3A/2-2A-OI
361598	2AOI-HPD
2395143	MST-1 to SLD
23995112	3-3 Way A(O)I (2-Load)
23995113	3-3 Way AI (No Load)
2551658	CONVERTER
2395148	3-3 Way API

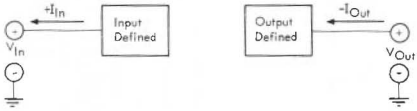
SLD - 100ns Pages 125 to 144

361440	2-5 Way-AI
361441	3-3A/1A-2OR inverter
361442	4II/DCI-II
361443	3-3 Way-AI
361444	AOX 3
361452	2x3 Way AOI-II
361458	Trigger
2395140	4-2 Way API

SLD - 700ns Pages 145 to 165

361416	2-5 Way-AI
361417	3-3A/1A-2OR inverter
361418	4II/DCI-II
361419	3-3 Way-AI
361420	AOX 3
361421	Trigger
361422	2x3 Way AOI-II
361490	TLR

SLT 5

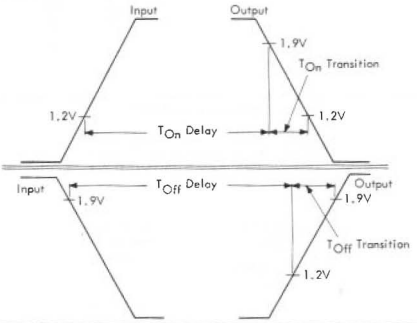


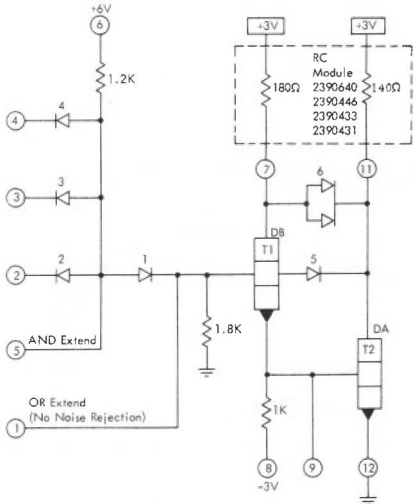
Any Current into a Module from Either Input or Output Terminals is Considered a Negative Flow

Device Information

Transistors		Diodes	
Type	Part No.	Type	Part No.
DA	2393105	DA	5323877
DB	2393106	DB	5323878
DC	2393107	DB-1	2393239
		DC	5323879
		DD	5323880
		B-8	5323823

Power Supply at the Circuit ±4%





Reference Flyers 872081

U03AU, U03AV, U03AW, U03AX, U03AY, U03AZ, U03CA, U61AB, U61AC, U03AI, U03AJ, U03AK, U03AL, U03AM, U01AB

T_{On_D} at 25°C
16.3ns

T_{Off_D} at 55°C
7.6ns

Average Power Dissipation Max
72.8mw

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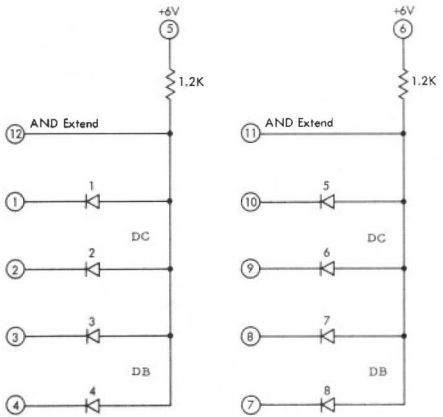


IBM Eng Spec 872081

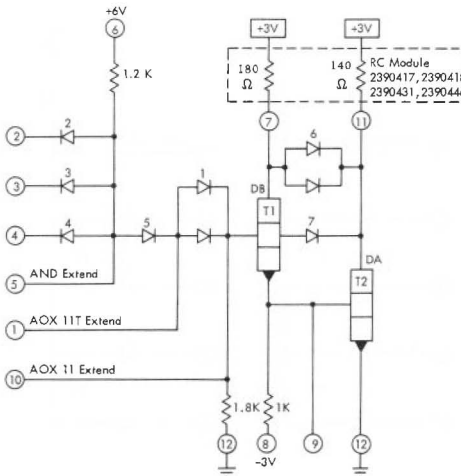
Power	
Requirements	Dissipation
7.4mA	36.8mw
-	-

All Values/Module

Input Up

Input Down

Power	
Requirements	Dissipation
9.2mA	53.6
-	-



Reference Flyers Same as Part No. 361408

Input Requirements		Output Specifications	
Max Up +3.12V		Max Up +3.12V	
Min Up - 25C° +2.57V		Min Up - 25C° +2.73V	
Min Up - 50C° +2.48		Min Up - 50C° +2.73V	Max I_{Load} 43.5mA at +0.52V
	Max Down - 25C° +1.62V		Max Down - 25C° +0.996V
	Max Down - 55C° +1.44V		Max Down - 50C° +0.945V
	Min Down +0.398		Min Down +0.466V

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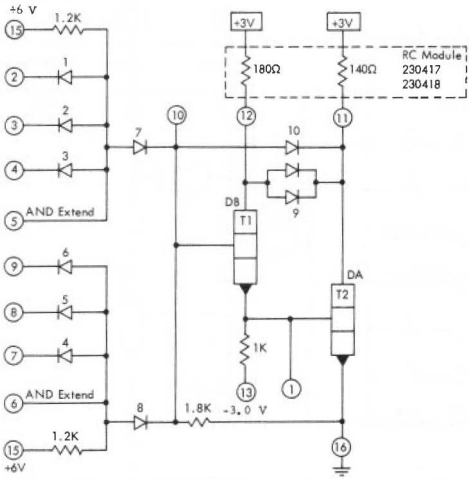
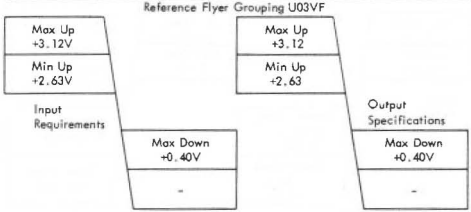
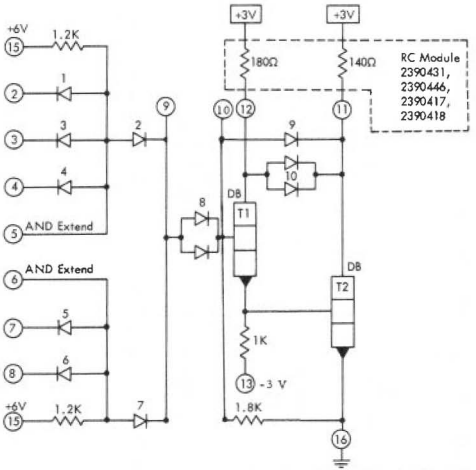


Reference Flyer Grouping U03VF



Average Power Dissipation (mw)
101.9 Max

Delay Worst Case	
Turn On	Turn Off
16.3ns	7.65ns
25C°	55C°



Reference Flyer Grouping U03AV

Input Requirements		Output Specifications
Up - Nom +3.0V		Up - Nom +3.0V
Up Min +2.48V		Up - Nom I = 0
	Down - Nom $+1.62_{-0.398}$ V	Down - Max +0.996V
	Down - Nom $+2.98_{-4.0}$ mA	Down - Max -49.3mA

Average Power Dissipation	Delay Worst Case	
	Turn On	Turn Off
99.7mw Max	21.4nsec	10.8nsec
	25C°	55C°

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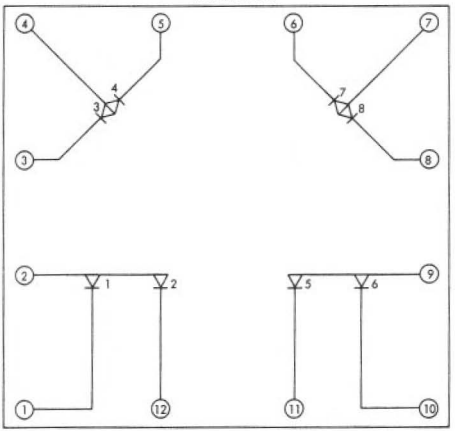
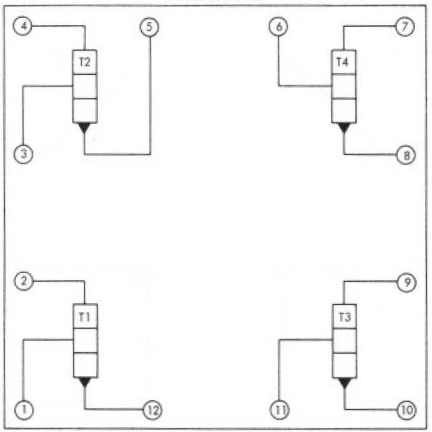
All Diodes DC



Test	Conditions	C°	Limits	
			Min	Max
Reverse Recovery	I_F = 3.0mA	25		0.24V
Forward Recovery	I_F = 2.0mA	25		0.80V
V_F	I_F = 0.1mA	75	0.455V	
V_F	I_F = 1.0mA	75	0.575V	
V_F	I_F = 3.0mA	25		0.80V
V_{BR}	I_R = 5.0μA	25	4.5V	
Cap	Bias = 0.0 V f = 1mc (±.5) VAC = 50mV P to P	25		2.5pF
Temp Coef	I_F = 0.1mA	25/75		2.2mV/C°

All Transistors DC



Test	Condition	C°	Limits	
			Min	Max
BVceo	Ic=5.0mA	25	4.50V	
BVebo	Ie=10μA	25	2.0V	
Icbo	Vcb=5.0V	75		1.0μA
Icex	Vce=6V Vbe=0.275V	75		100.0μA
HFE-1	Ie=7.5mA Vcb=0	25	28	
HFE-2	Ie=64.0mA Vcb=0	25	20	
Veb 1	Ie=1.0mA Vcb=0	75	0.54V	
Cob	Vcb=0 Ie=0 f=10mc 50mV P P	25		6.0pF

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SLTI0

Device Information

Transistor

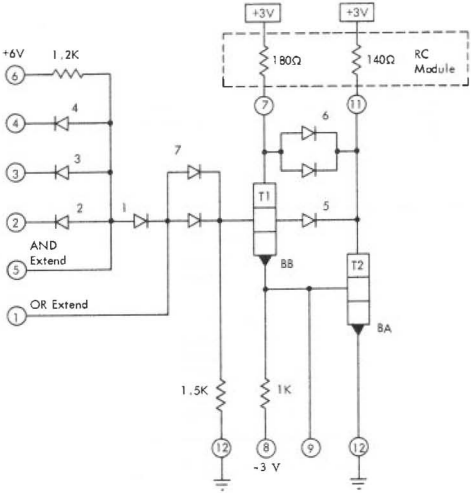
BA	5323876
BB	5323875

Diodes

DDG	2393413
B-8	5323823
B-9	5323909
AXL	2393092
B-19	2393091
CS	2393084

Power Supply at Circuit Pins ± 4%

All SLT-10 Module Resistor Values = + 5%/- 6% E.O.L.

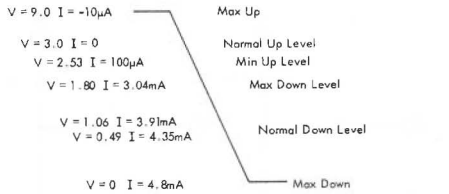


Reference Flyers V03CI

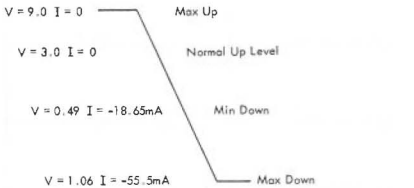
U03AA	873148	U03AT	872193
U03AP	873189	U03CM	873196
U03AQ	873190	U61AB	873201
U03AR	873191	U03CU	873199
U03AS	873192	U03CT	873198

U03CN 873197

Input Requirements



Output Specifications



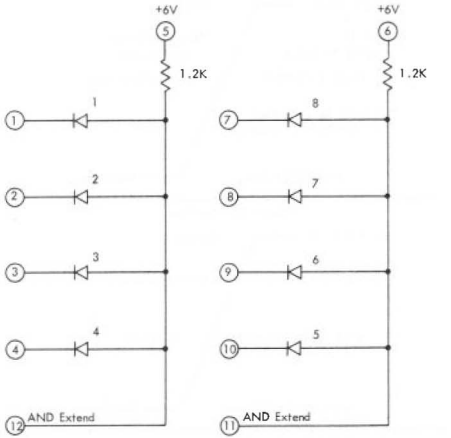
IBM Engineering Specification No. 873437

Delays (Worst Case)
Nano Seconds

Temp C°	Ton Delay	Toff Delay
55	22.8	5.9

Average
Power Dissipation
Per Circuit mw

Nom	Max
69.12	76.78



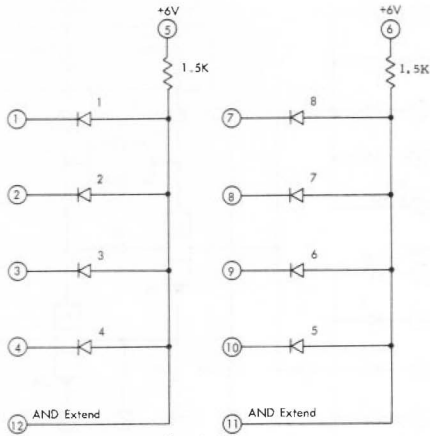
ALL B-9

Power	
Requirements	Dissipation
3.08 mA/Ckt	12.97 mW/Ckt
6.16 mA/Mod	25.94 mW/Mod

Input Up

Input Down

Power	
Requirements	Dissipation
4.42 mA/Ckt	25.42 mW/Ckt
8.84 mA/Mod	50.84 mW/Mod



All Diodes 8-8

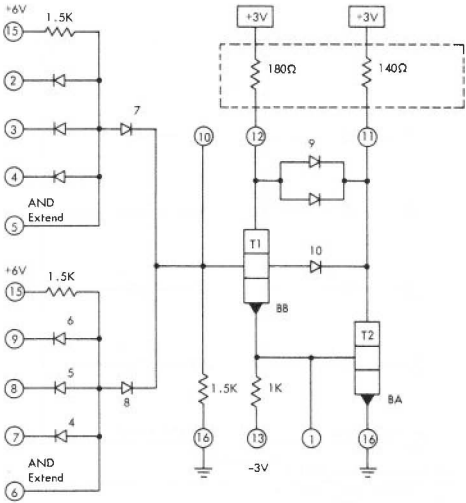
IBM Engineering Spec. 873413

Power	
Requirements	Dissipation
2.93 mA/Ckt	14.29 mW/Ckt
5.86 mA/Mod	28.58 mW/Mod

Input Up

Input Down

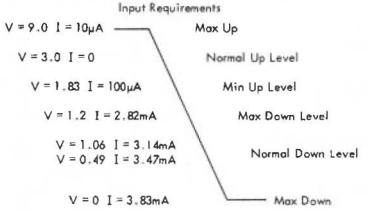
Power	
Requirements	Dissipation
3.54 mA/Ckt	20.41 mW/Ckt
7.08 mA/Mod	40.82 mW/Mod



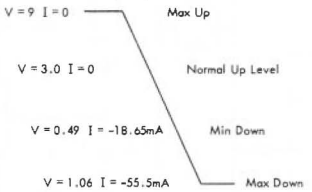
U03VD Reference Flyers – U03VC

U03AA	873184	U03CK	873194
U03AC	873185	U03CL	873195
U03AD	873186	U03VG	
U03AE	873187	U61AB	
U03AF	873188	U03VH	

Input Requirements



Output Specifications



IBM Engineering Specification 873413

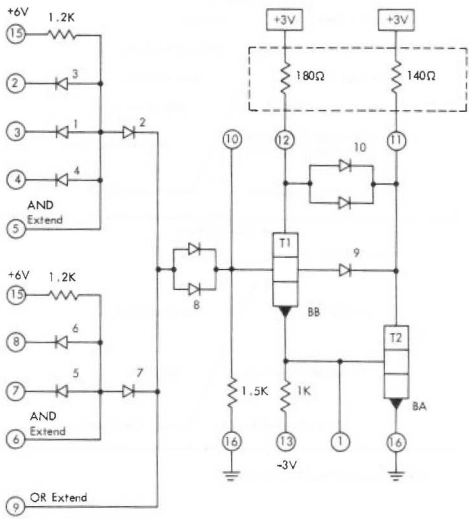
Delays (Worst Case)
Nano Seconds

Temp C°	Ton Delay	Toff Delay
55	13	9.5

Average
Power Dissipation
Per Circuit mW

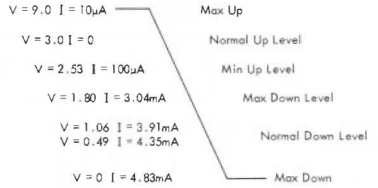
Not Including External RC Module →

Nom	Max
87.35	108.05

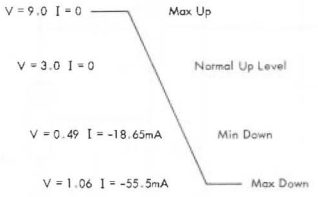


Reference Flyers

Input Requirements



Output Specifications



IBM Engineering Specification 873437

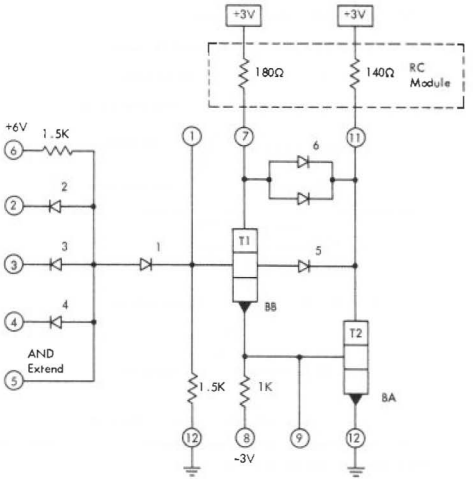
Delays (Worst Case)
Nano Seconds

Temp C°	Ton Delay	Toff Delay
55	22.8	5.9

Average
Power Dissipation
Per Circuit mw

Not Including External RC Module →

Nom	Max
103.3	113.9



Reference Flyers

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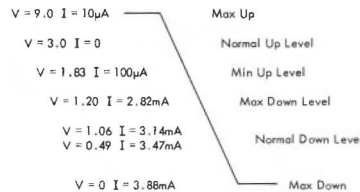
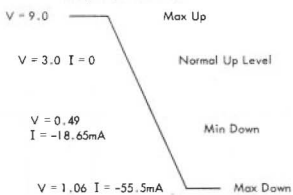
Input Requirements



