

Phillips Scientific

Hex Discriminator

NIM MODEL 711

FEATURES

- Six Channels In Single Width NIM Module
- 125 MHz Rate Capability
- Burst Guard Capability
- Deadtimeless Updating Outputs
- Fast Summed Output
- Fast Veto and Bin Gate Inhibiting

DESCRIPTION

The Model 711 is a high-performance, six-channel, leading edge discriminator packaged in a single-width NIM module. It features independent threshold and width controls, updating or burst guard-operation, a fast veto for inhibiting, a prompt linear summed output, and a versatile output configuration with five outputs per channel.

The 711 has high input sensitivity of -25 mV variable to -1 Volt via a 15-turn front panel control. A front panel test point on each channel provides a DC voltage equal to ten times the actual threshold to insure accurate settings.

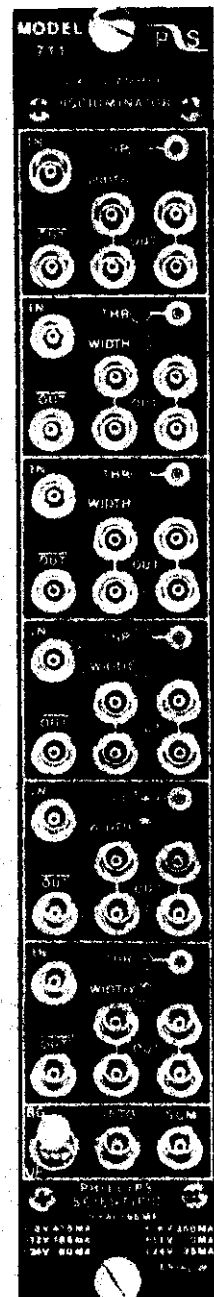
A two position switch permits the 711 to be used as either a conventional updating discriminator or, when in the Burst Guard position, an updating discriminator with the time-over-threshold feature. As an updating discriminator the output width is variable from 4 nSEC to 1 uSEC via a front panel screwdriver adjustment. Should inputs occur at time intervals less than the double-pulse resolution (typically 7 nSEC), the unit will not respond. In the Burst Guard mode should inputs occur that are less than the discriminator resolving time, the outputs will be extended until the trailing edge of the last pulse within the burst.

Inhibiting of the discriminator can be accomplished in two ways. A front panel LEMO input accepts a NIM level pulse for fast simultaneous inhibiting of all six channels. Secondly, a slow bin gate via the rear panel connector inhibits the module and is enabled or disabled from a rear panel slide switch.

A unique summed output common to all six channels delivers -1 mA of current for each activated channel, thus allowing a fast decision to be made on the number of channels simultaneously hit. Up to 18 channels can be "OR'D" directly by cable to other summed outputs providing a versatile scheme to form a trigger.

The 711 has five high-impedance current switching outputs per channel. They are configured as two pairs of double-amplitude bridged outputs and one complemented NIM output. When only one output from a bridged pair is used, a double-amplitude NIM pulse (-32 mA) is generated for driving long cables. Two normal NIM levels are produced when both of the bridged pairs operate into 50 ohm loads. The output risetimes and falltimes are typically 1 nSEC, and their shapes are virtually unaffected by the loading conditions of the other outputs.

NSCL-ELECTRONICS



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INPUT CHARACTERISTICS

General:

One LEMO connector input per channel; 50 ohms $\pm 1\%$; direct coupled; less than 2% input reflection for a 2.0 nSEC input risetime. Input protection clamps at +.7V and -5V and can withstand transients of ± 2 amps (± 100 Volts) for 1 μ SEC with no damage to the input.

Threshold:

Variable from -25 mV to -1 Volt; 15 turn screwdriver adjustment; better than $\pm 0.2\%/^{\circ}\text{C}$ stability; front panel test point provides a DC voltage ten (10) times the actual threshold setting.

Fast Veto:

One LEMO connector input common to all six (6) channels; accepts normal NIM level pulse (-500 mV), 50 ohms impedance direct coupled; must precede the negative edge of input pulse by 5 nSEC to veto; 4 nSEC minimum input width.

Bin Gate:

Rear panel slide switch enables or disables bin slow gate in accordance with TID-20893. Responds in approximately 10 nSEC to Bin Gate signal.

