

# Phillips Scientific

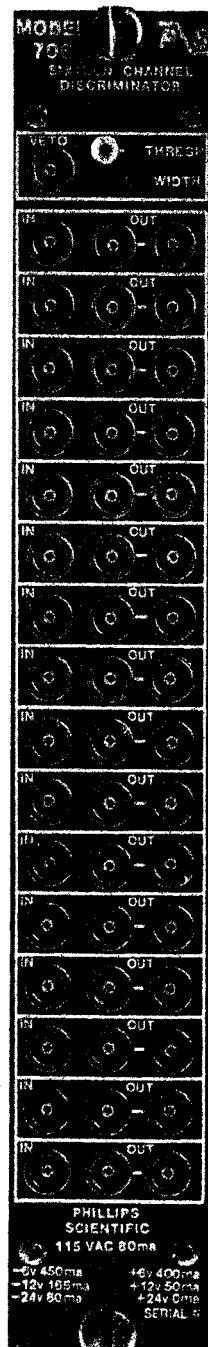
## Sixteen Channel Discriminator

## NIM MODEL 706

### FEATURES

- Sixteen Channels in Single Width NIM Module
- 100 MHz Input to Output Rate
- Common Threshold Control -25mV to -1 Volt
- Common Width Control 5 nS to 150 nS
- Fast Common Veto and Bin Gate
- Non-Updating Outputs
- Two Outputs Per Channel - One Pair Double-Amplitude Bridged
- Reliable Current-Switched Outputs

**NEW-IMPROVED!!**  
LEADING EDGE DISCRIMINATORS  
**THRESHOLD RANGE**  
-10mV to -1V



### DESCRIPTION

The Model 706 is a 100 MHz Leading Edge Discriminator specifically designed for experiments with large counter arrays, offering high performance and reliability at a reasonable cost. The 706 features sixteen channels with common threshold and width controls. In addition, a fast veto input and a Bin Gate are common to all channels.

The 706 has high input sensitivity of -25 mV variable to -1 volt via a 15-turn front panel control. A front panel test point provides a DC voltage equal to the actual threshold to insure accurate settings, likewise, output durations are continuously variable via a front panel control over the range of 5 nSec to 150 nSec. The 706 employs non-updating regeneration circuits for output widths that are always the same duration regardless of the input rate conditions.

A fast veto input allows simultaneous inhibiting of all channels to reject unwanted events early in the system. Similarly, a bin gate will inhibit the entire module when applied via the rear connector.

The outputs are the current source type with one pair of negative bridged outputs for each channel. When only one output from the 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 outputs operate into 50 ohm loads. The output risetimes and falltimes are typically 1 nSec, and their shapes are unaffected by the loading conditions of the other outputs.

## INPUT CHARACTERISTICS

### General:

One LEMO connector input per channel; 50 ohms,  $\pm 1\%$ , DC coupled; less than  $\pm 2\%$  input reflection for a 2.0 nSec input risetime. Input protection clamps at +7 Volts and -5 Volts and can withstand  $\pm 2$  amps for 1  $\mu$ Sec with no damage to the input.

### Threshold:

-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 equal to the actual threshold setting.

### Fast Veto:

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

### Bin Gate:

Rear panel slide switch enables or disables slow bin gate in accordance with TID-20893.

## OUTPUT CHARACTERISTICS

### General:

Two LEMO connector outputs per channel  
One negative bridged pair; deliver -32mA in single 50 ohm load (-1.6 volts), or -16mA (-800mV) when both outputs 50 ohm terminated. The output rise and fall times are less than 1.5 nSec from 10% to 90% levels.

### Width Control:

One control per module; 15-turn screwdriver adjustment; outputs continuously variable from 5 nSec to 150 nSec non-updating outputs,  $\pm .2\%/^{\circ}\text{C}$  stability. The output width track within  $\pm 5\%$  for all sixteen channels.