Output Specifications



IBM Engineering Specification 873413

Delays (Worst Case)
Nano Seconds

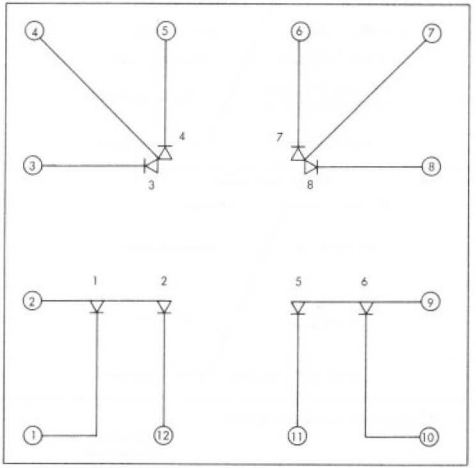
Temp C°	Ton Delay	Toff Delay
25	13.0	--
55	----	9.5

Average
Power Dissipation
Per Circuit mw

Not Including
RC Module

Nom	Max
67.40	78.67

All Diodes B-9



Test	Conditions	C°	Limits	
			Min	Max
VF	IF = 0.1mA	25	0.54V	
VF	IF = 1.0mA	25	0.64V	
VF	IF = 3.0mA	25		0.76V
IR	VR = 15.0V	75		0.5μA
Cop	BIAS = 0V VAC = 50mV (f = 1Mc ± .5) P P	25		2.5pF
Temp Coef	IF = 0.1mA	25/75		2.2mV/C°
QS	IF = 3.0mA	25	4.0pC	11.5pC
Fwd Rec	IF = 2.0mA	25		0.80V

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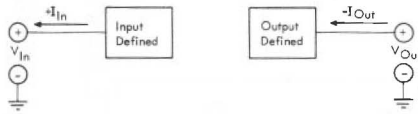
SLT 30

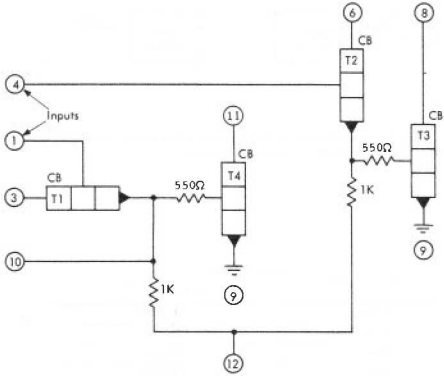


Any current flow into a module be it at the input or the output, shall be considered negative. Positive current flow is out of the module

Device Information

Class	Part Number
A Diode	5323782
A-30 Diode	5323936
AAA	5323865
AAB	5323866
AAC	5323973
ABA	5323842
ABB	5323847
ABC	5323843
ACA	5323883
ACB	5323882
ACC	5323972
CB	5323845
CC	5323844
CD	2393008

Power Supply ±4% at Module Pins



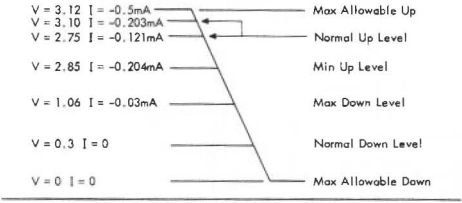
Pin 2 Not Used

This module may be used as a low speed ID or high speed ID as well as with the SLT-30 family. See Engineering Spec 873405

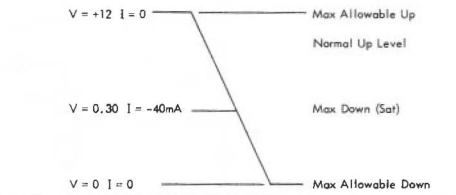
Reference Flyers

T55AH	873104
U55AB	873105
U55AJ	873106

Input Requirements



Output Specifications



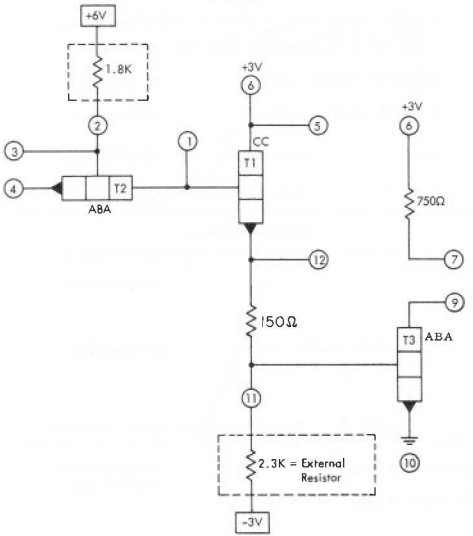
I_C Max = 40mA at V_{CE} = 0.30

Delay Information
Does not Apply

Pins 2 and 5 not Used

Power Dissipation
Per Circuit mw

Max-On	Max-Off
30.0	0

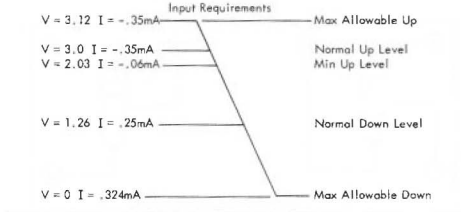


Reference Flyers

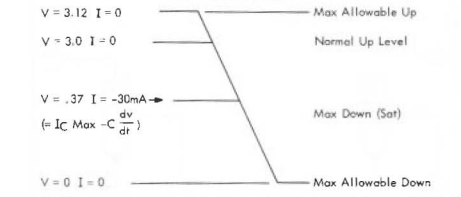
S06AK	872039
S06AN	872039
S05CJ	872039

(I-High) Terminated and Unterminated Line

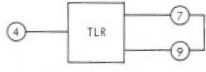
Input Requirements



Output Specifications

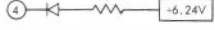


Engineering Specification
872039



Driving SLT-30
Delays (Worst Case)
Nano Seconds

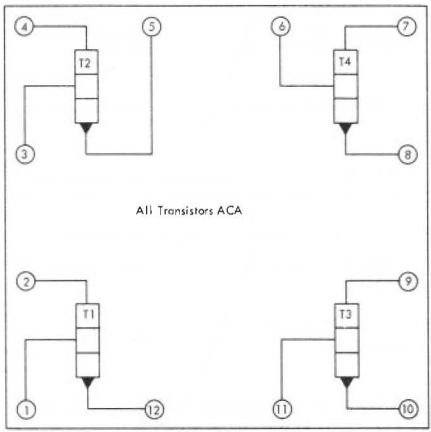
Temp C°	Ton Delay	Toff Delay
25	20	38
55		48



Equivalent Circuit seen at Input of TLR

Mode II
Power Dissipation
Per Module - mw

Max-On	Max-Off
69.2	5.64

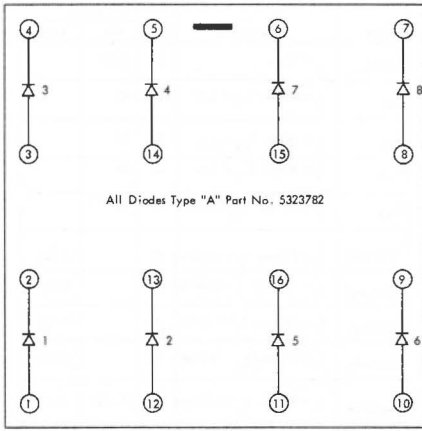


Top View

Test	Conditions	Temp C°	Limits Min	Limits Max
I_{CEX}	V_{CE} = +12 V_{BE} = +0.36	75		20μA
I_{BEX}	V_{CE} = +12 V_{BE} = -2.5V	75		1.0μA
B_{VCEO}	I_C = 5.0μA	25	12.0V	
B_{VEBO}	I_E = 10μA	25	3.0V	

Continued on Page 31

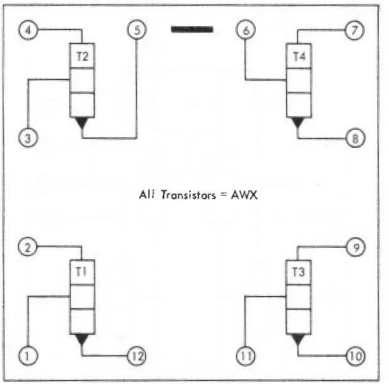
Test	Conditions	C°	Limits	
			Min	Max
$^{B}V_{CBO}$	I_C = 10 μa	25	15.0v	
h_{fe2}	I_E = 2.0 ma, V_{CB} = 0.2v	25	20	
h_{fe3}	I_E = 10 ma, V_{CB} = 0.2v	25	25	
h_{fe4}	I_E = 50 ma, V_{CB} = 1.0v	25	20	
h_{fe5}	I_E = 100 ma, V_{CB} = 1.0v	25	10	
$V_{CE1\ (sat)}$	I_C = 2.0 ma, I_b = 0.133 ma	25		0.25v
$V_{CE2\ (sat)}$	I_c = 10.0 ma, I_b = 0.57 ma	25		0.3v
$V_{CE4(sat)}$	I_c = 50.0 ma, I_b = 3.33 ma	25		0.50v
$V_{ce5(sat)}$	I_c = 100 ma, I_b = 14.3 ma	25		0.90v
$V_{be1(sat)}$	I_c = 2.0 ma, I_b = 0.133 ma	25	0.625v	0.775v
$V_{be2(sat)}$	I_c = 10.0 ma, I_b = 0.57 ma	25	0.70v	0.85v
$V_{be3(sat)}$	I_c = 50.0 ma, I_b = 3.33 ma	25	0.80v	1.10v
$V_{be4(sat)}$	I_c = 100 ma, I_b = 14.3 ma	25		1.50v
$V_{be(on)}$	I_c = 1.13 ma, V_{CB} = 1.2v	75	0.50v	
C_{ib}	V_{EB} = 0 f = 1 Mc + 0.5 Mc	25		6.50 pf
C_{ob}	V_{CB} = 0 f = 1 Mc + 0.5 Mc	25		6.50 pf
Gain HFE	I_E = 10.0 ma V_{CB} = 3.0 f = 100 Mc	25	1.70	
h_{rb}	I_E = 1.0 ma f = 10.0Mc V_{CB} = 1.0v	25		0.05
R_E (Int)				0.25 °C/mw



Top View

Test	Conditions	Temp C°	Limits	
			Min	Max
Qs	IF = 3.0mA	25		19.5pc
(Peak) Fwd. Recovery	IF = 2.0mA	25		0.80V
VF	IF = 0.1mA	25	0.53V	
VF	IF = 0.5mA	25	0.61V	
VF	IF = 1.0mA	25	0.64V	
VF	IF = 3.0mA	25		0.80V
VF	IF = 5.0mA	25		0.83V
Fwd. V Temp. Coef.	IF = 0.1mA	25 75		2.4mV/C°
VBR	IR = 10.0μA	25	15.0V	
IR	VR = 15.0V	75		0.5μA
CAP	Bias = 0f = 1MC ± .5 AC Sig = 50mV P-P	25		2.5pF
Rt				0.4C°/mW

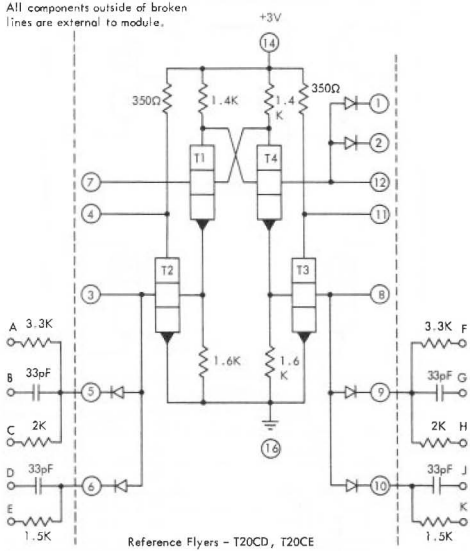
IBM Confidential



Top View

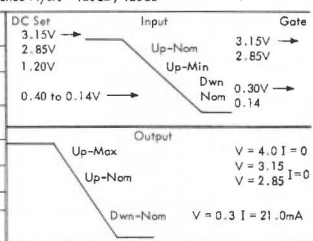
Test	Conditions	Temp C°	Limit	
			Min	Max
ICBO	IE = 0 VCB = 9.0v	75		100nA
IEBO	IC = 0 VEB = 2.0v	75		100nA
BVEBO	IE = 10μA	25	3.0V	
BVCEO	IC = 5.0mA Ib = 0	25	9.0V	
Cib	IC = 0 VEB = 0 f = 1MC ± 0.5	25		6.0pF
Cob	IE = 0 VCB = 0 f = 1MC ± 0.5	25		6.0pF
ICEX	VBE = -3.0v VCEX = 15.0v	25		10.0μA
VBE	IB = 1.40mA IC = 30.0mA	25		0.90V
VCE 1	IC = 14.0mA IB = 1.50mA	25		0.20V
VCE 2	IC = 8.0mA IB = 1.5mA	25		0.17V
VCE 3	IC = 3.5mA IB = 1.5mA	25		0.13V
hfe	IE = 30.0mA VCB = 0	25	22	

All components outside of broken lines are external to module.

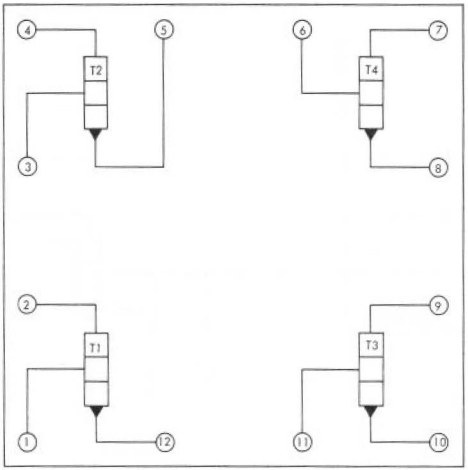


Reference Flyers – T20CD, T20CE

Term ID	Function
(1) (2)	DC Set
(3) (8)	AC Input Extend
(7)	Additional Diode DC Reset
(12)	Extender
(4) (11)	Output
D, J	AC Set
See Engineering Spec 872681	

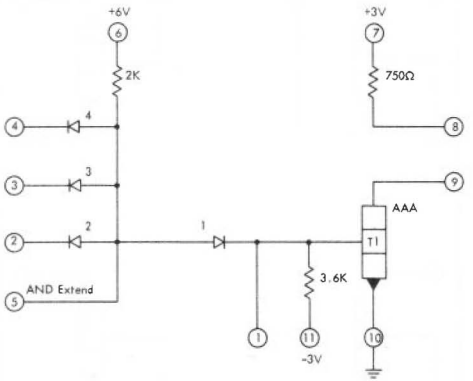


IBM Confidential



All Transistors ACC

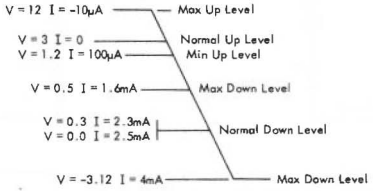
Test	Conditions	C°	Limits	
			Min	Max
Icex	Vce = 13V Vbe = .35V	75		20μA
BVceo	Ic = 5mA	25	13V	
Vce^{SAT}_1	Ic = 22mA Ib = 2.2mA	25		.30V
Vce^{SAT}_3	Ic = 100mA Ib = 10mA	25		.90V
Vbe-ON	Vcb = 1.2V Ie = 1.3mA	75	.50V	
HFE	Vcb = 1.0V Ie = 100mA	25	10	
hfe	f = 100MC Vcb = 3V Ie = 10mA	25	1.50	4.75
Cob	Vcb = 0 f = 1MC (± .5) 50mV PP (Max)	25		4pF
Cib	VEb = 0 f = 1MC (± .5) 50mV PP (Max)	25		7.5pF