OUTPUT CHARACTERISTICS

General:

Five (5) LEMO connector outputs per channel; Two pairs of negative bridged outputs and one complementary output. The bridged pairs deliver a double-amplitude pulse of -32 mA (-1.6 Volts into a single 50 ohm load, or -800 mV when both outputs are 50 ohm terminated). The complementary output is quiescently -16 mA (-800 mV into 50 ohms) and delivers 0 mA (0 Volts into 50 ohms) during output. Output risetimes and falltimes are less than 1.5 nSEC from 10% to 90% levels. The output pulse shapes are optimized when the bridged outputs are 50 ohm terminated.

Output Duration:

A two position front panel locking toggle switch allows either updating operation or burst guard operation common for all six (6) channels. Updating: The output width is controlled by a front panel 15 turn screwdriver adjustment, continuously variable from 4 nSEC to 1 μ SEC. Burst Guard: The output duration equals either the input signals time-over-threshold (TOT), or the preset duration of 4 nSEC to 1 μ SEC, whichever is greater. For input bursts of 125 MHz or greater, the output will equal the duration of the burst, should it be greater than the preset duration. Output width stability is $\pm 15\%/^{\circ}\text{C}$ of setting.

Summed Output:

One LEMO connector output common to all eight (8) channels; -1 mA output pulse (-50 mV into 50 ohms) for each channel fired. Output duration is equal to the output width setting of the respective channel. Output risetimes and falltimes are less than 2.5 nSEC into 50 ohms. Up to 18 channels can be directly "OR'D" by cable. -1 Volt of dynamic range.

GENERAL PERFORMANCE

Rate:

125 MHz minimum, input to output. Typically 140 MHz.

Double-Pulse Resolution:

Less than 8 nSEC; typically 7 nSEC with output width set at minimum.

Input to Output Delay:

Less than 8 nSEC.

Multiple Pulsing:

One and only one output pulse regardless of input pulse amplitude or duration.

Power Supply Requirements:

- 6 V @ 415 mA	+ 6 V @ 350 mA
-12 V @ 165 mA	+12 V @ 0 mA
-24 V @ 80 mA	+24 V @ 35 mA
115 VAC @ 65 mA	

Note: All currents within NIM specification limits allowing a full-powered bin to be operated without overloading.

Operating Temperature:

0 $^{\circ}$ C to 70 $^{\circ}$ C ambient.

Packaging:

Standard single width NIM module in accordance with TID-20893 and Section 524.

Options:

Contact Phillips Scientific to find out about available options.

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MODEL 711 SIX-CHANNEL DISCRIMINATOR
(FRONT PANEL DESCRIPTION)

Standard #1 NIM Packaging
in accordance with
TID-20893

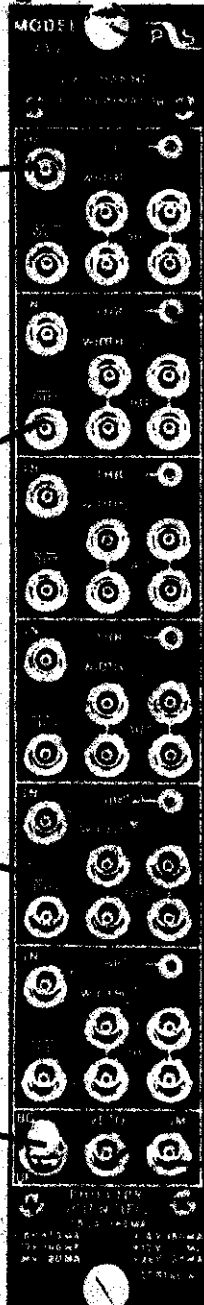
50 Ohm Input

One Complemented NIM Output.
Quiescently -16 mA (-800 mV)
Goes to 0 mA (0 Volts) during
output.

Double amplitude bridged
output; -32 mA (1.6 Volts
across 50 ohms, -.8 Volt with
two 50 ohm terminations)

Two position locking toggle
switch (pull to toggle).
Selects Burst Guard mode
or Updating mode.

NOTE: Bin Gate Enable/
Disable Switch on Rear
Panel permits Inhibiting
via Bin Connector.