## GENERAL PERFORMANCE

### Continuous Repetition Rate:

Greater than 100 MHz, with output width set at minimum.

### Pulse-Pair Resolution:

Better than 10 nSec, with output width set at minimum.

### Input to Output Delay:

Less than 9 nSec.

### Multiple Pulsing:

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

### Power Supply Requirements:

- 6 Volts @ 450 mA	+ 6 Volts @ 400 mA
- 6 Volts @ 165 mA	+ 12 Volts @ 50 mA
-24 Volts @ 80 mA	+24 Volts @ 80 mA
115 Volts AC @ 80 mA	

**NOTE: All currents are within NIM specification limits permitting a full powered bin to be operated without overloading.**

### Operating Temperature:

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

### Packaging:

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

### Quality Control:

Standard 36-hour, cycled burn-in with switched power cycles.

### Options:

Call Phillips Scientific to find out about available options.

# MODEL 706 SIXTEEN CHANNEL DISCRIMINATOR

(Front Panel Description)

Standard #1 NIM Packaging in accordance with TID-20893

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

Threshold Monitor; Test Point provides a DC Voltage equal to the actual Threshold Setting

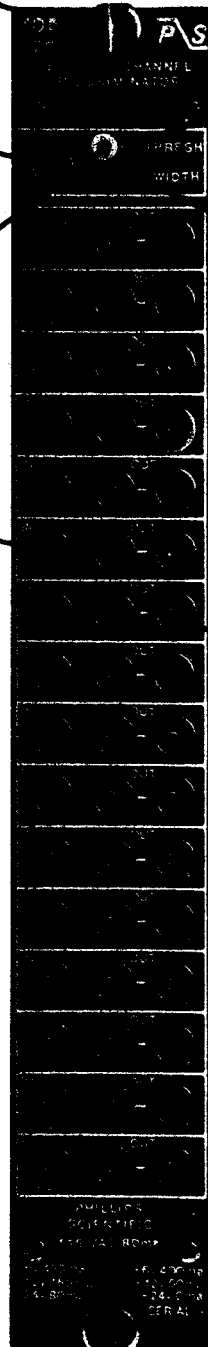
50 Ohm Input

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

Output Width Control; 15-turn Screwdriver Adjustment, Variable from 5 nSec to 150 nSec

Double Amplitude Bridged Output; -32 mA (-1.6 Volts across 50 Ohms, -.8 Volt with two 50 Ohm Terminations)