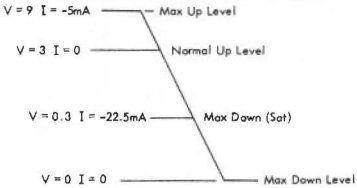
Reference Flyers

T03AA	873020
T03AB	873021
T61AA	873028
T61AB	833029

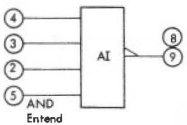
Input Requirements



Output Specifications



Engineering Specification
890971

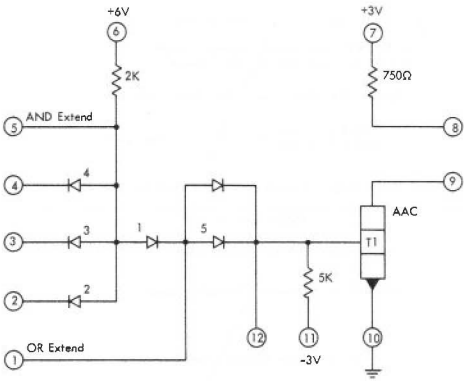


Delays (Worst Case)
Nano Seconds

Temp C°	Ton Delay	Toff Delay
25	23	26
75		33

Average Power
Dissipation mw

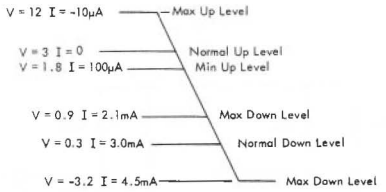
Nom	Max
24.8	27.4



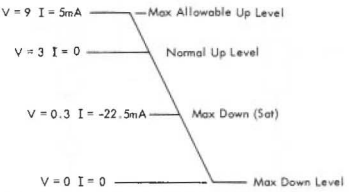
Reference Flyers

T03AC	873022
T03AD	873023
T03AE	873024
T61AA	873028
T61AB	873029
T03VA	873025
T03VB	873026

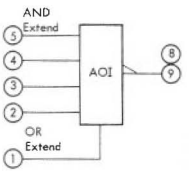
Input Requirements



Output Specifications



Engineering Specification
890972

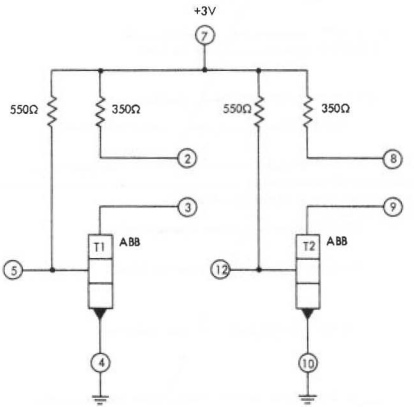


Delays (Worst Case)
Nano Seconds

Temp C°	Ton Delay	Toff Delay
25	39	28
75		37

Average Power
Dissipation mw

Nom	Max
26.5	29

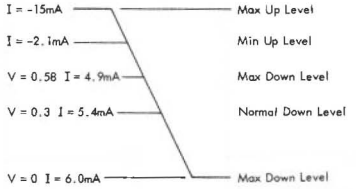


Reference Flyers

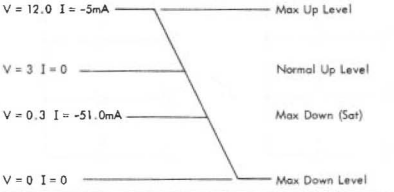
T05AA	873056
T05AB	873057
T61AC	873063

Due to special nature of this circuit see IBM Eng Spec 873402

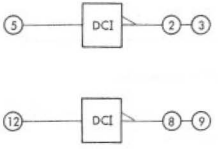
Input Requirements



Output Specifications



Engineering Specification
873402

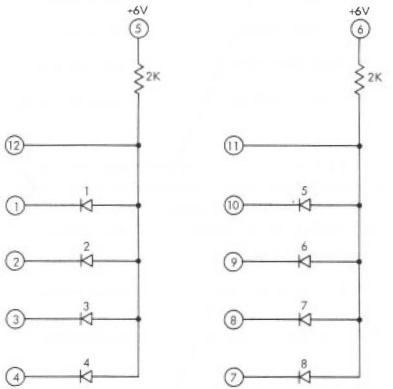


Delays (Worst Case)
Nano Seconds

Temp C°	Ton Delay	Toff Delay
25	<40	<55
75		<65

Average Power Dissipation Per Module mw

Nom	Max
67	76



All Diodes "A"

Reference Flyer

T03AC 873022

All Values/Module

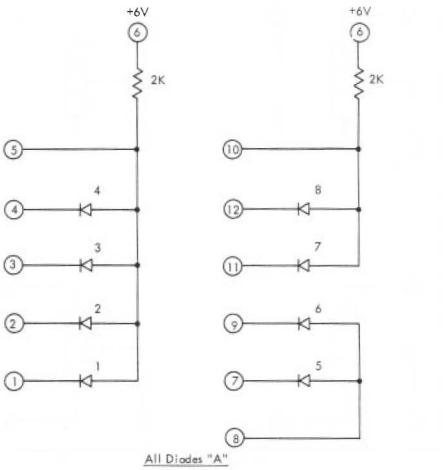
Power Requirements		Dissipation
Nom	4mA	20mw
Max	4.4mA	22mw

Input Up

Input Down

Power Requirements		Dissipation
Nom	5mA	30mw
Max	6mA	38mw

IBM Confidential



Reference Flyer
T03AC 873022

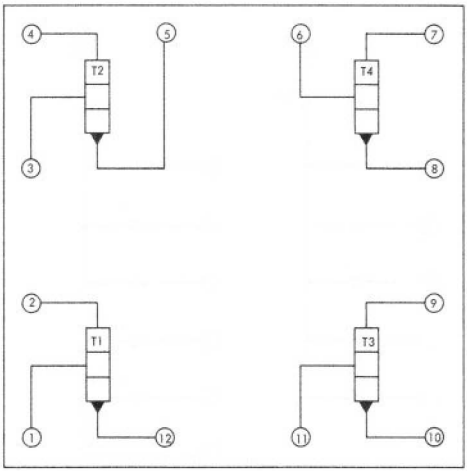
All Values/Module

Power Requirements		Dissipation
Nom	4mA	20mW
Max	4.4mA	22mW

Input Up

Input Down

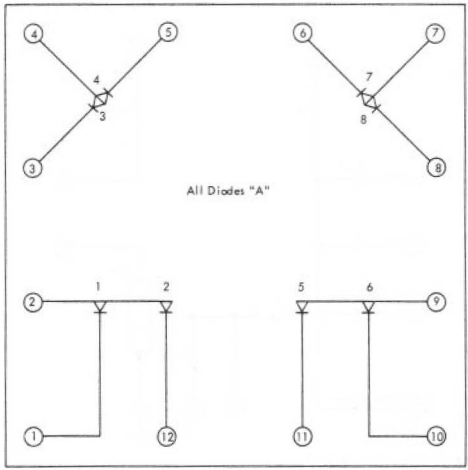
Power Requirements		Dissipation
Nom	5mA	30mW
Max	6mA	38mW



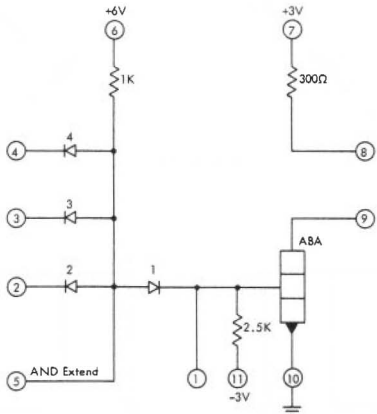
All Transistors ACB

Test	Conditions	C°	Limits	
			Min	Max
Icex	Vce = 9V VBE = +0.36V	75		20μA
BVceo	Ic = 5mA	25	9V	
$Vce^{(SAT)}_1$	Ic = 1mA Ib = .05mA	25		.25V
$Vce^{(SAT)}_3$	Ic = 22mA Ib = 1.2mA	25		.30V
Vbe (ON)	Ic = 1.3mA Vcb = 1.2V	75	.50V	
Cib	Vcb = 0 f = 1Mc (± .5)	25		6.5pF
Cob	Vcb = 0 f = 1Mc (± .5)	25		6.5pF
hfe	IE = 10mA Vcb = 3V f = 100Mc	25	1.7	

IBM Confidential



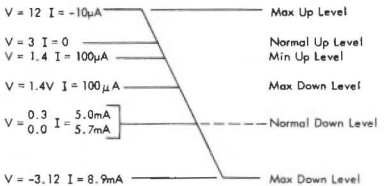
Test	Conditions	C°	Limits	
			Min	Max
QS	IF = 3mA	25		19.5pc
VF	IF = 0.1mA	25	0.53V	
VF	IF = 1.0mA	25	0.64V	
VF	IF = 5.0mA	25		0.83V
VBR	IR = 10μA	75	15V	
IR	VR = 15V	75		0.5μA
VF	IF = 1.5mA	25		1.05V
VF	IF = 25mA	25	0.85V	1.10V



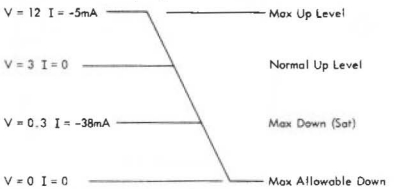
Reference Flyers

T03AF	873053
T03AJ	873054
T61AJ	873055
T03AN	873101
T03AO	873113

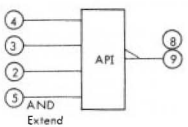
Input Requirements



Output Specifications



Engineering Specification
873401

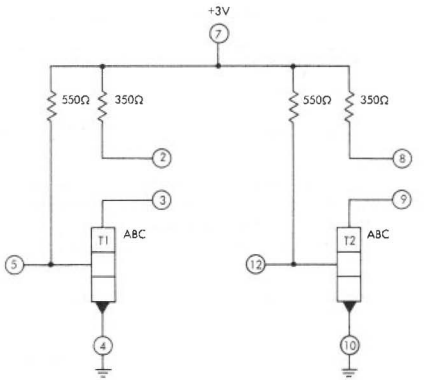


Delays (Worst Case)
Nano Seconds

Temp C°	Ton Delay	Toff Delay
25	19	37
75		51

Average Power Dissipation Per Module mw

Nom	Max
51	55.5



Reference Flyers

T15AA	873112
T15AE	873103
T06AR	873111

Due to the special nature of this circuit consult IBM engineering specification 873410 for input and output information.

For all Functional Testing, Terminals

(2)—(3)
(8)—(9)
(5)—(12)

are Tied Together

Delays (Worst Case)
Nano Seconds

Temp C	Ton Delay	Toff Delay
25	50	70
75		86

Average Power Dissipation Per Circuit mw

Nom	Max
68	77

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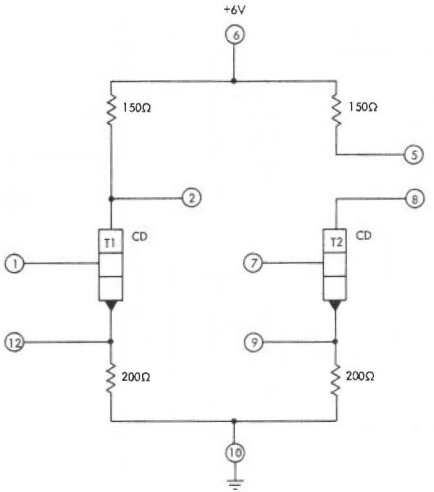
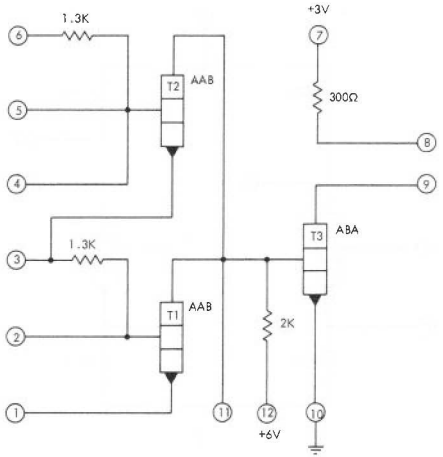


Reference Flyer T06AA 873027

Due to the special nature of this circuit consult IBM Engineering Specification 890974 and 872081 for input and output information. Delay values are dependent upon usage.

Average Power Dissipation Per Circuit mw

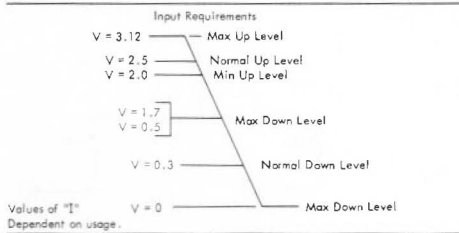
Nom	Max
74.1	83.6

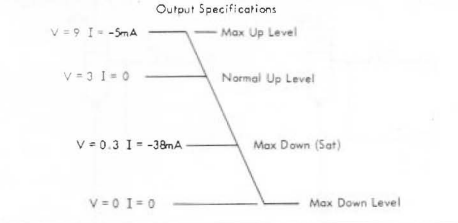


(3) and (6) are input pins.

Reference Flyers

T03AI	873060
T03AP	873059
T61AJ	873055





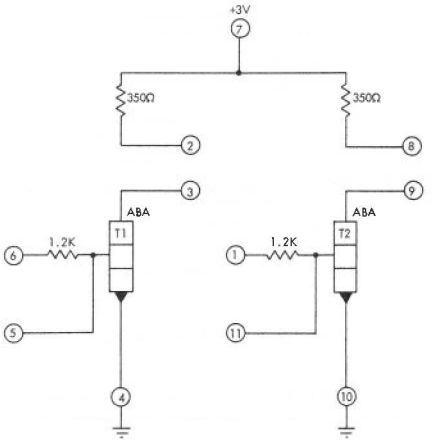
See IBM Engineering Specification 873400

Delays (Worst Case)
Nano Seconds

Temp C°	Ton Delay	Toff Delay
25	40	55
75		67

Average
Power Dissipation
Per Circuit mw

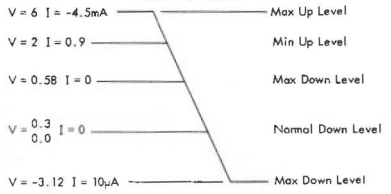
Nom	Max
33.2	41.5



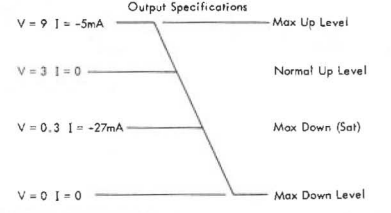
Reference Flyers

S05AS	873102
S05AH	873114
T61AC	873063

Input Requirements



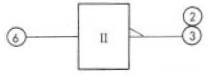
Output Specifications

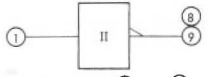


Engineering Specification
873409

Delays (Worst Case)
Nano Seconds

Temp C°	Ton Delay	Toff Delay
25	35	39
75		51

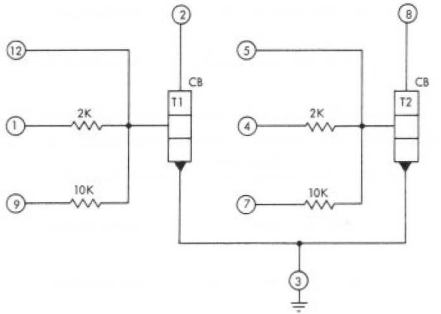




For DCI input, pins (5) and (11) are used

Average Power
Dissipation Per
Module mw

Nom	Max
30.4	35.3

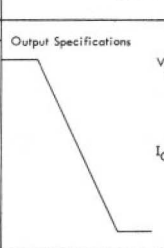


Reference Flyers

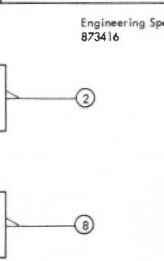
U55AA U55AC
U55AD T55AD
T55AF

This module may be used with 30 and 10 nano second family modules

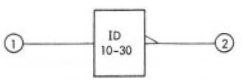
10ns	30ns	Input Requirements
V = 9	V = 9	Max Up Level
V = 2.99 I = -1.01mA V = -2.73 I = -1.03	V = 2.96 I = 0.97mA V = -2.30 I = -.076	Normal Up Level
V = 1.06 I = -0.40mA V = 0.49 I = -0.32	V = 0.30 I = 0 V = 0.14 I = 0	Normal Down Level

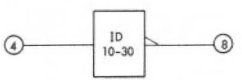


10ns	30ns	Output Specifications
V = 0.30	V = 0.30	V_{CE}
I = -14.1mA	I = -19mA	I_C



Engineering Specification
873416

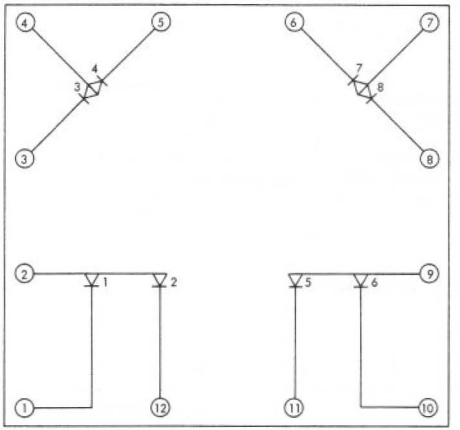




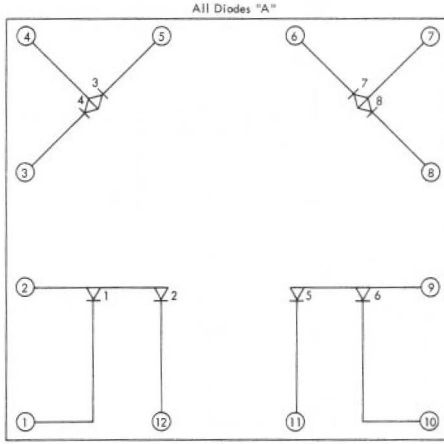
Power Dissipation
Per Module mw

10ns	30ns
11.2	11.74

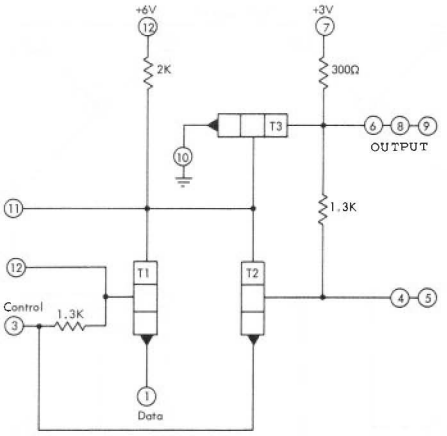
All Diodes A-30



Test	Conditions	C°	Limits	
			Min	Max
V_F	I_F = 20μA	25	0.4V	
V_F	I_F = 0.5mA	25	0.61V	0.72V
V_F	I_F = 1.0mA	25	0.64V	
V_F	I_F = 3.0mA	25		0.80V
V_F	I_F = 25mA	25	0.85V	1.10V
V_{BR}	I_R = 10μA	75	30V	
Q_S	I_F = 3.0mA	25		19.5PC
I_R	V_R = 15V	75		0.5μA