Threshold Control; 15-turn
Screwdriver Adjustment,
Variable from -25 mV
to -1 Volt

Threshold Monitor; Test
Point provides a DC
Voltage 10 times the
actual Threshold Setting
(-250 mV to -10 V)

Output Width Control;
15-turn Screwdriver
Adjustment, Variable from
4 nSec to 1 μ Sec

Double amplitude bridged
output; -32 mA (-1.6 Volts
across 50 ohms, -.8 Volt
with two 50 ohm terminations)

Fast Inhibit Input accepts
normal NIM logic (-500 mV)
50 Ohm Impedance

Linear summed output;
-1 mA/step. (-50 mV across
50 ohms)

Voltage and Current
Requirements

MODEL 111 DISCRIMINATOR QUALITY CONTROL CHECK-OFF

DATE: 2-24-82

SERIAL NUMBER: 187

CHECKED BY: G.T.

ECO LEVEL: 500

MODIFICATIONS: None

TESTS	CHANNEL 1	1	2	3	4	5	6	7	8	Units
Visual Inspection		✓	✓	✓	✓	✓	✓			✓
Power Supplies		-2.17	-5.20	-5.30	-10.67	+5.24	+10.08	+3.64		Volts
Input to Output Response		✓	✓	✓	✓	✓	✓			✓
Burn-In										✓
Verification		✓	✓	✓	✓	✓	✓			✓
Bin Gate Test		✓	✓	✓	✓	✓	✓			✓
Veto Test		✓	✓	✓	✓	✓	✓			✓
Burst Guard Test		✓	✓	✓	✓	✓	✓			✓
Output Levels Out 1		855 1562	839 1563	851 1585	836 1577	861 1585	845 1587			mV
Output Levels Out 2		829 1556	862 1571	857 1583	861 1587	837 1568	864 1571			mV
Output Levels Out		810	801	813	813	809	800			mV
Pulse Shapes		✓	✓	✓	✓	✓	✓			✓
Maximum Output Width		1046	1016	1034	1053	1022	1010			nsec
Minimum Output Width		3.3	3.5	4.1	4.1	3.3	3.1			nsec
Risetime Outputs 1		.82	.83	.85	.84	.82	.84			nsec
Risetime Outputs 2		.91	.89	.90	.91	.88	.84			nsec
Risetime Output		1.0	1.0	1.0	1.0	1.0	1.0			nsec
Falltime Outputs 1		1.4	1.3	1.3	1.0	1.1	1.3			nsec
Falltime Outputs 2		1.0	1.2	1.3	1.5	1.0	1.3			nsec
Falltime Output		1.2	1.5	1.5	1.7	1.2	1.4			nsec
Test Point Minimum		251	250	250	250	250	250			mV
Test Point Maximum		10.0	10.0	10.0	10.0	10.0	10.0			Volts
Hysteresis		12	12	12	12	12	12			mV
Minimum Threshold Trim		24.9	25.0	25.1	25.0	25.0	25.1			mV
Maximum Threshold Check		✓	✓	✓	✓	✓	✓			Volts
Alignment Check										✓
Cleaning										✓
Visual Inspection		✓	✓	✓	✓	✓	✓			✓

