

Phillips Scientific

Hex Discriminator

NIM MODEL 711

FEATURES

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

Hall A

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.

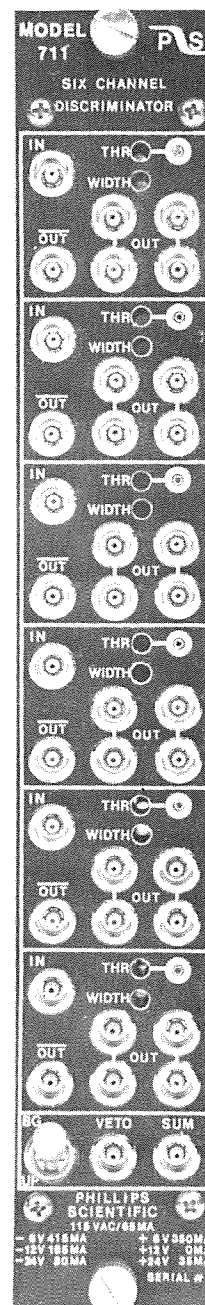
The 711 has high input sensitivity of -10mV variable to -1 Volt via a 15-turn front panel control. A front panel test point on each channel provides a DC voltage equal to ten times the actual threshold to insure accurate settings.

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 6nSEC), 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.



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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 -10 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 150 MHz or greater, the output will equal the duration of the burst, should it be greater than the preset duration. Output width stability is $\pm 0.15\%/^{\circ}\text{C}$ 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:

150 MHz minimum, input to output. Typically 160 MHz.

Double-Pulse Resolution:

Less than 6.5 nSEC; typically 6 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

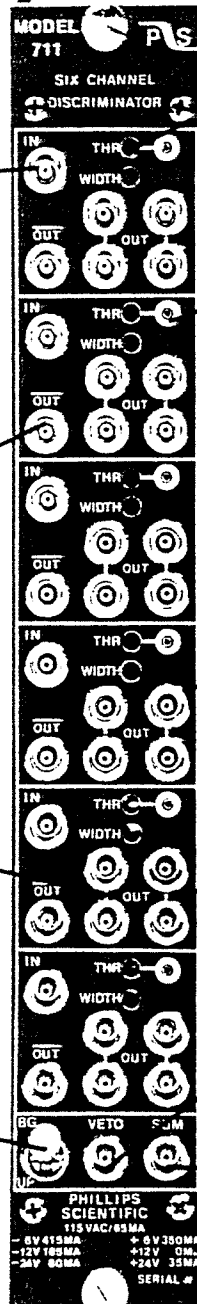
50 Ohm Input

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

DATE: 11/14/94

SERIAL NUMBER: 14056

CHECKED BY: Nayana

ECO LEVEL:

MODIFICATIONS:

TESTS	CHANNEL #	1	2	3	4	5	6	7	8	Units
Visual Inspection		✓	✓	✓	✓	✓	✓			
Power Supplies		-2.16	-5.06R	11.97	-9.99	5.31	5.15R			Volts
Input to Output Response		✓	✓	✓	✓	✓	✓			
Burn-In		✓	✓	✓	✓	✓	✓			
Verification		✓	✓	✓	✓	✓	✓			
Bin Gate Test		✓	✓	✓	✓	✓	✓			
Veto Test		✓	✓	✓	✓	✓	✓			
Burst Guard Test		✓	✓	✓	✓	✓	✓			
Output Levels Out 1	50n 25n	1617 819	1617 816	1619 823	1621 821	1619 821	1617 821			mV
Output Levels Out 2	50n 25n	1614 818	1621 822	1617 822	1621 825	1619 823	1611 815			mV
Output Levels Out		823	827	833	825	821	821			mV
Pulse Shapes		✓	✓	✓	✓	✓	✓			
Maximum Output Width		1060	1045	1056	1060	1032	1031			nsec
Minimum Output Width		3.5	3.7	3.4	3.5	3.5	3.7			nsec
Risetime Outputs 1	50n 25n	1.1 0.8	1.0 0.8	1.0 0.8	1.0 0.8	1.0 0.8	1.0 0.8			nsec
Risetime Outputs 2	50n 25n	1.0 0.8	1.1 0.8	1.1 0.8	1.0 0.8	1.0 0.8	1.1 0.8			nsec
Risetime Output		1.3	1.3	1.3	1.2	1.3	1.2			nsec
Falltime Outputs 1	50n 25n	1.0 1.1	1.0 1.2	1.0 1.2	1.0 1.2	1.0 1.1	1.0 1.2			nsec
Falltime Outputs 2	50n 25n	0.8 1.0	0.9 1.0	0.8 1.1	0.9 1.0	0.8 1.1	0.9 1.0			nsec
Falltime Output		1.1	1.1	1.2	1.2	1.3	1.2			nsec
Test Point Minimum		-99.5	-100.2	-99.1	-99.6	-99.8	-99.2			mV
Test Point Maximum		-9.99	-9.99	-9.99	-9.99	-9.99	-9.99			Volts
Hysteresis		18.95	18.95	19.22	19.22	18.80	18.80			mV
Minimum Threshold Trim		-10.10	-10.05	-10.02	-10.01	-9.99	-10.03			mV
Maximum Threshold Check		-9.97	-9.93	-9.94	-9.96	-9.96	-9.96			Volts
Alignment Check		✓								
Cleaning		✓								
Visual Inspection		✓								
Sum Output trim		52.2	52.8	52.9	52.1	51.4	51.4			mV