Test	Conditions	C°	Limits	
			Min	Max
V_F	I_F = 60mA	75	0.89V	
V_F	I_F = 60mA	25	0.95 V	1.4V
I_R	V_R = 15V	75		1.0μA
C	f = 1.0mc ± .5mc "0" Bias 50mV P to P	25		2.5pF
V_P	I_F = 75mA	25		1.9V
R_TINT				0.33°C/mw

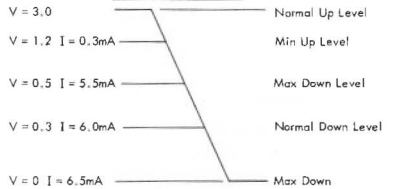


⑥-⑧-⑨ and ④-⑤ connections are external to the module

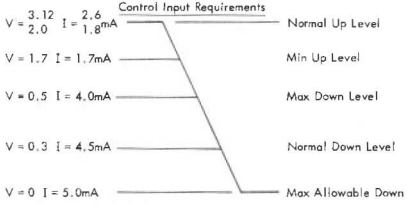
Reference Flyer

T03AK 873061

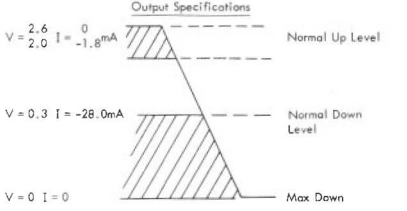
Data Input Requirements



Control Input Requirements



Output Specifications

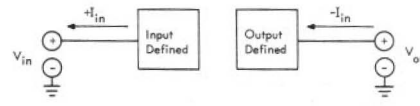


For delay information see IBM Eng Spec 890985

Average Power Dissipation Per Circuit mw

Nom	Max
37.9	46.6

SLT 700



Power Supply
+12V ± 7%

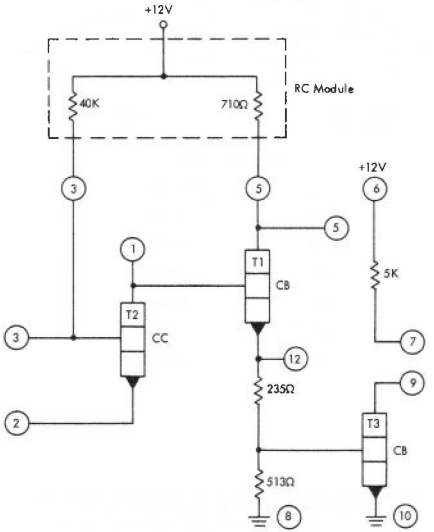
Resistor Values
± 5%

Device Identification

Type	Part No.
AAA	5323865
AAD	5323974
CA	5323850
CB	5323845
CC	5323884
"C" Diode	5323888

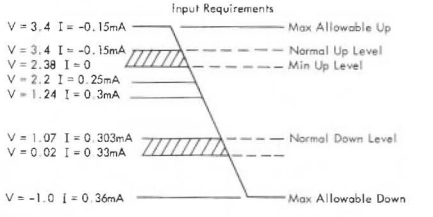
Circuits Can Be Constructed by Use of Following Module Combinations

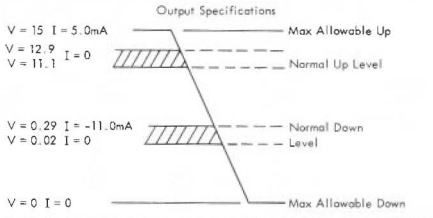
"OR" Variable Single Shot	Single Shot SSL	1.3μ sec. 3K Non-Latch Single Shot	Flip-Flop Latch	Delay Circuit
DCI-II 361494	AOX, 361495	DCI-II 361494	Two-IBM AI 361493	DCI-II 361494
AOX, 361495	DCI-II 361494	FDD 361499	R.C. Module 2390657	AOX 361495
R.C. Module 2390469	2K Pot IBM P.N. 483119	R.C. Module IBM P.N. 2390657		R.C. Module 2390469
R.C. Module 2390663	Ext Res. 1-3K, 2-4K, 2-11K	5K R.C. Module 2390467		R.C. Module 2390663
	Timing Capacitor			
Reference Eng. Spec. No.				
873118	890984	872324	873412	890983



Reference Flyers

V06EE	(TLR)	873095
V06EF		873096
V06EC	(Terminator)	873094

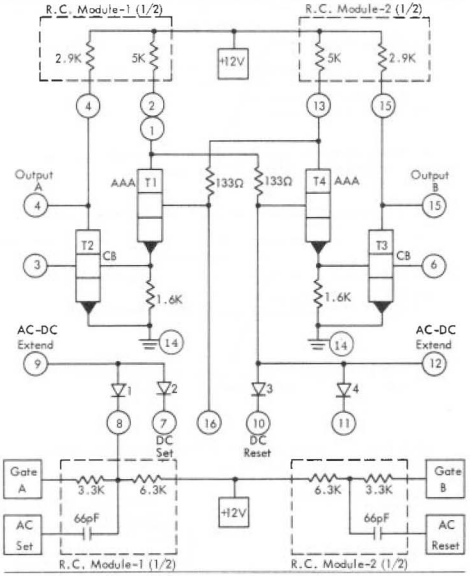




Engineering Specification
873404

Delays (Worst Case)
Nano Seconds

Temp C°	Ton Delay	Toff Delay
25	130	350
75		420



Reference Flyers

(873289)

V20A8 V20AC V20AD

Two (2) RC Modules Part No. 2390741 or 2390786

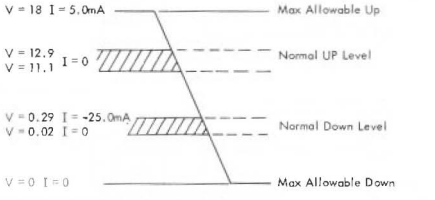
SLT-700 Trigger Module Part Number 361436

Input Requirements

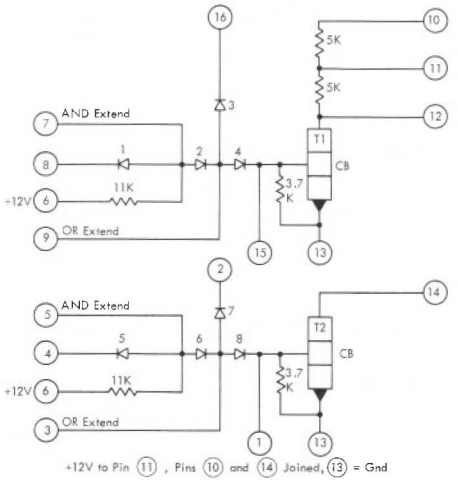
DC Set V	DC Set I	Gate V	Gate I	
15.0	-1μA	15.0	-.33mA	Max Allowable UP
12.9	0	12.9	0	Normal UP Level
11.1		11.1		
1.3	10μA	10.5	.45mA	Min Up Level
		0.8	1.3mA	
			1.1mA	
			1.4mA	
0	2.5mA	0	1.4mA	Max Allowable Down

For AC set req see 873502

Output Specifications



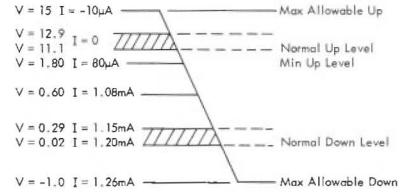
See 873502 for Delays (Worst Case)



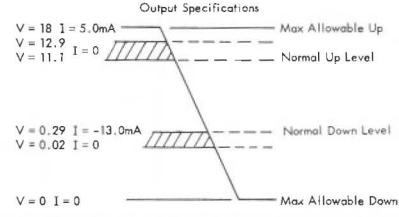
Reference Flyers

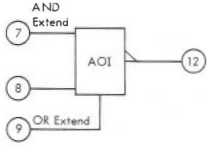
V03AA		873000
V03A8		873012
V03AL	(Endicott)	872326
V03E8		Endicott
V61A8		873019

Input Requirements



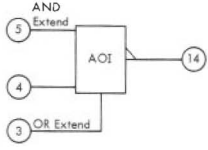
Output Specifications



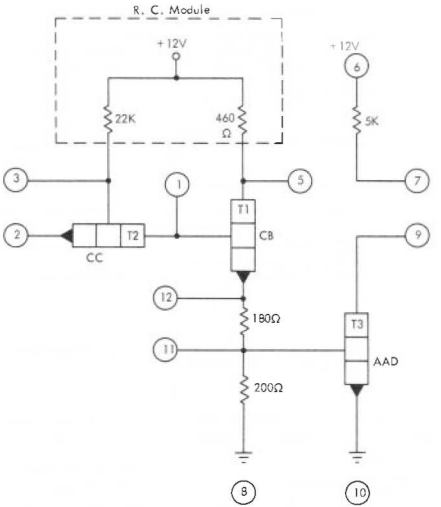


Delays (Worst Case)
Nano Seconds

Temp C°	Ton Delay	Toff Delay
25	340	680
75		850



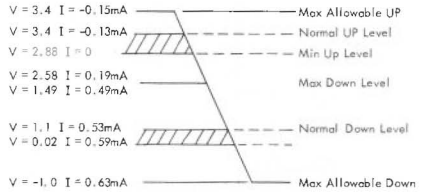
Engineering Specification
890980



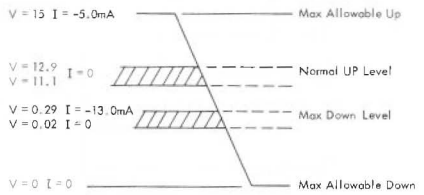
Reference Flyers

V06E1	(TLR)	873337
V06EJ		873338
S06EA		Terminator

Input Requirements

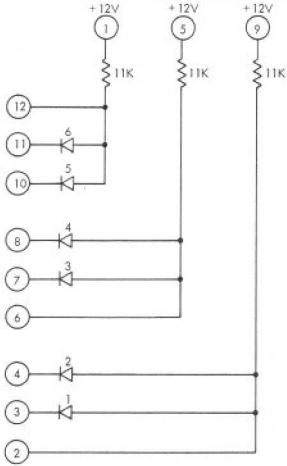


Output Specifications



Delays (Worst Case)
Nano Seconds

Temp C°	Ton Delay	Toff Delay
25	130	105
75		130



All Diodes "C"

Reference Flyers

V03AA	873000
V03AO	(San Jose)

Input Up

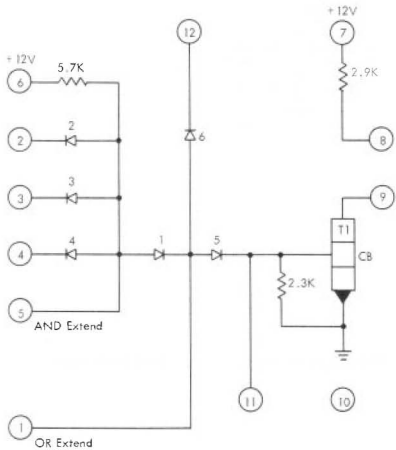
Power Requirements	Dissipation
Max	
3.3mA	41.7mw
Nom	
2.7mA	27.0mw

All Values are per Module

Power Supply +12.0V

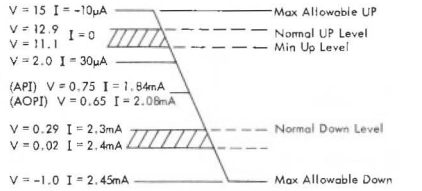
Input Down

Power Requirements	Dissipation
Max	
3.6mA	46.0mw
Nom	
3.0mA	35.4mw

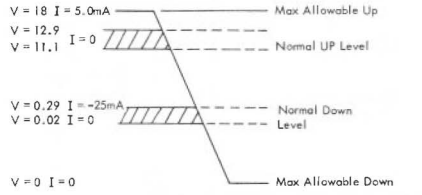


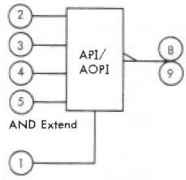
Reference	Flyers
V03AE	873003
V03AH	873005
V03A1	873006
V03AF	873007
V03AG	873008
V03AT	873009
V03AV	873018
V03AX	873004
V61AA	873011

Input Requirements



Output Specifications

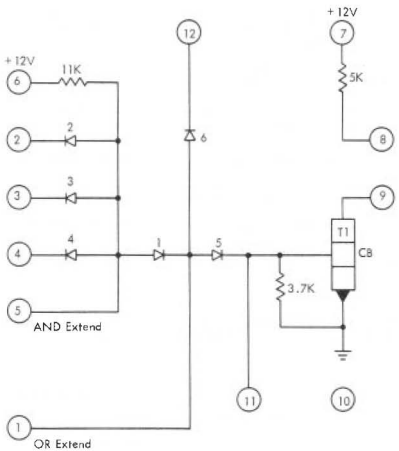




Delays (Worst Case)
Nano Seconds

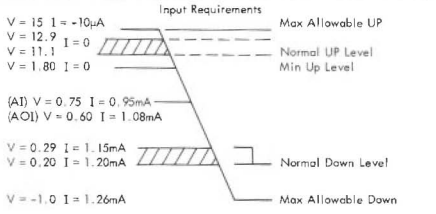
Temp C°	Ton Delay		Toff Delay	
	API	AOPI	API	AOPI
25	200	220	370	650
75			510	800

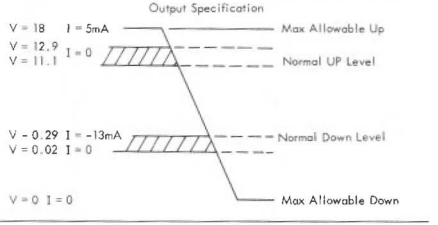
Engineering Specification
890979

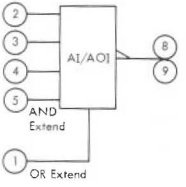


Reference Flyers

V03AA		873000
V03AB		873012
V03AC		873013
V03AJ		873014
V03AK		873015
V03AL	(Endicott)	872326
V03AW		873016
V03EB		Endicott
V03AV		873018
V61AB		873019



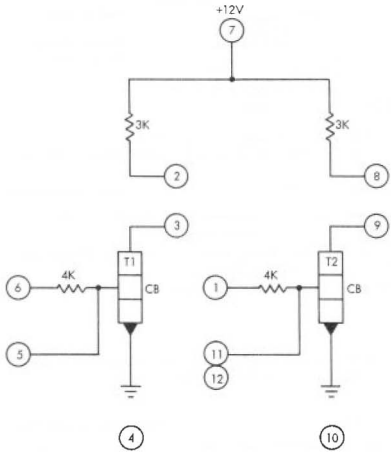




Delays (Worst Case)
Nano Seconds

Temp C°	Ton Delay AI	Ton Delay AOI	Toff Delay AI	Toff Delay AOI
25	310	340	380	680
75			520	850

Engineering Specification
890980

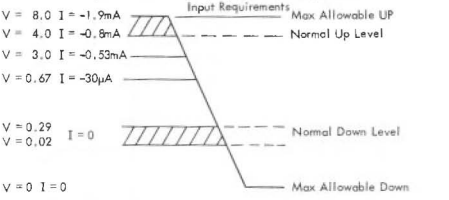


Reference Flyers

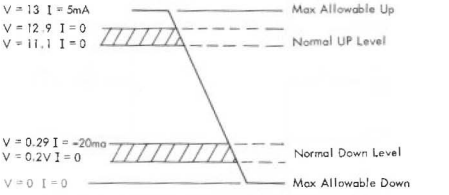
V06AC	873030
V06AD	873031
V06AE	873032
V06AF	873033

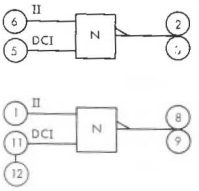
Due to special nature of DCI, input cannot be specified

Input Requirements



DCI II Output Specifications

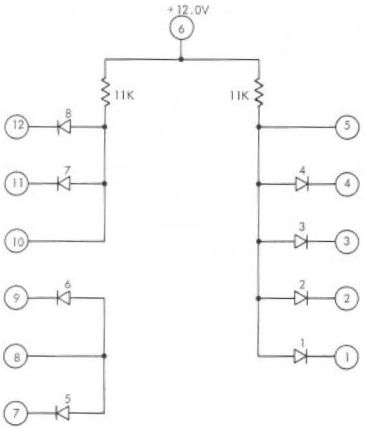




Delays (Worst Case)
Nano Seconds

Temp C°	Ton Delay		Toff Delay	
	DCI	II	DCI	II
25	550	310		
75			320	630

Engineering Specification
890982 - 890981



All Diodes "C"