MODEL 711 DISCRIMINATOR QUALITY CONTROL CHECK-OFF

DATE: 2-24-82

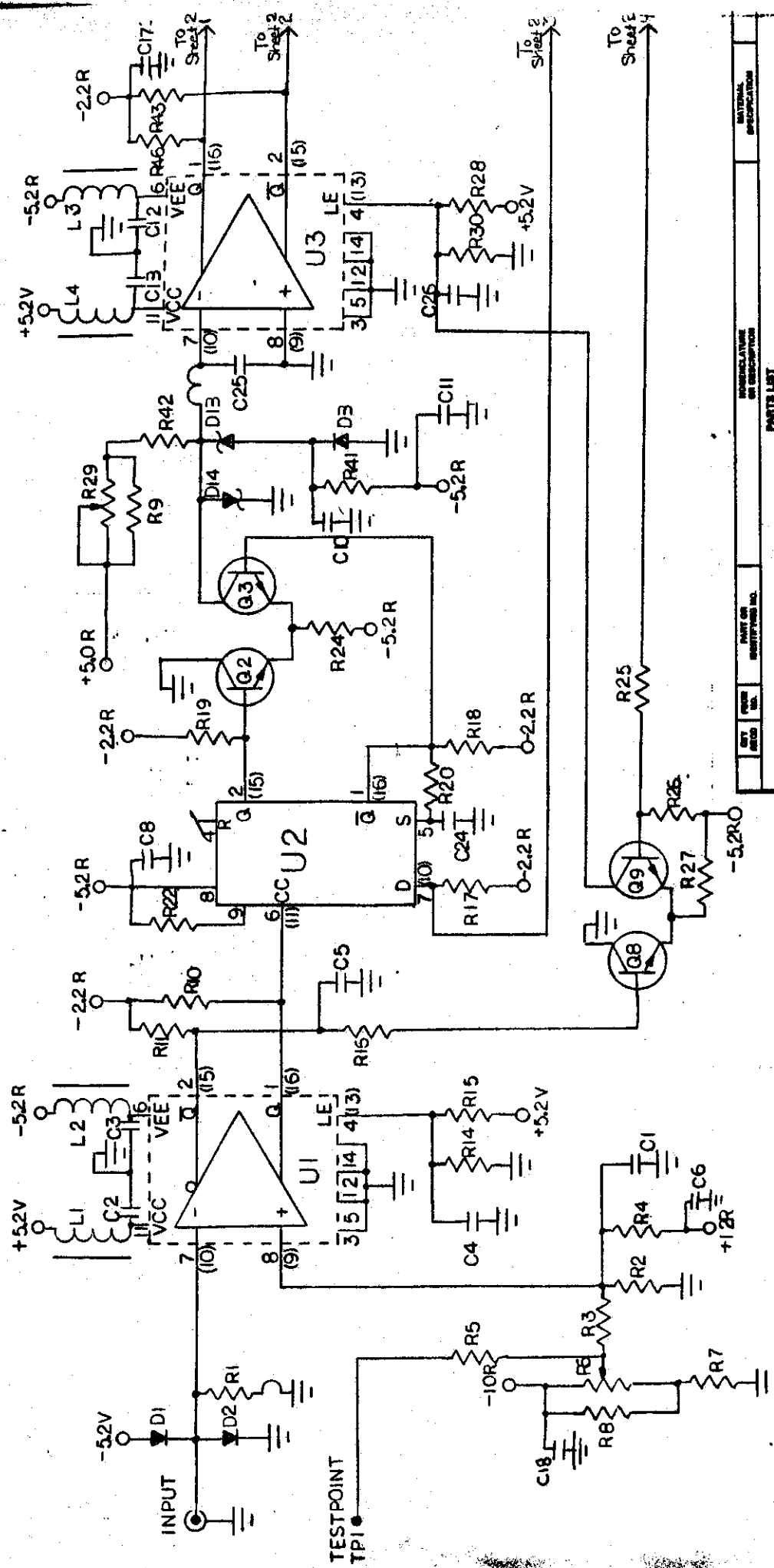
SERIAL NUMBER: 188

CHECKED BY: G.T.