Continued on Next Page if necessary.

71101

71102

71103

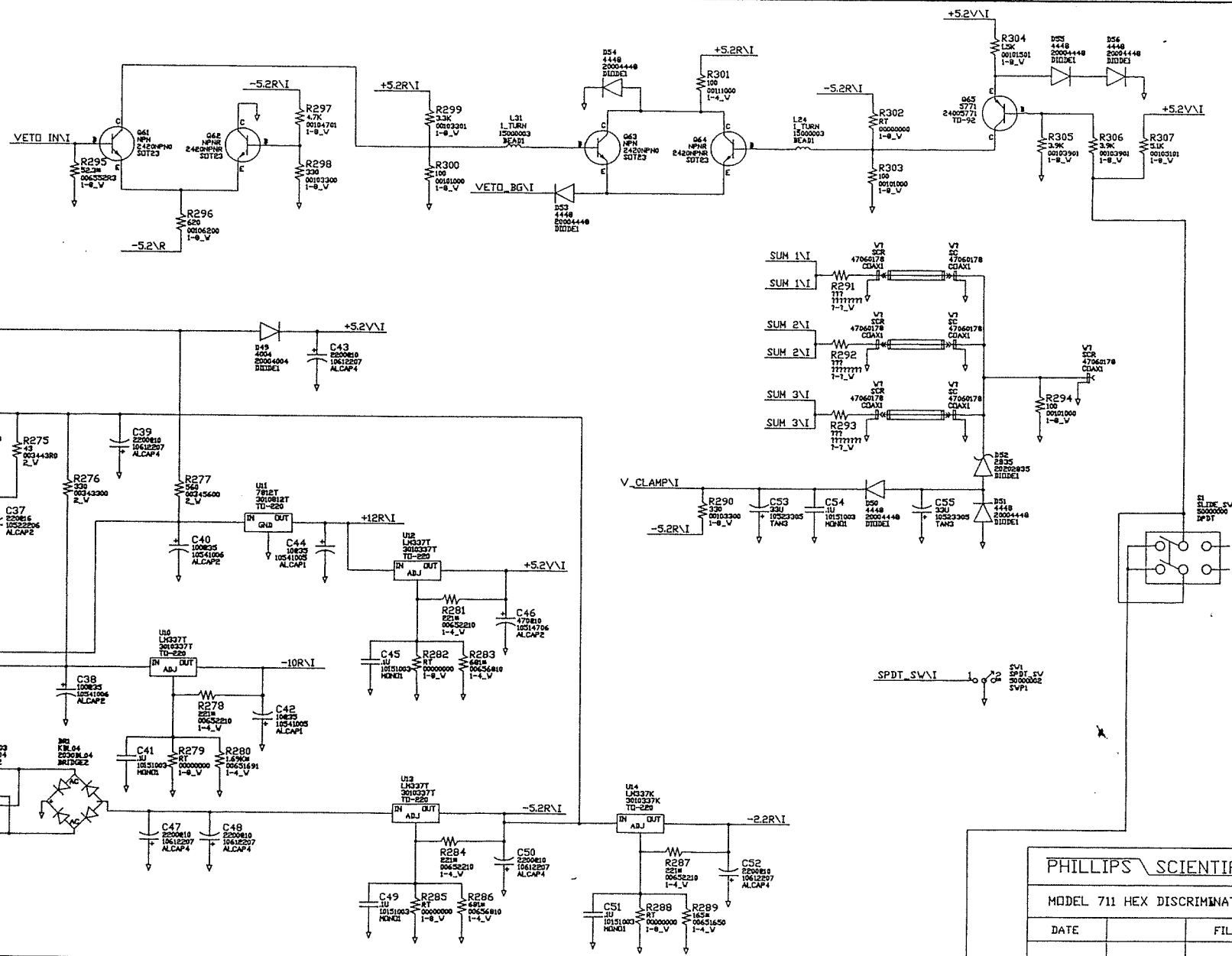
71104

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MODEL 711 HEX DISCRIMINATOR

DATE	REV.	FILE
08-15-94	-	71100

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PHILLIPS SCIENTIFIC		
MODEL 711 HEX DISCRIMINATOR		
DATE	REV.	FILE
08-15-94	REV. -	71104

UNIT #	FAMILY	DEVICE	VERSION	STATUS
W1	,,	SCR	X	OK
W2	,,	SC	X	OK
W3	,,	SCR	X	OK
W4	,,	SCR	X	OK
W5	,,	SC	X	OK
W6	,,	SCR	X	OK
W7	,,	SC	X	OK
W8	,,	SC	X	OK
W9	,,	SC	X	OK
W10	,,	SCR	X	OK
W11	,,	SCR	X	OK
W12	,,	SC	X	OK
W13	,,	SC	X	OK
W14	,,	SC	X	OK
W15	,,	SCR	X	OK
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W17	,,	SC	X	OK
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W30	,,	SC	X	OK
W31	,,	SC	X	OK
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W35	,,	SCR	X	OK
W36	,,	SC	X	OK
W37	,,	SC	X	OK
W38	,,	SC	X	OK
W39	,,	SC	X	OK
W40	,,	SCR	X	OK
W41	,,	SCR	X	OK
W42	,,	SC	X	OK
W43	,,	SC	X	OK
U1	,,	9687	A	OK
U1	,,	9687	B	OK
U2	,,	9687	A	OK
U2	,,	9687	B	OK
U3	,,	9687	A	OK
U3	,,	9687	B	OK