Reference Flyers

V03AA	873000
V03AO	(San Jose)
V03AR	873001
V03AS	873002

Input Up

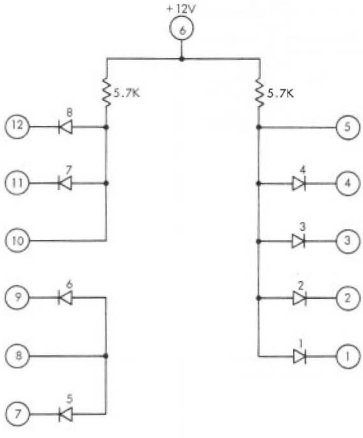
Power Requirements	Dissipation
Max	
2.2mA	27.8mw
Nom	
1.8mA	19.4mw

All Values Given Are Per Module

Power Supply +12V

Input Down

Power Requirements	Dissipation
Max	
2.4mA	31.0mw
Nom	
2.0mA	24.4mw



All Diodes "C"

Reference Flyers

V03AE	873003
V03AR	873001
V03AS	873002
V03AX	873004

Input Up

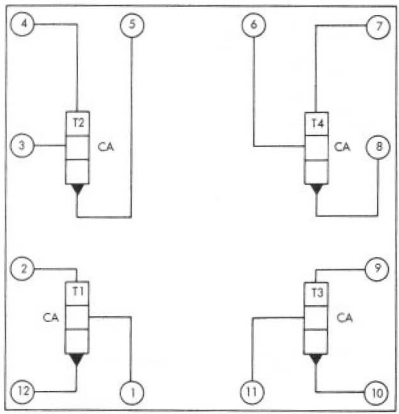
Power Requirements	Dissipation
Max	
4.2mA	54.5mw
Nom	
3.2mA	33.6mw

All Values Given Are Per Module

Power Supply +12.0V

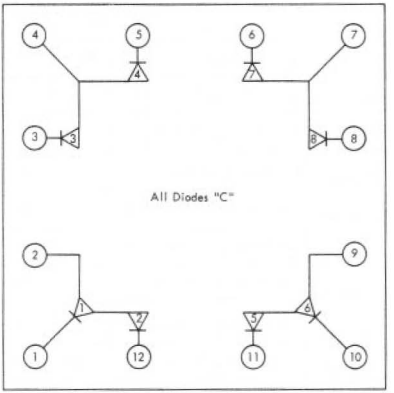
Input Down

Power Requirements	Dissipation
Max	
4.6mA	64.0mw
Nom	
3.8mA	47.0mw



Test	Conditions	C°	Limits	
			min	max
I_{CEX}	V_{CE} = 13.0V V_{BE} = +0.4V	75		20 µa
I_{BEX}	V_{CE} = 13.0V V_{BE} = -2.5V	75		1.0 µa
BV_{CEO}	I_C = 5 ma	25	12.0 V	
BV_{EBO}	I_E = 10µa	25	3.0 V	
BV_{CBO}	I_C = 10µa	25	18.0 V	
h_{FE1}	I_E = 0.1 ma V_{CB} = +0.20V	25	10.0 V	

Test	Conditions	C°	Limits Min	Limits Max
h_{fe3}	I_E = 10 ma, V_{CB} = 0.2v	25	30	
h_{fe5}	I_E = 100 ma, V_{CB} = 1v	25	10	
$V_{CE1\ (sat)}$	I_C = 1.0 ma, I_B = 0.05 ma	25		0.20 v
$V_{CE2\ (sat)}$	I_C = 10 ma, I_B = 0.5 ma	25		0.20v
$V_{CE3\ (sat)}$	I_C = 22 ma, I_B = 1.2 ma	25		0.30v
$V_{CE4\ (sat)}$	I_C = 50 ma, I_B = 2.5 ma	25		0.40v
$V_{CE5\ (sat)}$	I_C = 100 ma, I_B = 10.0 ma	25		0.70v
$V_{BE1\ (sat)}$	I_C = 1.0 ma, I_B = 0.05 ma	25	0.60v	0.75v
$V_{BE2\ (sat)}$	I_C = 10.0 ma, I_B = 0.5 ma	25	0.70v	0.85v
$V_{BE3\ (sat)}$	I_C = 50.0 ma, I_B = 2.5 ma	25	0.85v	1.10v
$V_{BE4\ (sat)}$	I_C = 100 ma I_B = 10.0 ma	25		1.50v
$V_{BE\ (on)}$	I_C = 1.0 ma V_{CB} = +1.0v	75	0.50v	
C_{ib}	Bias = 0 f = 1Mc ± 0.5 Mc Bias = 0	25		6.0 pf
C_{bo}	f = 1 Mc ± 0.5 Mc	25		6.0 pf
Gain h_{fe}	I_E = 10.0 ma V_{CB} = 3.0v, f = 100 Mc	25	1.70	
h_{ie}	I_C = 5.0 ma V_{CE} = + 5.0v f = 1 kc	25		1.50
h_{fe3}	I_C = 5.0 ma V_{CE} = + 5.0v f = 1 kc	25	30	200
h_{rb}	I_E = 5.0 ma V_{CB} = + 5.0v f = 1 kc	25	0	1.30 x 10^{-3}
h_{ob}	I_E = 5.0 ma V_{CB} = + 5.0v f = 1 kc	25	0	2.0 mho



Test	Conditions	C°	Limit	
			Min	Max
V_F	I_F = 0.02 ma	25	0.42v	
V_F	I_F = 0.10 ma	25	0.53v	
V_F	I_F = 1.0 ma	25		0.80v
V_F	I_F = 2.0 ma	25		0.88v
V_F	I_F = 5.0 ma	25		0.88v
BV_R	I_R = 0.01 ma	75	15.0v	
I_R	V_R = 15.0v	75		1.0 μa
Temp. Coef.	I_F = 0.10 ma	25 to 75	-2.4 mv/C°	
Diode Cap	Bias = 0 f = 1 ± 0.5Mc Signal 50 mv P-P	25	Max 3.5 pf	

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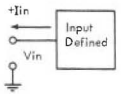
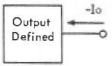
SLD 30

DEVICE INFORMATION

CLASS	PART NUMBER
A DIODE	5323782
AD 6	2393194
AD 7	2393195
AD 8	2393196
AD 9	2393197
AD 10	2393198
AD 13	2393422
AD 15	2393496
AD 16	2393497

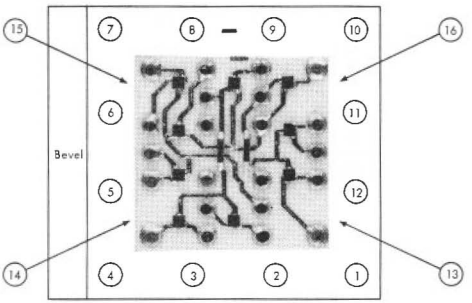


Common Pins
Pin 13 -3V
Pin 14 +3V
Pin 15 +6V
Pin 16 GND



All Power Supplies
±4%

All Diodes
"A"



Part Number	Title
361448	3A 3OI
361449	4IL/DCI
361450	2-4 Way AI
361594	3 XOR
361595	3-3 Way AI
361596	2A-5OI
361597	2-3A/2A OI
361598	2 AOI-HPD
23995112	3-3 Way A (O) I
23995113	3-3 Way AI
2551658	MST To SLD/NPL
2395148	3-3 Way API
2395143	MST-I To SLD

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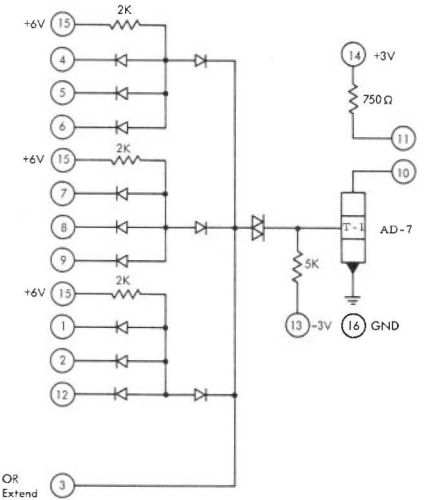
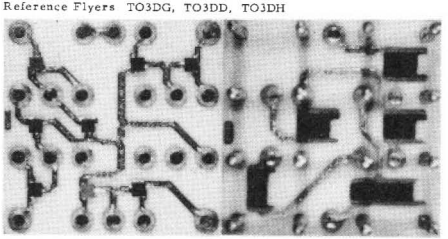
SLD-30 3A-30 Invert Module Part No. 361448



Reference Flyers TO3DG, TO3DD, TO3DH



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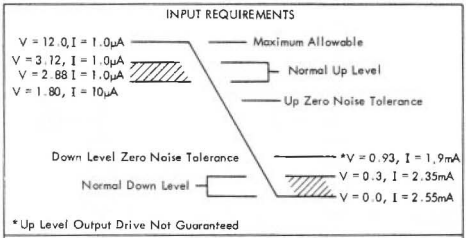
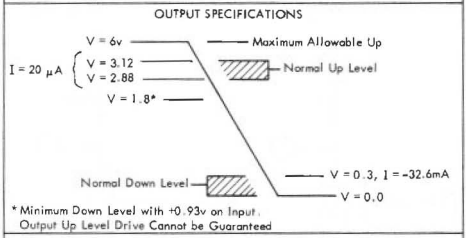
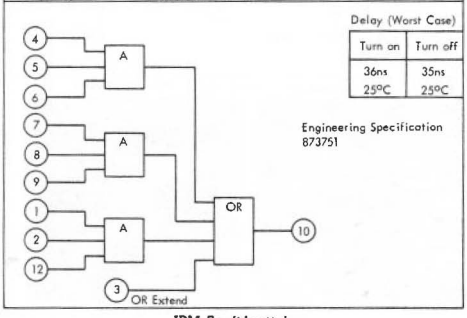
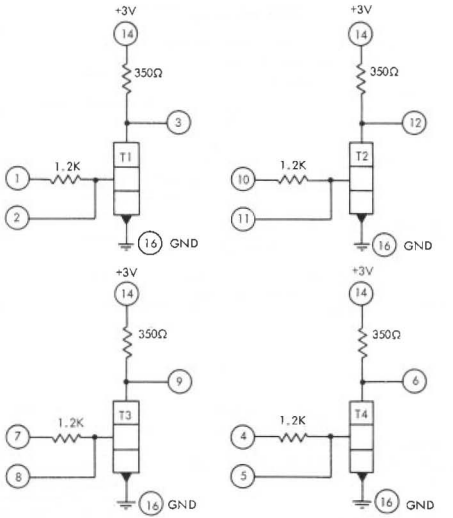

INPUT REQUIREMENTS
V = 12.0, I = 1.0μA
V = 3.12, I = 1.0μA
V = 2.88 I = 1.0μA
V = 1.80, I = 10μA
Maximum Allowable
Normal Up Level
Up Zero Noise Tolerance
Down Level Zero Noise Tolerance
Normal Down Level
*V = 0.93, I = 1.9mA
V = 0.3, I = 2.35mA
V = 0.0, I = 2.55mA
* Up Level Output Drive Not Guaranteed

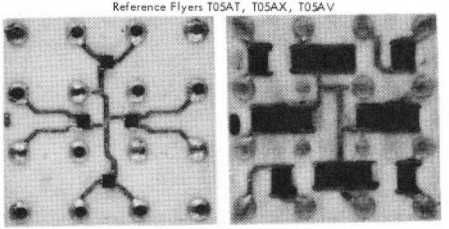

OUTPUT SPECIFICATIONS
V = 6v
I = 20 μA
V = 3.12
V = 2.88
V = 1.8*
Maximum Allowable Up
Normal Up Level
Normal Down Level
V = 0.3, I = -32.6mA
V = 0.0
* Minimum Down Level with +0.93v on Input.
Output Up Level Drive Cannot be Guaranteed


Delay (Worst Case)
Turn on
Turn off
36ns 25°C
35ns 25°C
Engineering Specification 873751
4
5
6
7
8
9
1
2
12
3
A
A
A
OR
10
OR Extend



ALL TRANSISTORS AD-10

Reference Flyers T05AT, T05AX, T05AV



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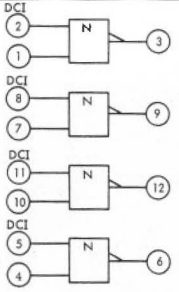
INPUT REQUIREMENTS

II		DCI 1.2K	Open	1.2K	+3V	
V	mA	V	mA	V	mA	
6.24	- 4.86		-10.0		-10.0	Maximum Allowable
See Spec		1.01	- 2.37	1.1	- 2.19	— Maximum Up
2.0	-0.9	0.78	- 2.37	0.8	- 2.19	— Minimum Up
0.58	0	0.58	0.02	0.58	2.25	—Down Zero Noise
0.3	-18.5	0.3	0.02	0.3	2.50	—Minimum Down
0.0	0.0	0.0	0.02	0.0	2.76	—Maximum Down

OUTPUT SPECIFICATIONS

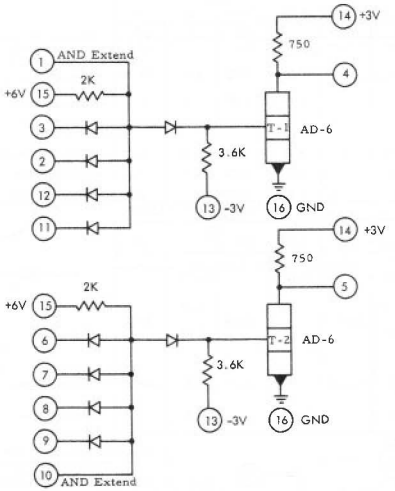
II		DCI 1.2K	"O"	1.2K	+3V	
V	I	V	I	V	I	
6.24		6.24		6.24		Maximum Allowable
3.12		3.12		3.12		—Maximum Up
2.88	20μA	2.88	20μA	2.88	20μA	—Minimum Up
0.3	-18.5mA	0.3	-34.3	0.3	-47.4	—Minimum Down
0.0		0.0		0.0		—Maximum Down



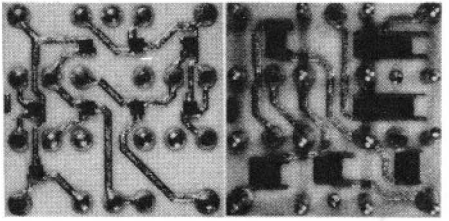
Delay (Worst Case) Nano Sec.

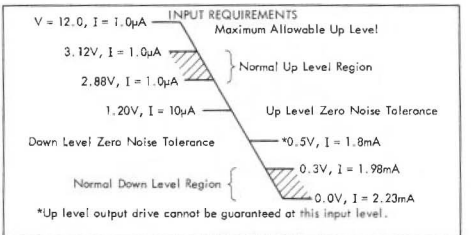
	DCI		II	
C°	Ton	Toff	Ton	Toff
25	68	37	34	54

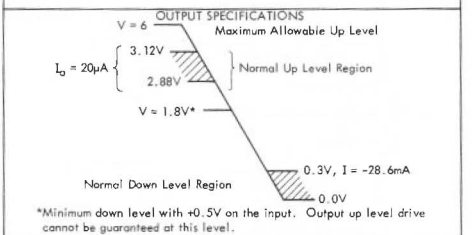
Engineering Specification
873753 - 873755

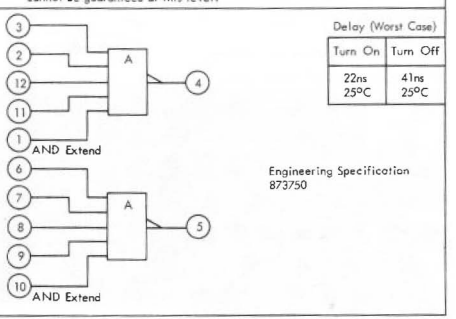


Reference Flyers TO3DC, TO3DE, TO3DF







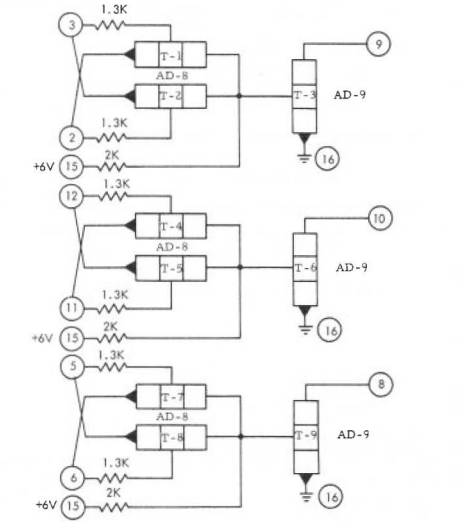


Delay (Worst Case)

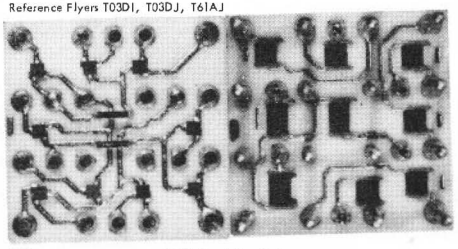
Turn On	Turn Off
22ns 25°C	41ns 25°C

Engineering Specification 873750

SLD-30 3 XOR Module Part No. 361594



Reference Flyers T03DI, T03DJ, T61AJ



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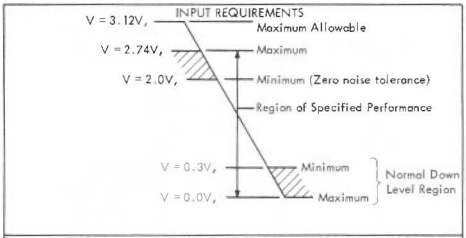
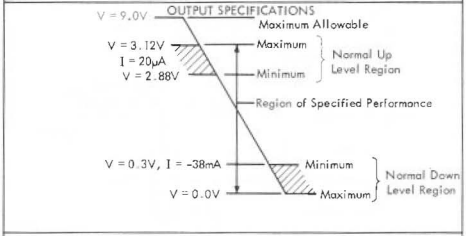
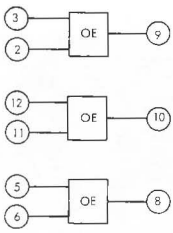