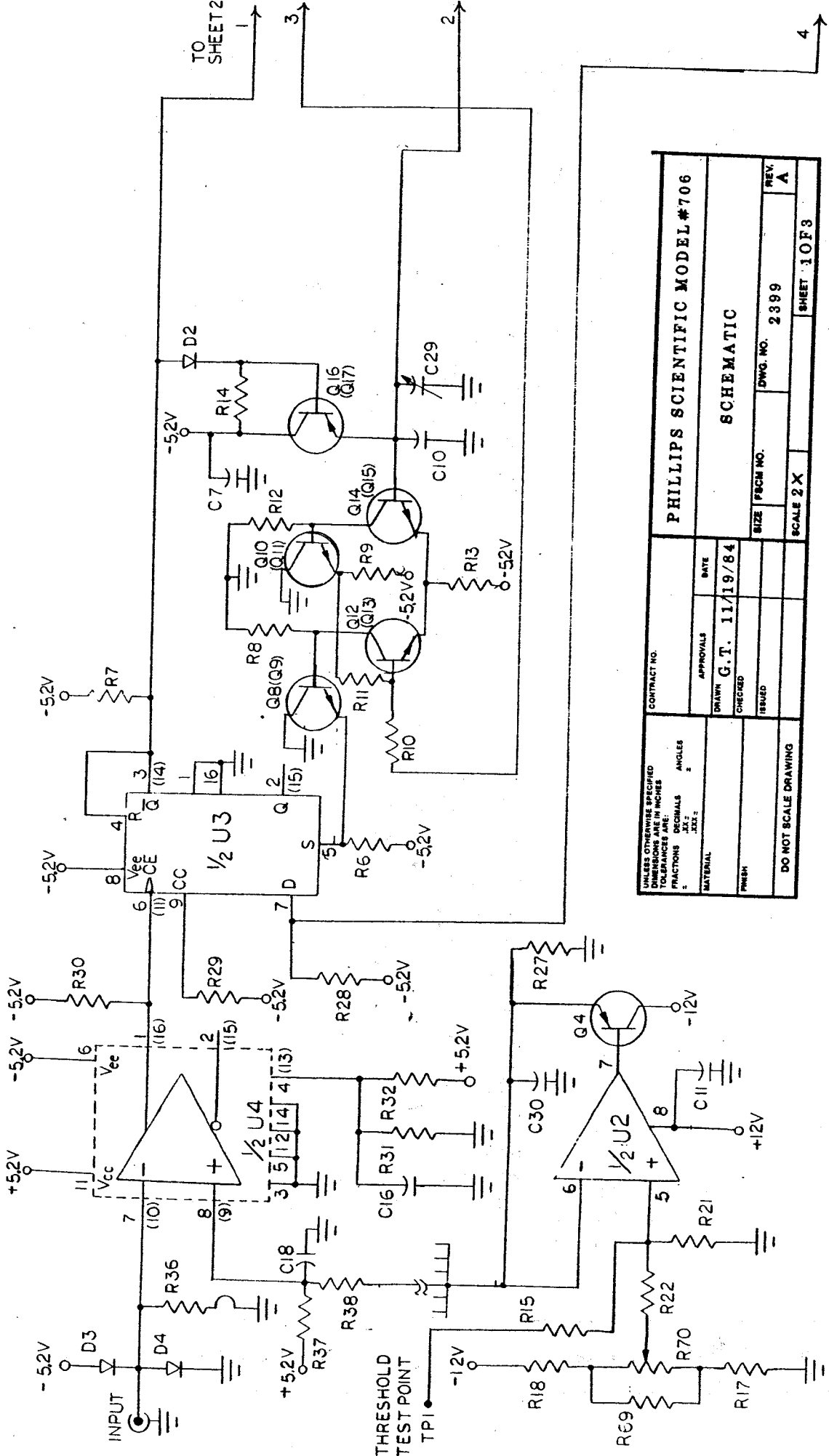
Voltage and Current Requirements



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

**Phillips Scientific**

13 Ackerman Avenue • Suffern, New York 10901 • USA • (914) 357-9417

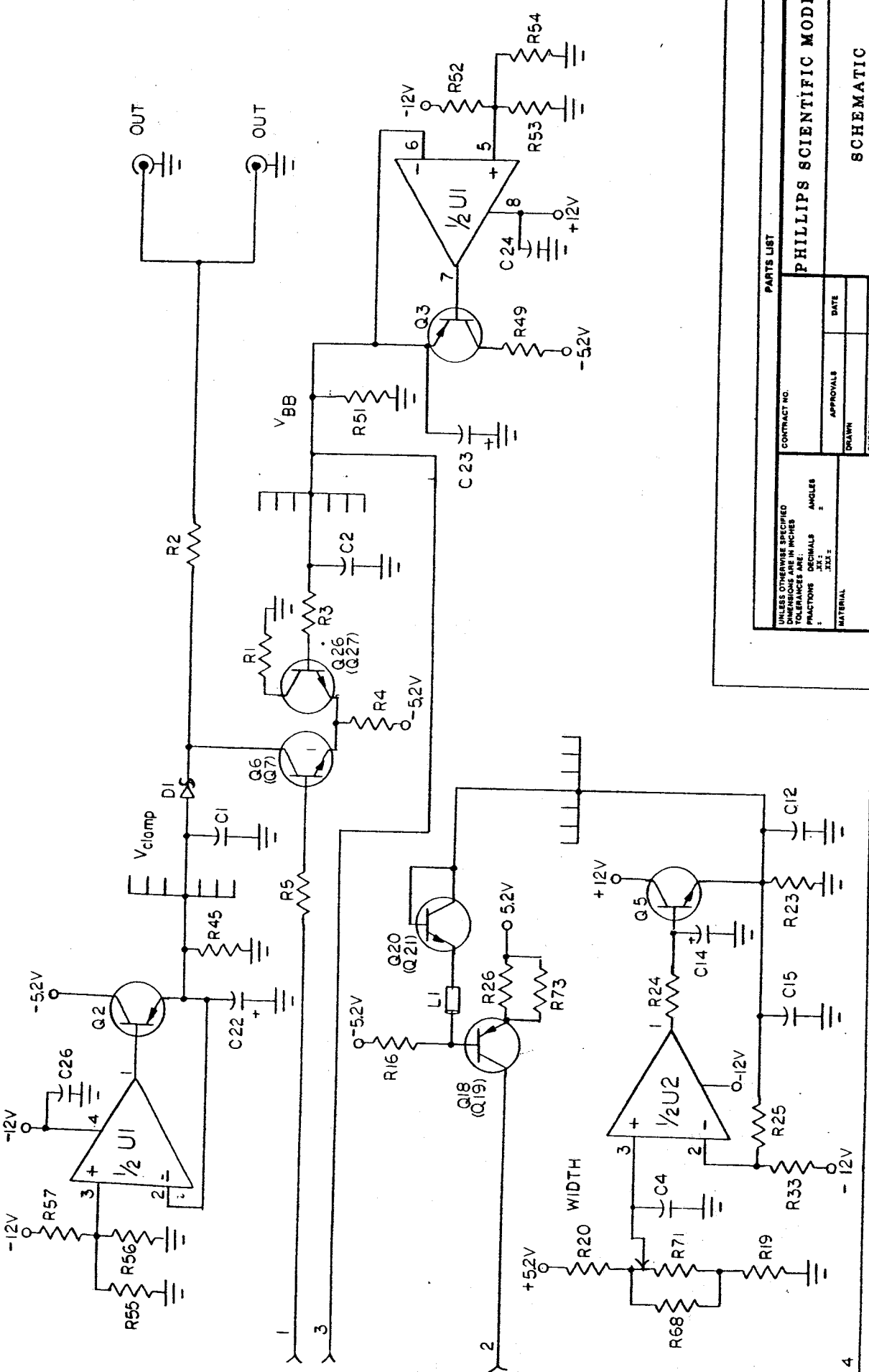


UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES 1/16 0.005 1/16		CONTRACT NO.		PHILLIPS SCIENTIFIC MODEL #706	
MATERIAL		APPROVALS		DATE	
FINISH		DRAWN		11/19/84	
DO NOT SCALE DRAWING		CHECKED		ISSUED	
SCALE 2X		DWG. NO. 2399		REV. A	
SHEET 10F3					