U4	,,	10H131	A	OK
U4	,,	10H131	B	OK

U5	,"	10H131	A	OK
U5	,"	10H131	B	OK
U6	,"	10H131	A	OK
U6	,"	10H131	B	OK
U7	,"	9687	A	OK
U7	,"	9687	B	OK
U8	,"	9687	A	OK
U8	,"	9687	B	OK
U9	,"	9687	A	OK
U9	,"	9687	B	OK
U10	,"	LM337T	X	OK
U11	,"	7812T	X	OK
U12	,"	LM337T	X	OK
U13	,"	LM337T	X	OK
U14	,"	LM337K	X	OK
TP1	,"	TEST_PT	X	OK
TP2	,"	TEST_PT	X	OK
TP3	,"	TEST_PT	X	OK
TP4	,"	TEST_PT	X	OK
TP5	,"	TEST_PT	X	OK
TP6	,"	TEST_PT	X	OK
T1	,"	SPW-303	X	OK
S1	,"	SLIDE_SW	X	OK
RP1	,"	5K	X	OK
RP2	,"	5K	X	OK
RP3	,"	5K	X	OK
RP4	,"	5K	X	OK
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RP6	,"	5K	X	OK
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RP8	,"	200K	X	OK
RP9	,"	200K	X	OK
RP10	,"	200K	X	OK
RP11	,"	200K	X	OK
RP12	,"	200K	X	OK
R1	,"	51.1*	X	OK
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R10	,"	1.0K	X	OK
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R12	,"	1.0K	X	OK
R13	,"	3.92K*	X	OK
R14	,"	3.92K*	X	OK
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R16	,"	3.92K*	X	OK
R17	,"	3.92K*	X	OK
R18	,"	3.92K*	X	OK
R19	,"	432*	X	OK