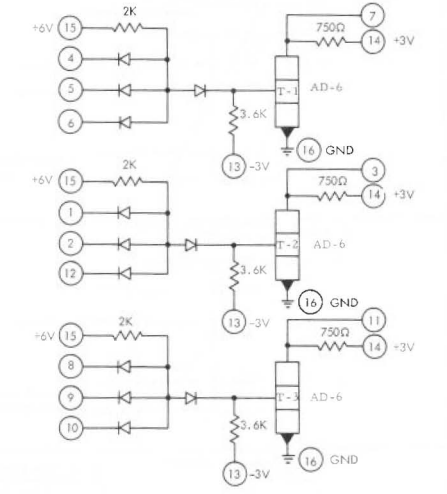
Engineering Specification
874754

Delay (Worst Case)

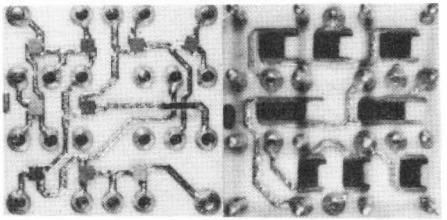
Turn on	Turn off
81ns 25°C	84ns 25°C



SLD-30 3-3 Way AI Module Part No. 361595



Reference Flyers TO3DC, TO3DE, TO3DF



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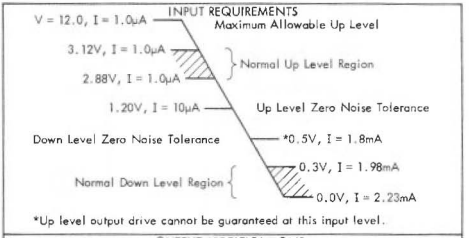
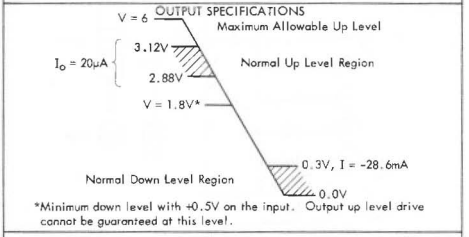
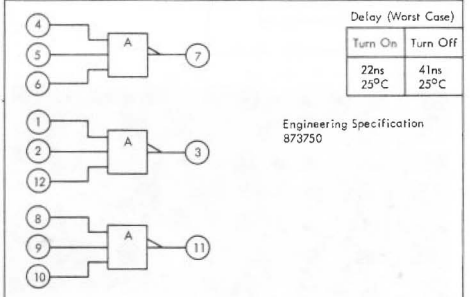


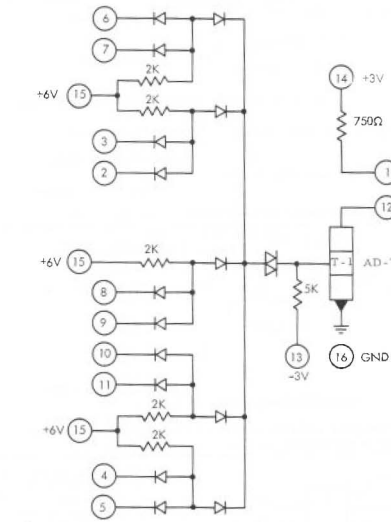




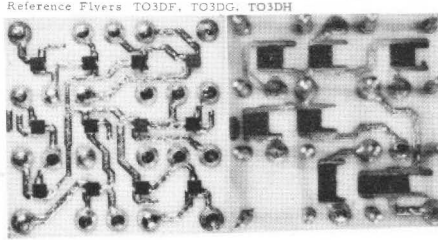
Delay (Worst Case)

Turn On	Turn Off
22ns 25°C	41ns 25°C

Engineering Specification 873750



Reference Flyers TO3DF, TO3DG, TO3DH



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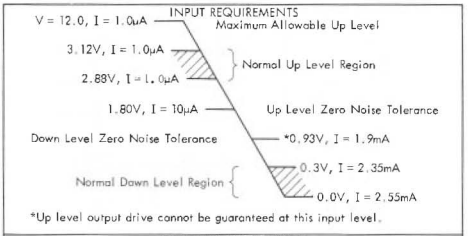
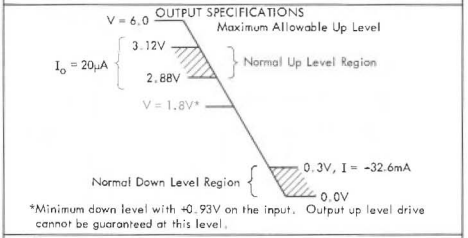
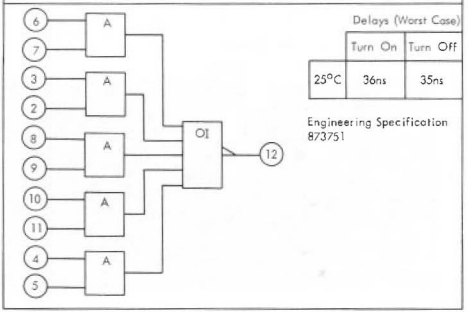




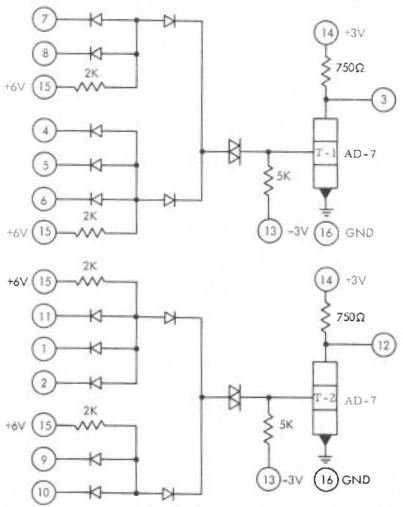


Delays (Worst Case)

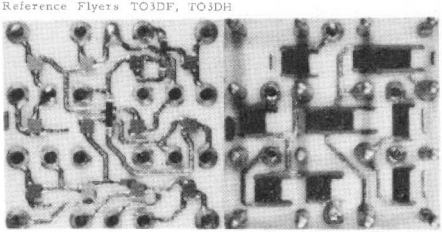
	Turn On	Turn Off
25°C	36ns	35ns

Engineering Specification 873751

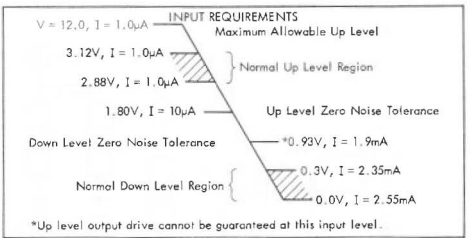
SLD-30 2-3A/2A - OR Invert Module Part No. 361597

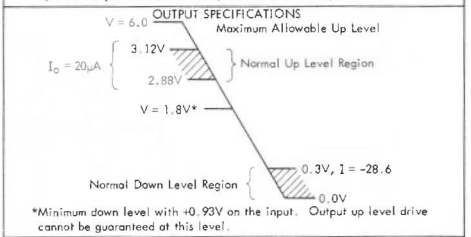


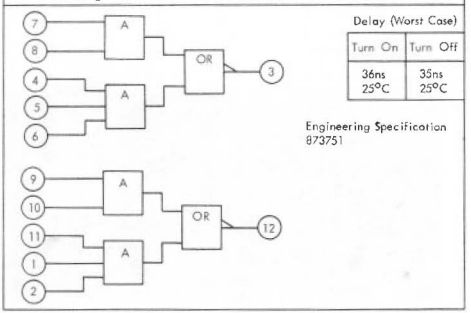
Reference Flyers TO3DF, TO3DH



IBM Confidential



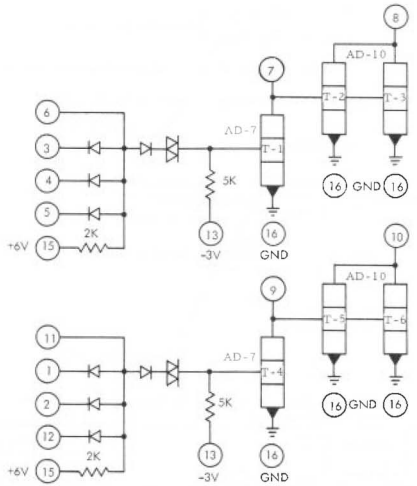




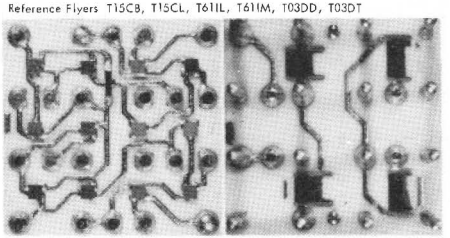
Delay (Worst Case)

Turn On	Turn Off
36ns 25°C	35ns 25°C

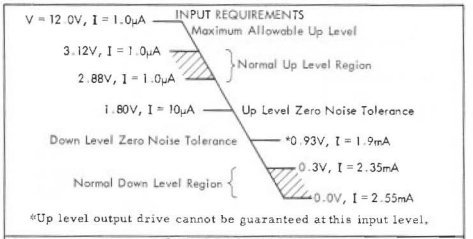
Engineering Specification 873751

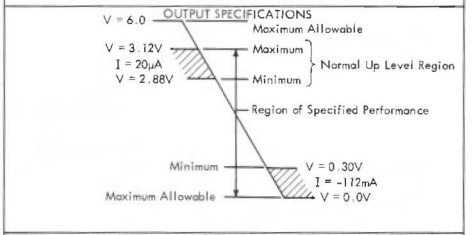


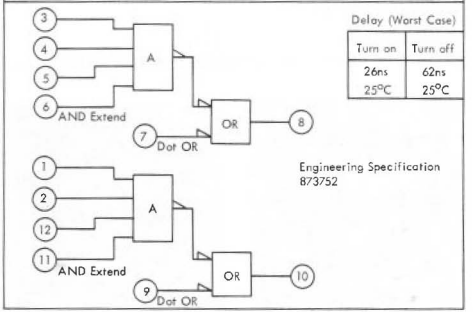
Reference Flyers T15C8, T15CL, T61IL, T61IM, T03DD, T03DT



IBM Confidential





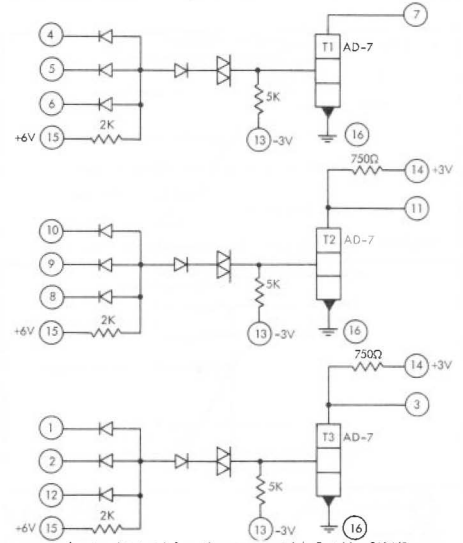


Delay (Worst Case)

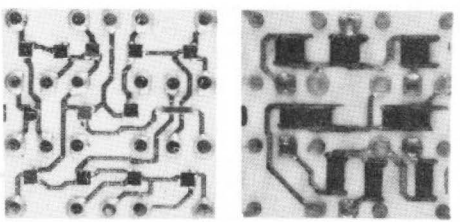
Turn on	Turn off
26ns 25°C	62ns 25°C

Engineering Specification 873752

SLD-30 3 - 3 Way AOI Module Part No. 2395112



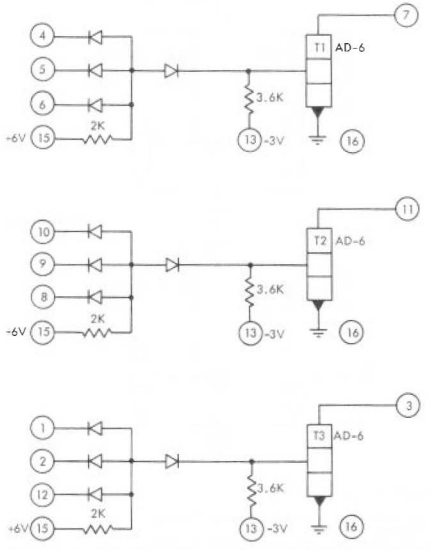
Input and output information same as module Part No. 361448



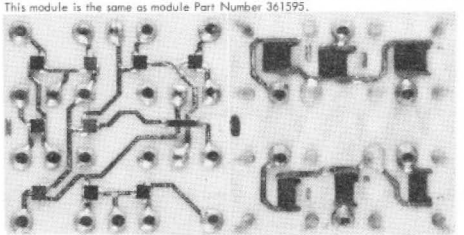
IBM Confidential

Three 3-Way and Invert (3 x 3AI) B

Module Part No. 2935113

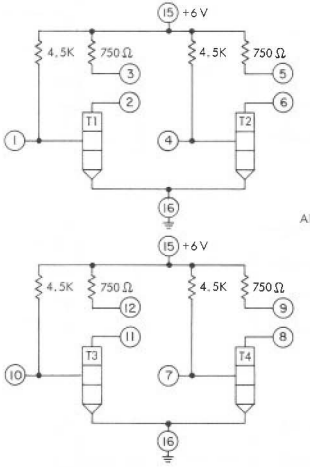


This module is the same as module Part Number 361595.



Converter
4 - MST To SLD/NPL

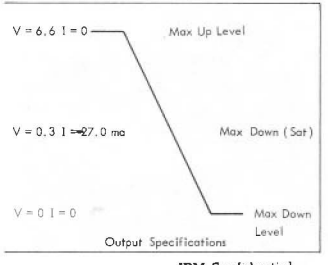
Module Part No. 2551658



All Transistors
AD - 13

Reference Flyers PXAAA, PXAAC

For Input and Delay Information See IBM Standard
TEB 2-6400-100 Section 16.5



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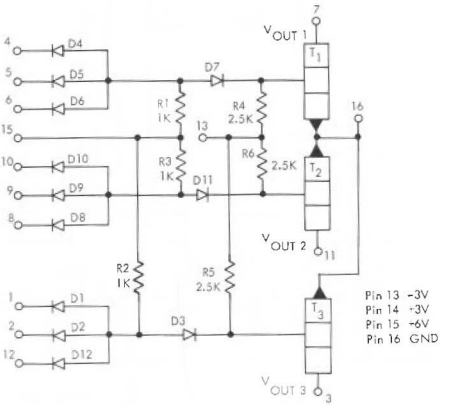
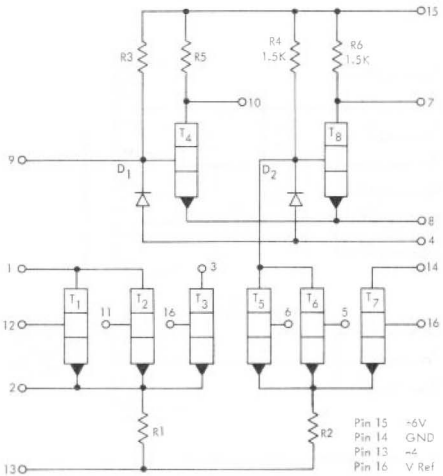


Reference Engineering Specification 862086

Reference Circuit Flyer T03IG

Worst Case Delays
(Nano Seconds)

Temp °C	t On Delay	t Off Delay
25	19	37



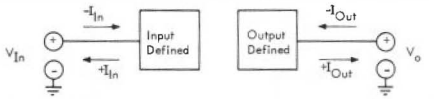
Reference Circuit Flyers: XXRAC, XNRAA, XLRAE, XXLRAF

Worst Case Delays
(Nano Seconds)

Temp °C	IP td On	OP rd On	IP td Off	OP td Off
25	28	28		
75			27	28

Pd: Maximum 210mw

SLD 100



Common Pins

Pin	Function
15	+6v
16	Gnd

All Diodes "C"

Power Supply ± 10%

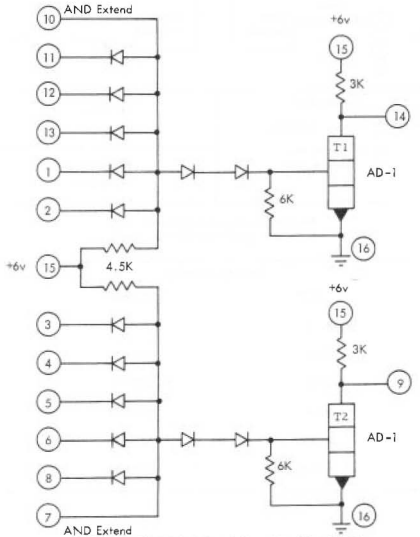
Pin and Bevel Location same as SLD-700. (See SLD-700 Fact Sheet)

Device Information

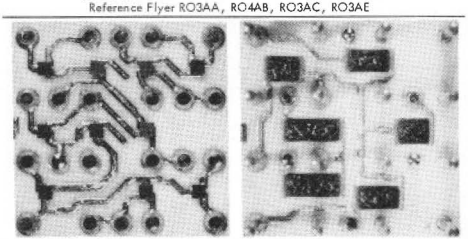
Type	Part Number
AD-1	2393148
AD-2	2393149
AD-3	2393150
AD-4	2393151
AD-14	2393824
"C"-Diode	5323888