ECO LEVEL: 500

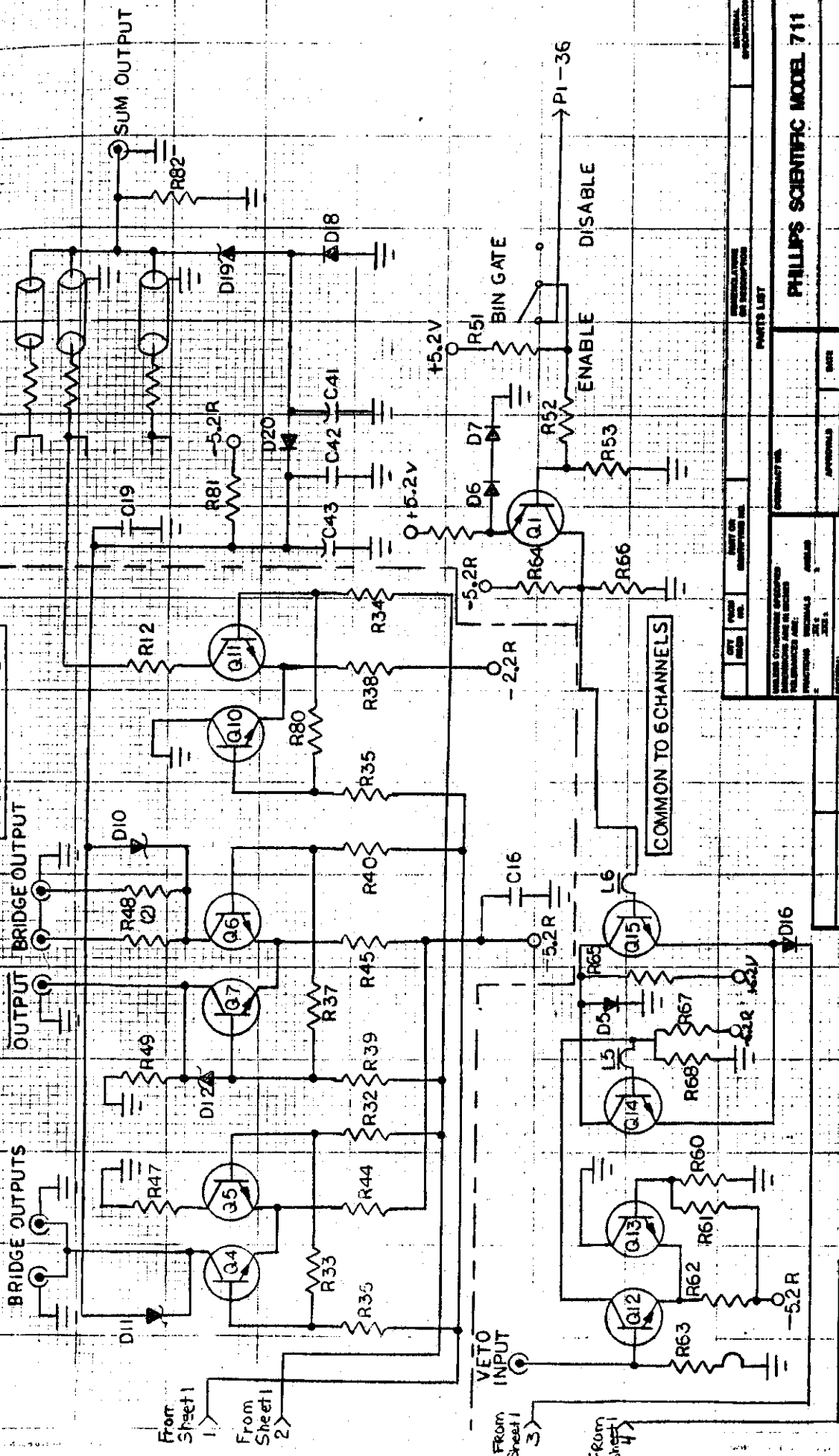
MODIFICATIONS: None

TESTS	CHANNEL #	1	2	3	4	5	6	7	8	Units
Visual Inspection		✓	✓	✓	✓	✓	✓			✓
Power Supplies		-2.20	-5.16	-5.28	-9.99	5.18	10.05			Volts
Input to Output Response		✓	✓	✓	✓	✓	✓			✓
Burn-In										✓
Verification		✓	✓	✓	✓	✓	✓			✓
Min Gate Test		✓	✓	✓	✓	✓	✓			✓
Veto Test		✓	✓	✓	✓	✓	✓			✓
Burst Guard Test		✓	✓	✓	✓	✓	✓			✓
Output Levels Out 1	₂₅₀ ₅₀₀	845 1602	828 1581	847 1584	835 1571	852 1587	847 1583			mV
Output Levels Out 2	₂₅₀ ₅₀₀	825 1586	858 1592	840 1574	850 1580	849 1583	841 1582			mV
Output Levels Out		809	793	805	803	818	794			mV
Pulse Shapes		✓	✓	✓	✓	✓	✓			✓
Maximum Output Width		1030	1031	1050	1010	1059	1051			nsec
Minimum Output Width		3.5	4.6	3.3	4.2	3.4	3.4			nsec
Risetime Outputs 1		.84	.87	.90	.87	.92	.93			nsec
Risetime Outputs 2		.97	.88	.91	.96	.99	.89			nsec
Risetime Output		1.0	1.0	1.0	1.1	1.1	1.0			nsec
Falltime Outputs 1		1.2	1.1	1.5	1.6	1.6	1.6			nsec
Falltime Outputs 2		1.1	1.2	1.4	1.6	1.4	1.5			nsec
Falltime Output		1.4	1.4	1.6	1.5	1.5	1.5			nsec
Test Point Minimum		249	250	249	250	250	250			mV
Test Point Maximum		10.0	10.0	10.0	10.0	10.0	10.0			Volts
Hysteresis		12	12	12	12	12	12			mV
Minimum Threshold Trim		24.9	25.1	25.0	24.9	25.1	25.0			mV
Maximum Threshold Check		✓	✓	✓	✓	✓	✓			Volts
Alignment Check										✓
Cleaning										✓
Visual Inspection		✓	✓	✓	✓	✓	✓			✓