R20	,,	432*	X	OK
R21	,,	432*	X	OK
R22	,,	432*	X	OK
R23	,,	432*	X	OK
R24	,,	432*	X	OK
R25	,,	40.2*	X	OK
R26	,,	40.2*	X	OK
R27	,,	40.2*	X	OK
R28	,,	40.2*	X	OK
R29	,,	40.2*	X	OK
R30	,,	40.2*	X	OK
R31	,,	RT	X	OK
R32	,,	RT	X	OK
R33	,,	RT	X	OK
R34	,,	RT	X	OK
R35	,,	RT	X	OK
R36	,,	RT	X	OK
R37	,,	RT	X	OK
R38	,,	RT	X	OK
R39	,,	RT	X	OK
R40	,,	RT	X	OK
R41	,,	RT	X	OK
R42	,,	RT	X	OK
R43	,,	RT	X	OK
R44	,,	RT	X	OK
R45	,,	RT	X	OK
R46	,,	51	X	OK
R47	,,	51	X	OK
R48	,,	51	X	OK
R49	,,	510	X	OK
R50	,,	510	X	OK
R51	,,	510	X	OK
R52	,,	510	X	OK
R53	,,	510	X	OK
R54	,,	510	X	OK
R55	,,	220	X	OK
R56	,,	220	X	OK
R57	,,	220	X	OK
R58	,,	220	X	OK
R59	,,	220	X	OK
R60	,,	220	X	OK
R61	,,	270	X	OK
R62	,,	270	X	OK
R63	,,	270	X	OK
R64	,,	270	X	OK
R65	,,	270	X	OK
R66	,,	270	X	OK
R67	,,	100	X	OK
R68	,,	100	X	OK
R69	,,	100	X	OK
R70	,,	100	X	OK
R71	,,	100	X	OK
R72	,,	100	X	OK
R73	,,	10K	X	OK

Reid
changed to
12K 7aw
10-29-94

R74	,,	10K	X	OK
R75	,,	10K	X	OK
R76	,,	390	X	OK
R77	,,	390	X	OK
R78	,,	390	X	OK
R79	,,	390	X	OK
R80	,,	390	X	OK
R81	,,	390	X	OK
R82	,,	100	X	OK
R83	,,	100	X	OK
R84	,,	100	X	OK
R85	,,	100	X	OK
R86	,,	100	X	OK
R87	,,	100	X	OK
R88	,,	2.7K	X	OK
R89	,,	2.7K	X	OK
R90	,,	2.7K	X	OK
R91	,,	2.7K	X	OK
R92	,,	2.7K	X	OK
R93	,,	2.7K	X	OK
R94	,,	100	X	OK
R95	,,	100	X	OK
R96	,,	100	X	OK
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R98	,,	100	X	OK
R99	,,	100	X	OK
R100	,,	75	X	OK
R101	,,	75	X	OK
R102	,,	75	X	OK
R103	,,	75	X	OK
R104	,,	75	X	OK
R105	,,	75	X	OK
R106	,,	200	X	OK
R107	,,	200	X	OK
R108	,,	200	X	OK
R109	,,	200	X	OK
R110	,,	200	X	OK
R111	,,	200	X	OK
R112	,,	390	X	OK
R113	,,	390	X	OK
R114	,,	390	X	OK
R115	,,	390	X	OK
R116	,,	390	X	OK
R117	,,	390	X	OK
R118	,,	2.2K	X	OK
R119	,,	2.2K	X	OK
R120	,,	2.2K	X	OK
R121	,,	2.2K	X	OK
R122	,,	2.2K	X	OK
R123	,,	2.2K	X	OK
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R125	,,	RT	X	OK
R126	,,	RT	X	OK
R127	,,	RT	X	OK