Module Information

Released PN	Logic Title	Development PN
361440	2-5 Way AI	16A-0193
361441	3-3 A/1A20I	16A-0194
361442	4II/DCI - II	16A-0195
361443	3-3 Way AI	16A-0196
361444	AOX-3	16A-0197
361452	2-3 Way AOI - II	16A-0198
361458	Trigger	16A-0199
2395140	4-2 Way API	16A-0282



Reference Flyer RO3AA, RO4AB, RO3AC, RO3AE



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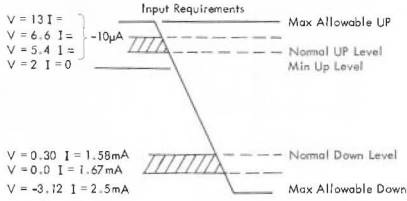
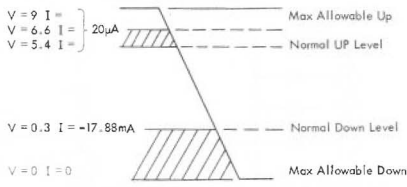
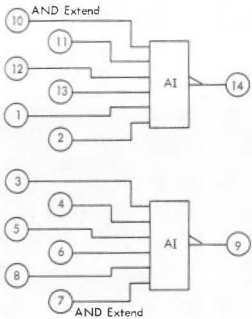
Input Requirements



Output Specifications

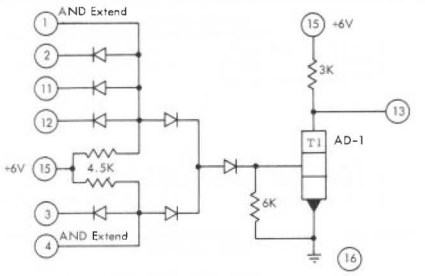


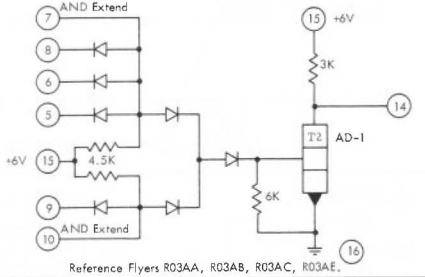


Delays (Worst Case)
Nano Seconds

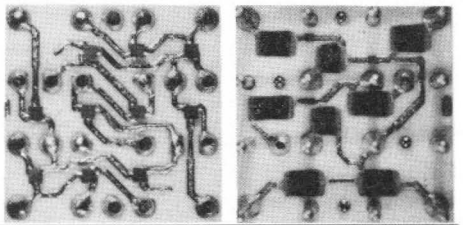
Temp C°	Ton Delay	Toff Delay
25	110	60

Engineering Specification
872193

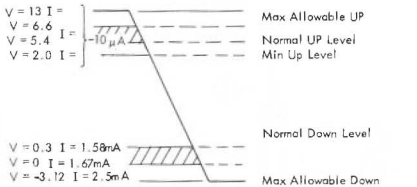




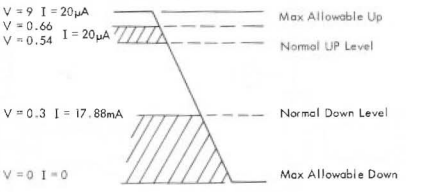
Reference Flyers R03AA, R03AB, R03AC, R03AE.

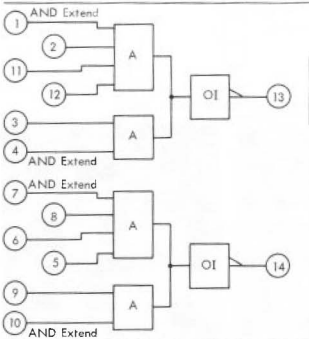


Input Requirements



Output Specifications

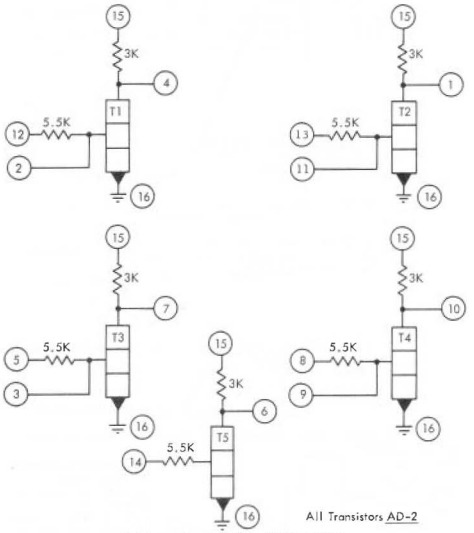




Delays (Worst Case)
Nano Seconds

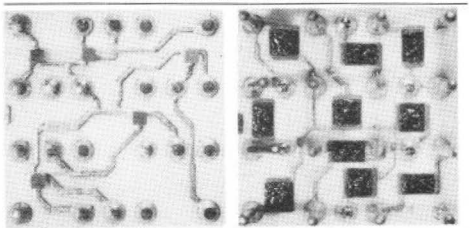
Temp C°	Ton Delay	Toff Delay
25	110	60

Engineering Specification
872193



All Transistors AD-2

Reference Flyers R05AA, R05AB, R05AC.



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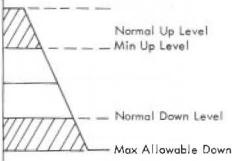
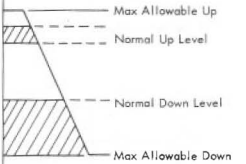
DCI				II	
5.5K to +.6V		5.5K - Float			
V	I-mA	V	I-mA	V	I-mA
.998	1.23	.934	1.23	6.6	1.33
				3.82	0.4
.765	1.23	.713	1.23	3.50	
.55	1.40	.55	.02	.55	0
0.3	1.45	0.3	.02	.3	0
0	1.52	0	.02	-3	20μA

Input Requirements

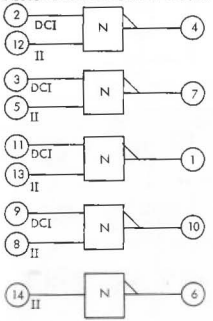


DCI	II
V = 9 I = 0 V = 6.6 I = 0 V = 5.4 I = 0	V = 9 I = 0 V = 6.6 V = 5.4 I = 20 μA
V = 0.3 I = -47.88mA	V = 0.3 I = -17.88mA
V = 0 I = 0	V = 0 I = 0

Output Specifications

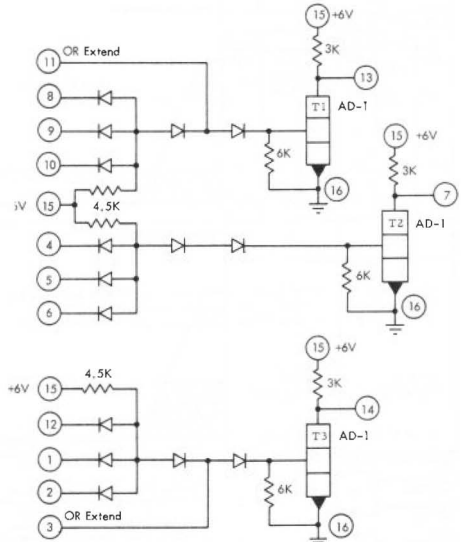


Above Values to be Used for a Guide Only. See Eng Spec 872194 and 872195

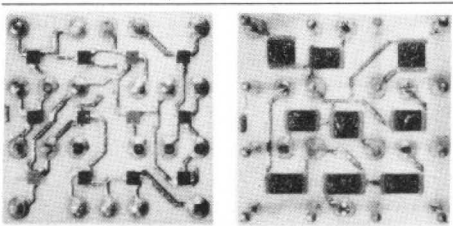


Delays (Worst Case) Nano Seconds

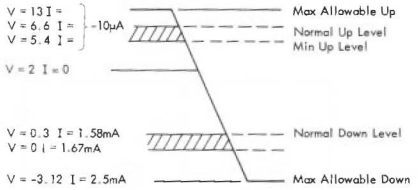
For DCI Only	Temp C°	Ton Delay		Toff Delay	
		DCI	II	DCI	II
R to +V	25	113	188	118	94
R to 0		130		112	



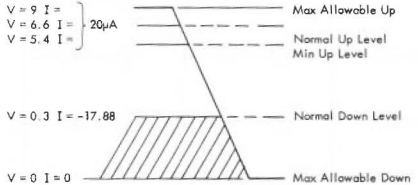
Reference Flyers R03AA, R03AB, R03AC, R03AE

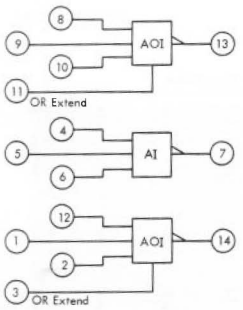


Input Requirements



Output Specifications

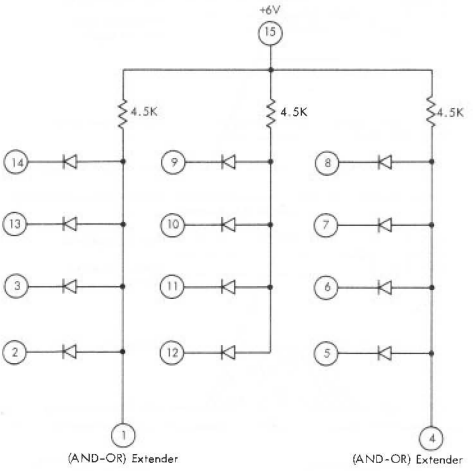




Delays (Worst Case)
Nano Seconds

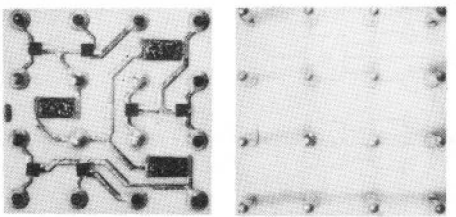
Temp C°	Ton Delay	Toff Delay
25	110	60

Engineering Specification
872193



All Diodes - "C"

Reference Flyers R03AA



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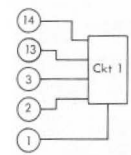
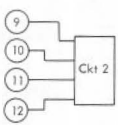
Power Per Ckt			
ma Requirements	mw Dissipation		
0.82	6.73	Nom	Input Up
1.25	10.91	Max	

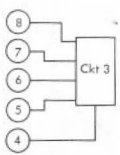
Power Supply +6v

		Power Per Ckt	
		ma Requirements	mw Dissipation
Input Down	Nom	1.13	3.98
	Max	1.68	6.93

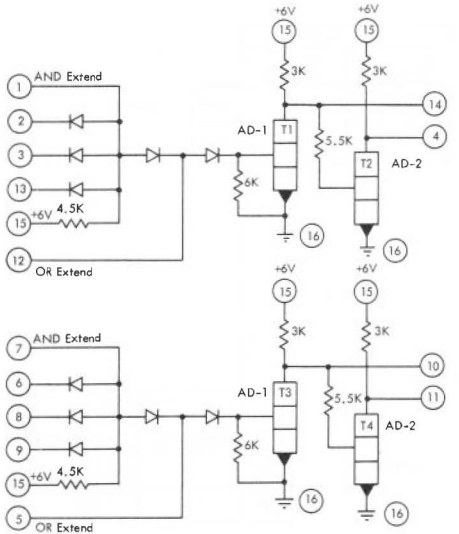


(AND-OR) Extender

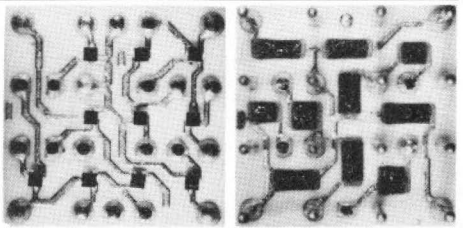




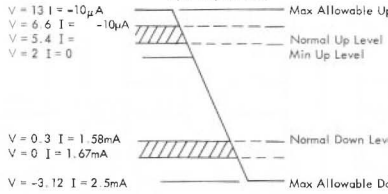
(AND-OR) Entender



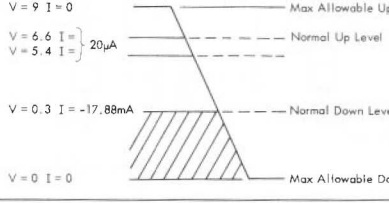
Reference Flyers R03AA, R03AB, R03AE, R05AA

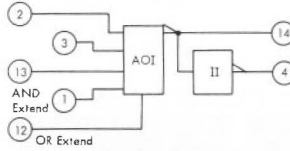


Input Requirements



Output Specifications

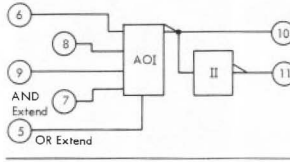


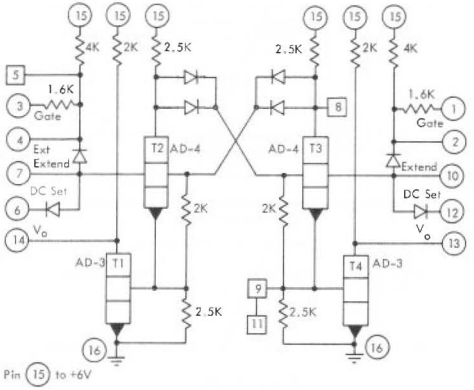


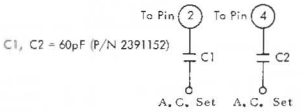
AOI Delays (Worst Case)
Nano Seconds

Temp C°	Ton Delay	Toff Delay
25	110	60

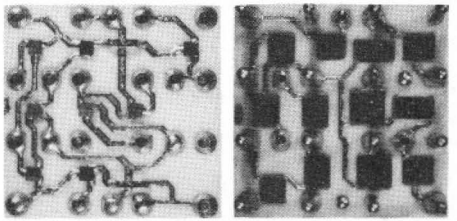
Engineering Specification
872193 - 872194



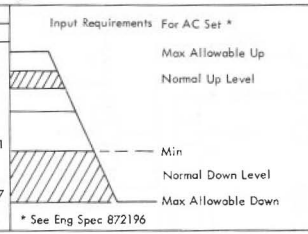




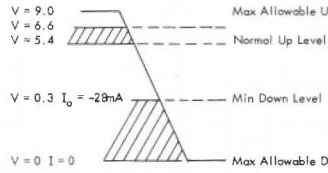
Reference Flyers R20AA, R20AB, R20AC, R20AD.



DC Set		Gate	
V	I	V	IG
9.0	-10μA	9.0	*
6.6		6.6	*
5.4	-10μA	3.4	
2.0	*	5.0	*
3.0	2μA	0.3	1.41 mA
0	5μA	0.65	1.47 mA

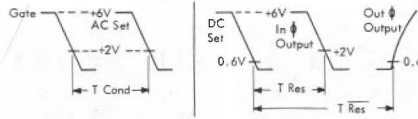


Output Specifications

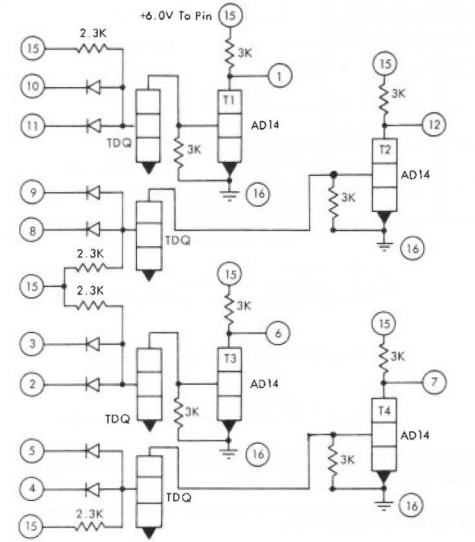


Conditioning Time = Time Required Between the Falling Transition of the Gate and AC Set Inputs, to Allow the Outputs to Switch

Resolution Time of DC Set Input = Delay Between the Falling Transitions of the DC Set Input and the In-Phase Output.