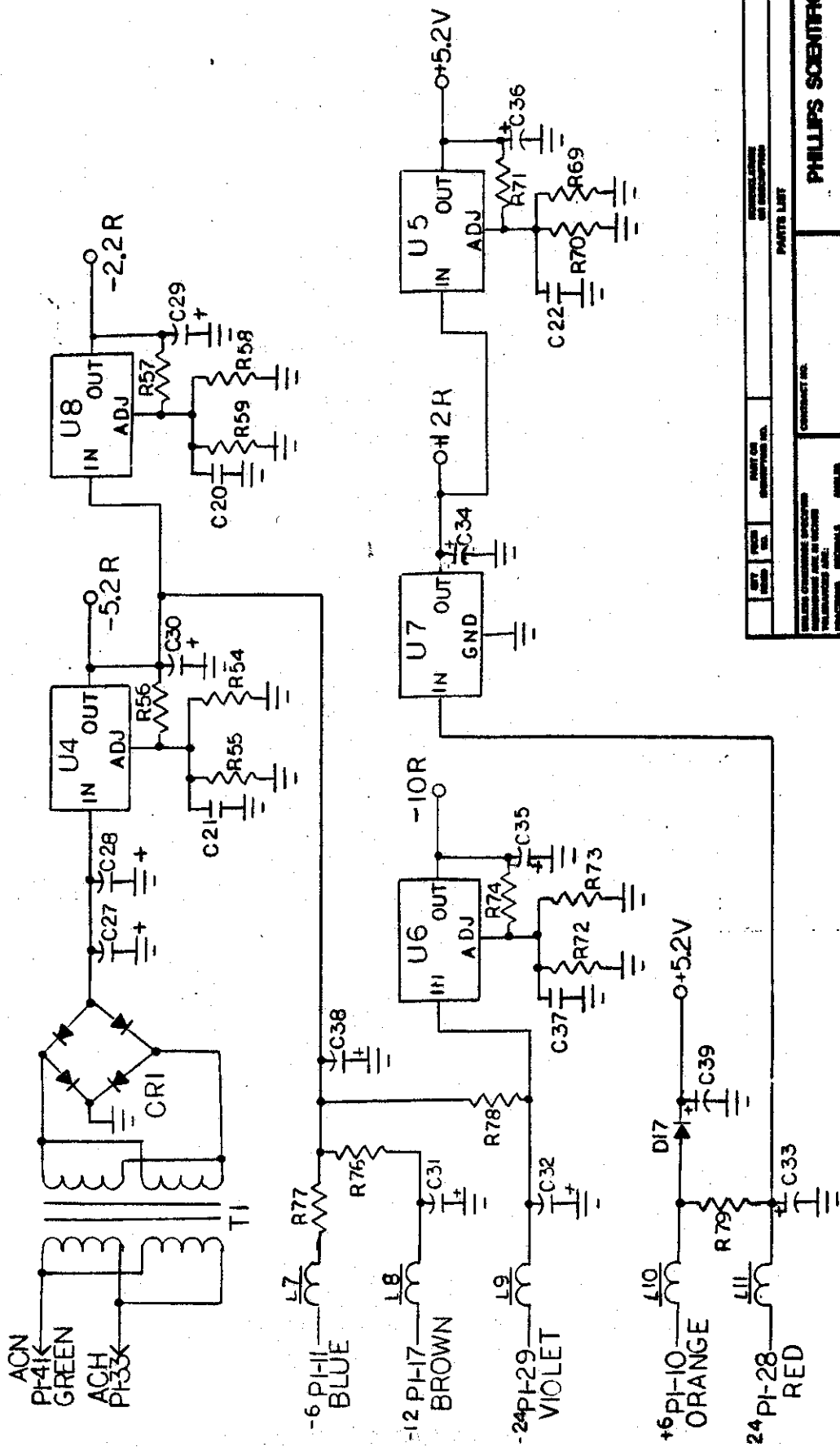


CITY		PART OR IDENTIFYING NO.		QUANTITY		DESCRIPTION		MATERIAL SPECIFICATION	
PARTS LIST									
CONTRACT NO.									
<small>ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED ARE IN INCHES</small> <small>TOLERANCES ARE:</small> <small>FRACTIONS DECIMALS ANGLES</small> <small>FRACTIONS .125 .001 .01 .01</small> <small>DECIMALS .001 .001 .01 .01</small> <small>ANGLES .01 .01 .01 .01</small>									
APPROVALS		DATE		CHECKED		REV		REV	
DESIGNED		J.T. 02/63		D.M. 02/63		D.W.G. NO. 20688		REV. F	
DRAWN									
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APPLICATION		USED ON							
MILITARY									
PHILIPS SCIENTIFIC MODEL 711									
SCHEMATIC									
SHEET		1 OF 1							

ONE OF 6 CHANNELS



PARTS LIST		APPROVALS		DATE	
CONTRACT NO.		DESIGNED BY	DATE	DRAWN BY	DATE
		CHECKED BY			
REVISIONS					
NO.	DESCRIPTION	DATE	BY	REASON	
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PHILIPS SCIENTIFIC MODEL 711					
SCHEMATIC					
DWG. NO.	2069	REV.			
SCALE					
DO NOT SCALE DRAWING					
APPLICATOR		DESIGNED BY		DATE	
APPLICATION					
PHILIPS SCIENTIFIC MODEL 711					
SCHEMATIC					
DRAWING NO. 2069					
REV. 1					
SCALE					
SHEET 2 OF 3					



REV.	NO.	DATE	DESCRIPTION	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	NAME	DATE	SCALE	SHEET NO.	TOTAL SHEETS