R128	,,	RT	X	OK
R129	,,	RT	X	OK
R130	,,	820	X	OK
R131	,,	820	X	OK
R132	,,	820	X	OK
R133	,,	820	X	OK
R134	,,	820	X	OK
R135	,,	820	X	OK
R136	,,	33	X	OK
R137	,,	33	X	OK
R138	,,	33	X	OK
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R140	,,	33	X	OK
R141	,,	33	X	OK
R142	,,	33	X	OK
R143	,,	33	X	OK
R144	,,	33	X	OK
R145	,,	33	X	OK
R146	,,	33	X	OK
R147	,,	33	X	OK
R148	,,	390	X	OK
R149	,,	390	X	OK
R150	,,	390	X	OK
R151	,,	390	X	OK
R152	,,	390	X	OK
R153	,,	390	X	OK
R154	,,	10K	X	OK
R155	,,	10K	X	OK
R156	,,	10K	X	OK
R157	,,	10K	X	OK
R158	,,	10K	X	OK
R159	,,	10K	X	OK
R160	,,	5.1	X	OK
R161	,,	5.1	X	OK
R162	,,	5.1	X	OK
R163	,,	5.1	X	OK
R164	,,	5.1	X	OK
R165	,,	5.1	X	OK
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R177	,,	5.1	X	OK
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R180	,,	51	X	OK
R181	,,	51	X	OK

R182	,,	51	X	OK
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R186	,,	27	X	OK
R187	,,	27	X	OK
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R189	,,	27	X	OK
R190	,,	91	X	OK
R191	,,	91	X	OK
R192	,,	91	X	OK
R193	,,	91	X	OK
R194	,,	91	X	OK
R195	,,	91	X	OK
R196	,,	22	X	OK
R197	,,	22	X	OK
R198	,,	22	X	OK
R199	,,	22	X	OK
R200	,,	22	X	OK
R201	,,	22	X	OK
R202	,,	91	X	OK
R203	,,	91	X	OK
R204	,,	91	X	OK
R205	,,	91	X	OK
R206	,,	91	X	OK
R207	,,	91	X	OK
R208	,,	22	X	OK
R209	,,	22	X	OK
R210	,,	22	X	OK
R211	,,	22	X	OK
R212	,,	22	X	OK
R213	,,	22	X	OK
R214	,,	5.1	X	OK
R215	,,	5.1	X	OK
R216	,,	5.1	X	OK
R217	,,	5.1	X	OK
R218	,,	5.1	X	OK
R219	,,	5.1	X	OK
R220	,,	51	X	OK
R221	,,	51	X	OK
R222	,,	51	X	OK
R223	,,	51	X	OK
R224	,,	51	X	OK
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R232	,,	91	X	OK
R233	,,	91	X	OK
R234	,,	91	X	OK
R235	,,	91	X	OK

R236	..	91	X	OK
R237	..	91	X	OK
R238	..	22	X	OK
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R245	..	150	X	OK
R246	..	150	X	OK
R247	..	150	X	OK
R248	..	150	X	OK
R249	..	150	X	OK
R250	..	RT	X	OK
R251	..	RT	X	OK
R252	..	RT	X	OK
R253	..	RT	X	OK
R254	..	RT	X	OK
R255	..	RT	X	OK
R256	..	270	X	OK
R257	..	270	X	OK
R258	..	270	X	OK
R259	..	270	X	OK
R260	..	270	X	OK
R261	..	270	X	OK
R262	..	10	X	OK
R263	..	10	X	OK
R264	..	10	X	OK
R265	..	10	X	OK
R266	..	10	X	OK
R267	..	10	X	OK
R268	..	150	X	OK
R269	..	150	X	OK
R270	..	150	X	OK
R271	..	150	X	OK
R272	..	150	X	OK
R273	..	150	X	OK
R274	..	2.0	X	OK
R275	..	43	X	OK
R276	..	330	X	OK
R277	..	560	X	OK
R278	..	221*	X	OK
R279	..	RT	X	OK
R280	..	1.69K*	X	OK
R281	..	221*	X	OK
R282	..	RT	X	OK
R283	..	681*	X	OK
R284	..	221*	X	OK
R285	..	RT	X	OK
R286	..	681*	X	OK
R287	..	221*	X	OK
R288	..	RT	X	OK
R289	..	165*	X	OK