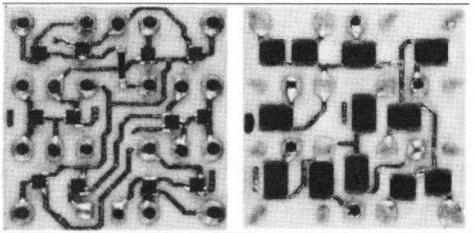


Deconditioning Time = Time Required Between Rising Transition of Gate Input and Falling Transition of AC Set Input to Prevent the Outputs from Switching from 0.6V (Gate) to +2V (AC Set)

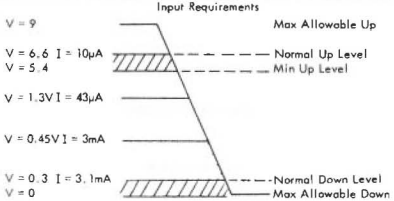


A Diodes

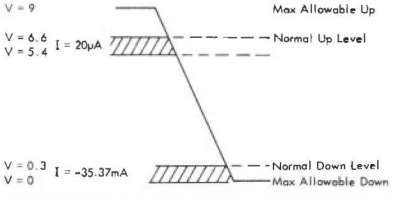
Reference Flyers R03AJ

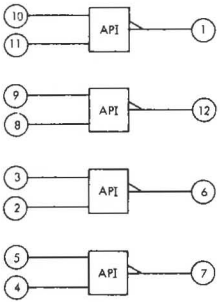


Input Requirements



Output Specifications



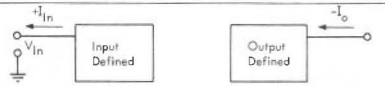


Delays (Worst Case)
Nano Seconds

Temp C°	Ton Delay	Toff Delay
25	54	83

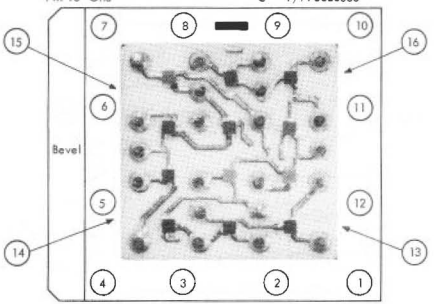
Engineering Specification
2401029

SLD 700



Common Pins
Pin 15 +12V
Pin 16 Gnd

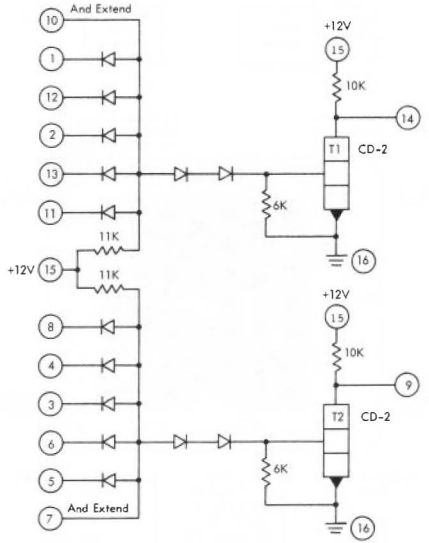
All Power Supplies 10%
All Diodes
"C" = P/N 5323888



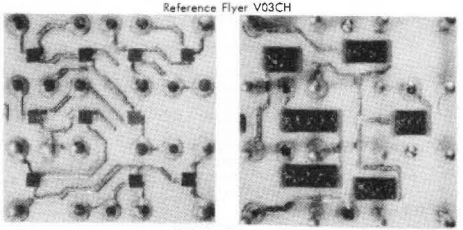
Released Part No.	Title	Developement Part No.
361416	2 - 5-Way AI	16A - 0153
361417	3 - 3A/IA - 2OI	16A - 0155
361418	4II/DCI-II	16A - 0156
361419	3 - 3-Way - AI	16A - 0157
361420	AOX - 3	16A - 0158
361421	Trigger	16A - 0159
361422	2 x 3-Way AOI-II	16A - 0187
361490	TLR	16A - 0258

Device Information

Device	Part Number
CD-1	2393085
CD-3	2393158
ADT	2393086
CD-2	2393087
CDT	2393088
AD-11	2393200
AD-12	2393201
"C" Diode	5323888

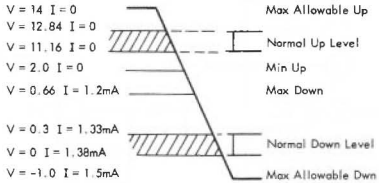


Reference Flyer V03CH

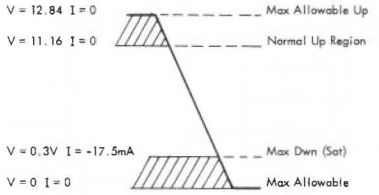


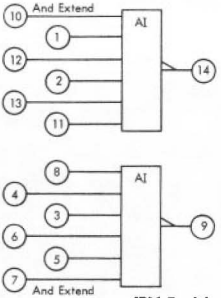
IBM Confidential

Input Requirement



Output Specifications

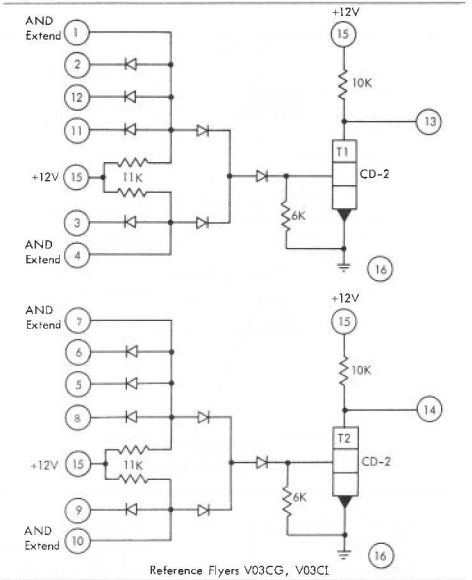




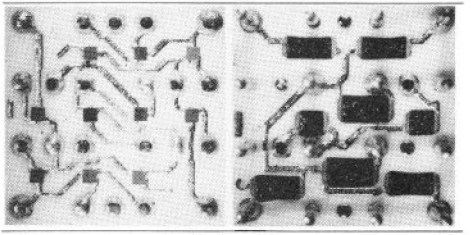
Delays (Worst Case)
Nano Seconds

Temp	Ton Delay	Toff Delay
25°	400	480

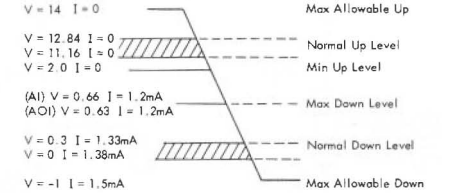
Engineering Specification
873582



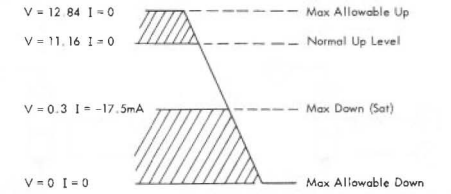
Reference Flyers V03CG, V03CI

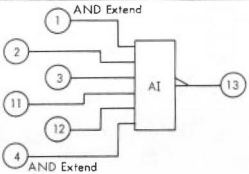


Input Requirements



Output Specifications

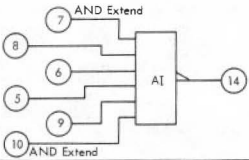


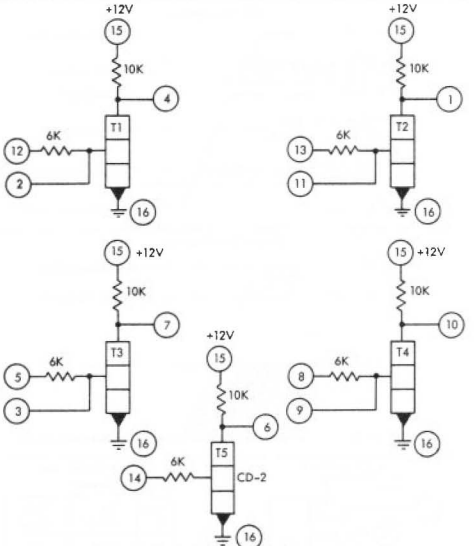


Delays (Worst Case)
Nano Seconds

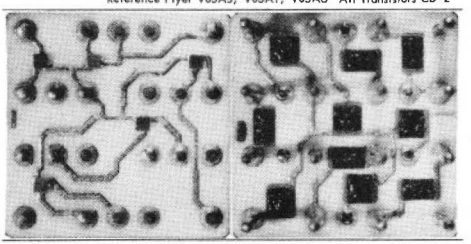
Temp °C	Ton Delay	Toff Delay
25	400	480

Engineering Specification
873582



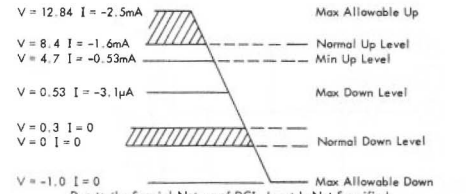


Reference Flyer V05AS, V05AT, V05AU All Transistors CD-2



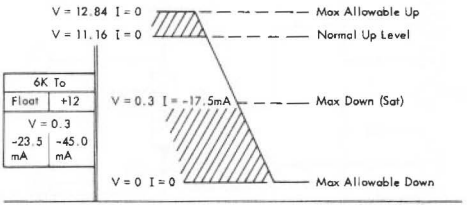
IBM Confidential

Input Requirements



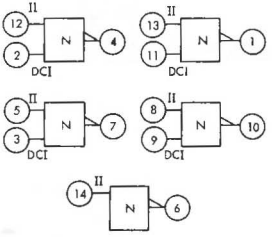
Due to the Special Nature of DCI, Input Is Not Specified.

DCI II Output Specifications

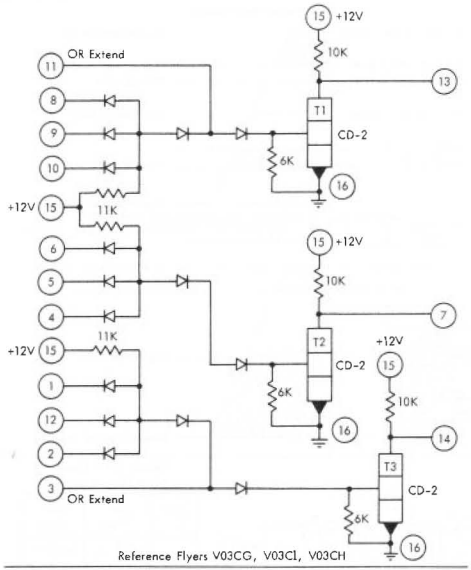


Delays (Worst Case)
Nano Seconds

Temp °C	Ton Delay		Toff Delay	
	DCI	II	DCI	II
25	150	600	140	645

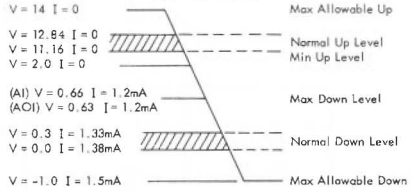


Engineering Specification
873581 - 873584

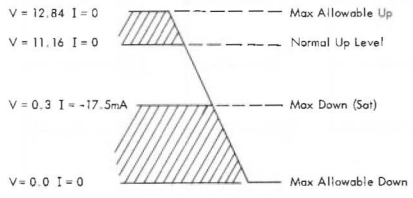


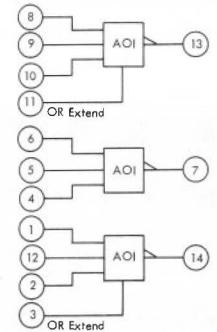
Reference Flyers V03CG, V03CI, V03CH

Input Requirements



Output Specifications

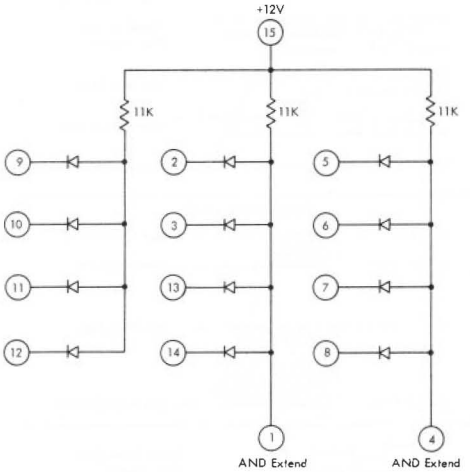




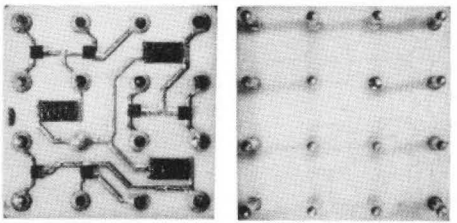
Delays (Worst Case)
Nano Seconds

Temp °C	Ton Delay	Toff Delay
25	400	480

Engineering Specification
873582



Reference Flyer V03CG



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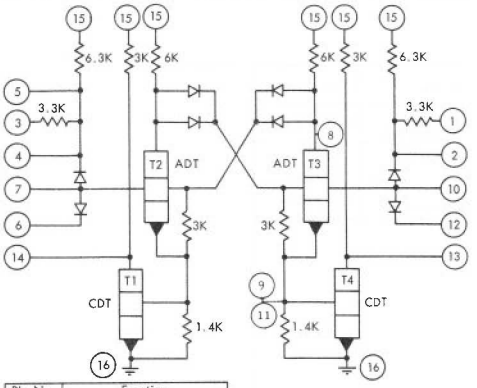
Input Up

V=+12.0	Nom	Max
Power Required/Mod	2.67mA	3.81mA
Power Dissipated/Mod	33mw	54mw

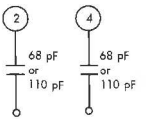
	Nom	Max
Power Required/Mod	3.99mA	4.50mA
Power Dissipated/Mod	26.1mw	38.1mw

Input Down

Engineering Specification
873582

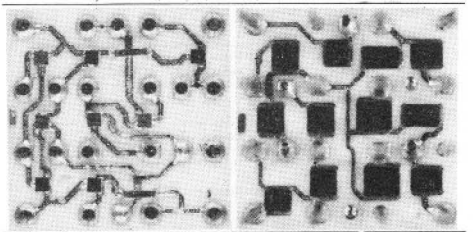


Pin No.	Function
1	Gate "A"
3	Gate "B"
6	DC Set
7	AC and DC Extend
10	AC and DC Extend
12	DC Reset
13	Output "B"
14	Output "A"
15	Power Supply +12.0V
16	Ground

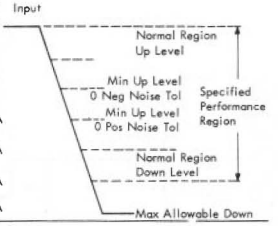


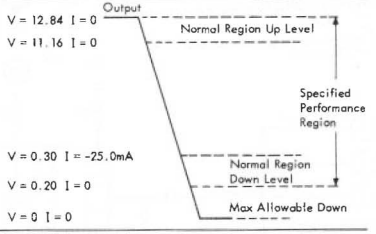
External Cap Part Nos. 350424 or 5301536 or 2391314 or 2391001

Reference Flyers V20AE, V20AF, V20AG, V20AJ-AK-AL, S61PR, S61PS

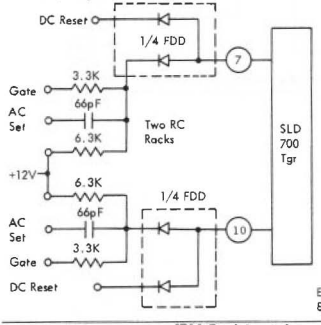


DC Set		Gate	
V-DC	I-DC	V-DC	IG
12.84	0	12.84	0
11.16	0	11.16	0
1.36	20µA	10.50	57µA
		0.80	1.57mA
0.30	30µA	0.30	1.63mA
0.20	150µA	0.20	1.67mA
-1.0	5.08mA	1.0	1.80mA





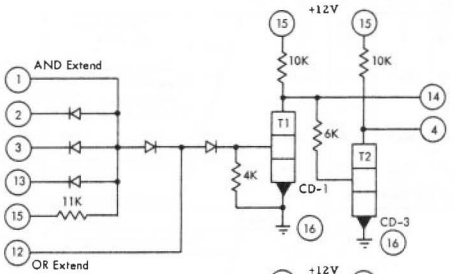
Extending SLD-700 Trigger



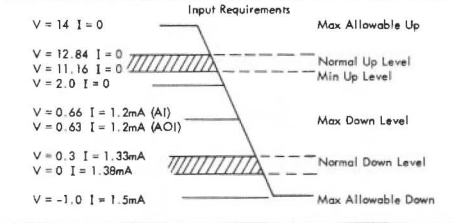
Power Dissipation/Mod Worst Case AC Set (mw)

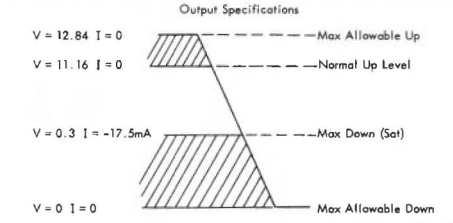
Output A = Down	Output B = Down
177.47	177.47
All Trigger Loads AI/AOI Only	
As Binary in mw	
157.43	157.43

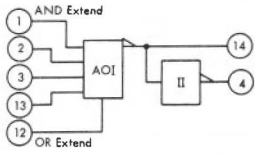
Engineering Specification 873593



Reference Flyers V03AA, V03CG, V03CT, V03CH, V05AT

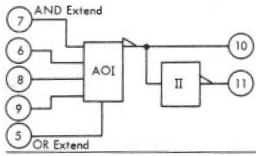




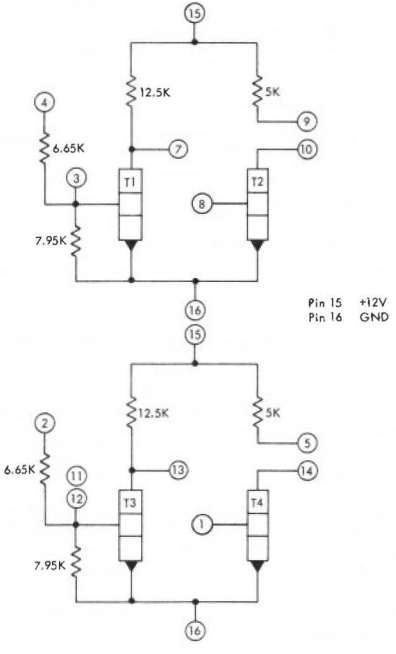


Delays (Worst Case)
Nano Seconds

Temp °C	Ton Delay		Toff Delay	
	AOI	II	AOI	II
25	400	600	480	645



Engineering Specification
873582



Pin 15 +12V
Pin 16 GND

Reference Engineering Specification 862735

AD-11, AD-12 Devices

Worst Case Delay

(Nano Seconds)

Temp. °C	t On Delay	t Off Delay
+25°	110	80