								JT	02/88			
								DM	02/88		2070	8

REV. NO.	DATE	DESCRIPTION	SCALE	SHEET NO.	TOTAL SHEETS

PHILIPS SCIENTIFIC MODEL 711 SCHEMATIC	PHILIPS SCIENTIFIC MODEL 711 SCHEMATIC
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DO NOT SCALE DRAWING	SHEET 3 OF 3
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Ident.	Qty.	Part Number	Description
R1	6	00655121	51.12 ± 1%
R2	6	00654320	432.2 ± 1%
R3	6	00653921	3.92K ± 1%
R4	6		Trim Resistor CF 1/8 Threshold Trim
R5	6	00101001	1K 5% 1/8 watt
R6	6	05105001	5K-Ω Pot Threshold adjustment
R7	6	00651210	121.2 ± 1%
R8	6		Trim Resistor CF 1/8 Test Point Trim
R9	6		Trim Resist Width Trim
R10	6	00101000	100Ω 1/8 watt
R11	6	00102200	220Ω 1/8 watt
R12	6	00101000	100Ω 1/8
R13			
R14	3	00105120	51Ω 1/8 watt
R15	3	00102202	22K 1/8 watt
R16	6	00105100	510Ω 1/8 watt
R17	6	00102700	270Ω 1/8 watt
R18	6	00101000	100Ω 1/8 watt resistor
R19	6	00101000	100Ω 1/8 watt resistor
R20	6	001075R0	75Ω 1/4 watt resistor
R21			Not Used
R22	3	00101002	10K 1/8 watt resistor
R23			Not Used
R24	6	00102000	200Ω 1/8 watt Resistor
R25	6	00101001	1K 1/8 watt resistor
R26	6	00102701	2.7K 1/8 watt Resistor
R27	6	00103900	390Ω 1/8 watt resistor
R28	6	00101002	10K 1/8 watt resistor
R29	6	05102003	200K Pot Threshold Adj.
R30	6	001051R0	51Ω 1/8 trim Resistor