R290	,,	330	X	OK
R291	,,	???	X	OK
R292	,,	???	X	OK
R293	,,	???	X	OK
R294	,,	100	X	OK
R295	,,	52.3*	X	OK
R296	,,	620	X	OK
R297	,,	4.7K	X	OK
R298	,,	330	X	OK
R299	,,	3.3K	X	OK
R300	,,	100	X	OK
R301	,,	100	X	OK
R302	,,	RT	X	OK
R303	,,	100	X	OK
R304	,,	1.5K	X	OK
R305	,,	3.9K	X	OK
R306	,,	3.9K	X	OK
R307	,,	5.1K	X	OK
Q1	,,	NPN	X	OK
Q2	,,	NPN	X	OK
Q3	,,	NPN	X	OK
Q4	,,	NPN	X	OK
Q5	,,	NPN	X	OK
Q6	,,	NPN	X	OK
Q7	,,	NPNR	X	OK
Q8	,,	NPNR	X	OK
Q9	,,	NPNR	X	OK
Q10	,,	NPNR	X	OK
Q11	,,	NPNR	X	OK
Q12	,,	NPNR	X	OK
Q13	,,	NPN	X	OK
Q14	,,	NPN	X	OK
Q15	,,	NPN	X	OK
Q16	,,	NPN	X	OK
Q17	,,	NPN	X	OK
Q18	,,	NPN	X	OK
Q19	,,	NPNR	X	OK
Q20	,,	NPNR	X	OK
Q21	,,	NPNR	X	OK
Q22	,,	NPNR	X	OK
Q23	,,	NPNR	X	OK
Q24	,,	NPNR	X	OK
Q25	,,	NPN	X	OK
Q26	,,	NPN	X	OK
Q27	,,	NPN	X	OK
Q28	,,	NPN	X	OK
Q29	,,	NPN	X	OK
Q30	,,	NPN	X	OK
Q31	,,	NPNR	X	OK
Q32	,,	NPNR	X	OK
Q33	,,	NPNR	X	OK
Q34	,,	NPNR	X	OK
Q35	,,	NPNR	X	OK
Q36	,,	NPNR	X	OK

Q37	''	NPN	X	OK
Q38	''	NPN	X	OK
Q39	''	NPN	X	OK
Q40	''	NPN	X	OK
Q41	''	NPN	X	OK
Q42	''	NPN	X	OK
Q43	''	NPNR	X	OK
Q44	''	NPNR	X	OK
Q45	''	NPNR	X	OK
Q46	''	NPNR	X	OK
Q47	''	NPNR	X	OK
Q48	''	NPNR	X	OK
Q49	''	5770	X	OK
Q50	''	5770	X	OK
Q51	''	5770	X	OK
Q52	''	5770	X	OK
Q53	''	5770	X	OK
Q54	''	5770	X	OK
Q55	''	5770	X	OK
Q56	''	5770	X	OK
Q57	''	5770	X	OK
Q58	''	5770	X	OK
Q59	''	5770	X	OK
Q60	''	5770	X	OK
Q61	''	NPN	X	OK
Q62	''	NPNR	X	OK
Q63	''	NPN	X	OK
Q64	''	NPNR	X	OK
Q65	''	5771	X	OK
L1	''	8.2MHY	X	OK
L2	''	8.2MHY	X	OK
L3	''	8.2MHY	X	OK
L4	''	8.2MHY	X	OK
L5	''	8.2MHY	X	OK
L6	''	8.2MHY	X	OK
L7	''	1_TURN	X	OK
L8	''	1_TURN	X	OK
L9	''	1_TURN	X	OK
L10	''	1_TURN	X	OK
L11	''	1_TURN	X	OK
L12	''	1_TURN	X	OK
L13	''	8.2MHY	X	OK
L14	''	8.2MHY	X	OK
L15	''	8.2MHY	X	OK
L16	''	8.2MHY	X	OK
L17	''	8.2MHY	X	OK
L18	''	8.2MHY	X	OK
L19	''	P.I.	X	OK
L20	''	P.I.	X	OK
L21	''	P.I.	X	OK
L22	''	P.I.	X	OK
L23	''	P.I.	X	OK
L24	''	1_TURN	X	OK
L31	''	1_TURN	X	OK

J1	,,	NIM_BLOCK	X	OK
D1	,,	4448	X	OK
D2	,,	4448	X	OK
D3	,,	4448	X	OK
D4	,,	4448	X	OK
D5	,,	4448	X	OK
D6	,,	4448	X	OK
D7	,,	4448	X	OK
D8	,,	4448	X	OK
D9	,,	4448	X	OK
D10	,,	4448	X	OK
D11	,,	4448	X	OK
D12	,,	4448	X	OK
D13	,,	2835	X	OK
D14	,,	2835	X	OK
D15	,,	2835	X	OK
D16	,,	2835	X	OK
D17	,,	2835	X	OK
D18	,,	2835	X	OK
D19	,,	2835	X	OK
D20	,,	2835	X	OK
D21	,,	2835	X	OK
D22	,,	2835	X	OK
D23	,,	2835	X	OK
D24	,,	2835	X	OK
D25	,,	4448	X	OK
D26	,,	4448	X	OK
D27	,,	4448	X	OK
D28	,,	4448	X	OK
D29	,,	4448	X	OK
D30	,,	4448	X	OK
D31	,,	2835	X	OK
D32	,,	2835	X	OK
D33	,,	2835	X	OK
D34	,,	2835	X	OK
D35	,,	2835	X	OK
D36	,,	2835	X	OK
D37	,,	2835	X	OK
D38	,,	2835	X	OK
D39	,,	2835	X	OK
D40	,,	2835	X	OK
D41	,,	2835	X	OK
D42	,,	2835	X	OK
D43	,,	2835	X	OK
D44	,,	2835	X	OK
D45	,,	2835	X	OK
D46	,,	2835	X	OK
D47	,,	2835	X	OK
D48	,,	2835	X	OK
D49	,,	4004	X	OK
D50	,,	4448	X	OK
D51	,,	4448	X	OK
D52	,,	2835	X	OK
D53	,,	4448	X	OK

D54	..	4448	X	OK
D55	..	4448	X	OK
D56	..	4448	X	OK
C1	..	.1U	X	OK
C2	..	.1U	X	OK
C3	..	.1U	X	OK
C4	..	.1U	X	OK
C5	..	.1U	X	OK
C6	..	.1U	X	OK
C7	..	.1U	X	OK
C8	..	.1U	X	OK
C9	..	.1U	X	OK
C10	..	.1U	X	OK
C11	..	.1U	X	OK
C12	..	.1U	X	OK
C13	..	CT	X	OK
C14	..	CT	X	OK
C15	..	CT	X	OK
C16	..	CT	X	OK
C17	..	CT	X	OK
C18	..	CT	X	OK
C19	..	10PFD	X	OK
C20	..	10PFD	X	OK
C21	..	10PFD	X	OK
C22	..	10PFD	X	OK
C23	..	10PFD	X	OK
C24	..	10PFD	X	OK
C25	..	10PFD	X	OK
C26	..	10PFD	X	OK
C27	..	10PFD	X	OK
C28	..	10PFD	X	OK
C29	..	10PFD	X	OK
C30	..	10PFD	X	OK
C31	..	.1U	X	OK
C32	..	.1U	X	OK
C33	..	.1U	X	OK
C34	..	.1U	X	OK
C35	..	.1U	X	OK
C36	..	.1U	X	OK
C37	..	220@16	X	OK
C38	..	100@35	X	OK
C39	..	2200@10	X	OK
C40	..	100@35	X	OK
C41	..	.1U	X	OK
C42	..	10@35	X	OK
C43	..	2200@10	X	OK
C44	..	10@35	X	OK
C45	..	.1U	X	OK
C46	..	470@10	X	OK
C47	..	2200@10	X	OK
C48	..	2200@10	X	OK
C49	..	.1U	X	OK
C50	..	2200@10	X	OK
C51	..	.1U	X	OK

REV A
3-11-94
Spts.
10-24-94

C52	,,	2200@10	X	OK
C53	,,	33U	X	OK
C54	,,	.1U	X	OK
C55	,,	33U	X	OK
BR1	,,	KBL04	X	OK