Ident.	Qty.	Part Number	Description
R31	6		Trim Resistor
R32	6	001022R0	22Ω 1/8 watt resistor
R33	6	00101000	100Ω 1/8 watt resistor
R34	6	00101500	150Ω 1/8 watt resistor
R35	6	00101500	150Ω 1/8 watt resistor
R36	6	001022R0	22Ω 1/8 watt resistor
R37	6	00101000	100Ω 1/8 watt resistor
R38	6	00103900	390Ω 1/8 watt resistor
R39	6	001022R0	22Ω 1/8 watt resistor
R40	6	001022R0	22Ω 1/8 watt resistor
R41	6	00102201	2.2K 1/8 watt resistor
R42	6	00108200	820Ω 1/8 watt resistor
R43	6	001033R0	33Ω 1/8 watt resistor
R44	6	00101000	100Ω 1/8 watt resistor
R45	6	00101000	100Ω 1/8 watt resistor
R46	6	001033R0	33Ω 1/8 watt resistor
R47	6	001027R0	27Ω 1/8 watt resistor
R48	12	00105101	5.1K 1/8 watt resistor
R49	6	001051R0	51Ω 1/8 watt resistor
R50	1	00101501	1.5K 1/8 watt resistor
R51	1	00105101	5.1K 1/8 watt resistor
R52	1	00103901	3.9K 1/8 watt resistor
R53	1	00103901	3.9K 1/8 watt resistor
R54	1	00656810	681Ω 1% RN55C
R55	1		Trim Resistor -5.2R
R56	1	00652210	221Ω 1% RN55C
R57	1	00652210	221Ω 1% RN55C
R58	1	00651650	165Ω 1% RN55C
R59	1		NOT USED Trim Resistor -2.2R
R60	1	00103300	330Ω 1/8 watt resistor

Ident.	Qty.	Part Number	Description
C1	6	10151003	.1 mfd cap
C2	3	10151003	.1 mfd cap
C3	3	10151003	.1 mfd cap
C4	3	10151003	.1 mfd cap
C5	6	101010P0	10 pfd cap NPO Ceramic
C6	1	10151003	.1 mfd
C7	0		NOT USED
C8	3	10151003	.1 mfd cap
C9	0		NOT USED
C10	6	10151003	.1 mfd cap
C11	6	10151003	.1 mfd cap
C12	3	10151003	.1 mfd cap
C13	3	10151003	.1 mfd cap
C14			NOT USED
C15			NOT USED
C16	3	10151003	.1 mfd cap
C17	3	10151003	.1 mfd cap
C18	6	10151003	.1 mfd cap
C19	6	10151003	.1 mfd cap
C20	1	10151003	.1 mfd cap
C21	1	10151003	.1 mfd cap
C22	1	10151003	.1 mfd cap
C23	1		.1 mfd cap NOT USED
C24	6		CT
C25	6	101010P0	10 pfd NPO Ceramic
C26	6	101010P0	10 pfd NPO Ceramic
C27	1	10612207	2200 mfd @ 10V
C28	1	10612207	2200 mfd @ 10V
C29	1	10612207	2200 mfd @ 10V
C30	1	10612207	2200 mfd @ 10V

Ident.	Qty.	Part Number	Description
D1	6	20004448	1N4448 diode
D2	6	20004448	1N4448 diode
D3	6	20004448	1N4448 diode
D4	—		not used
D5	1	20004448	1N4448 diode
D6	1	20004448	1N4448 diode
D7	1	20004448	1N4448 diode
D8	1		1N4448 diode - not used
D10	6	20002835	ND2835 diode
D11	6	20002835	ND2835 diode
D12	6	20002835	ND2835 diode
D13	6	20002835	ND2835 diode
D14	6	20002835	ND2835 diode
D16	6	20004448	1N4448 diode
D17	1	20004004	1N4004
D18	1	20004448	1N4448 diode
D19	1	20002835	ND2835 Diode
D20	1	20004448	1N4448 diode
U5	1	3010317T	LM317T +5.0R
U6	1	3010337T	LM337T -1.0R
U7	1	30107812	7812 +12R
U1	3	38006970	PS006 970
U2	3	3800821	PS006 821
U3	3	38006970	PS006 970
U4	1	3010337T	LM337T -5.2R
U8	1	3010337K	LM337K -2.2R