PHILLIPS SCIENTIFIC MODEL #706

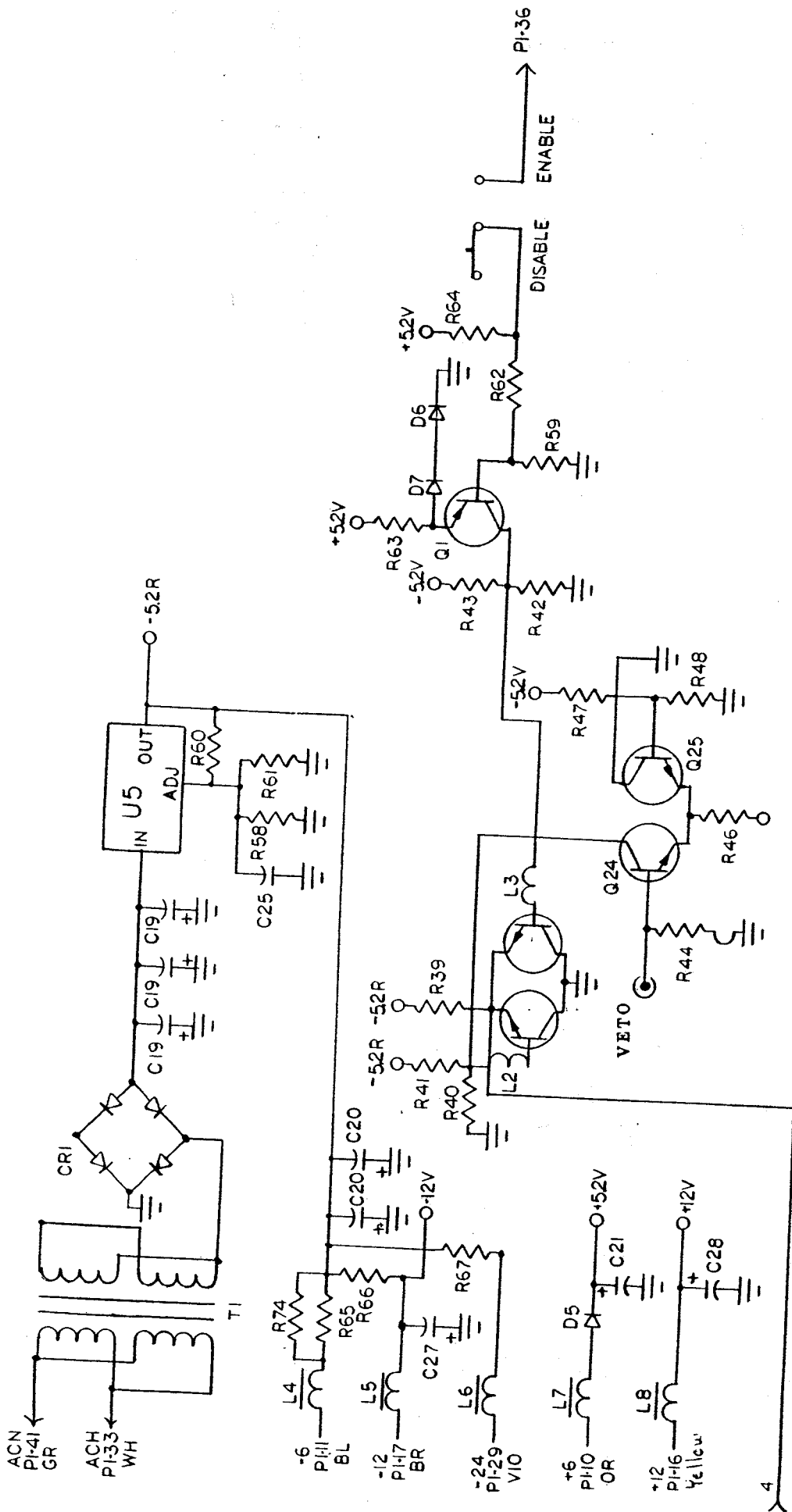
SCHEMATIC

CONTRACT NO. \_\_\_\_\_ DATE \_\_\_\_\_  
 DRAWN G.T. 11/19/84  
 CHECKED \_\_\_\_\_ ISSUED \_\_\_\_\_  
 DWG. NO. 2399 REV. A  
 SCALE 2X SHEET 10F3



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		APPROVALS		DATE	
FRACTIONS	DECIMALS	DRAWN	CHECKED	ISSUED	
1/16	.015				
1/32	.005				
1/64	.002				
MATERIAL		CONTRACT NO.			
FINISH		PHILLIPS SCIENTIFIC MODEL #706			
DO NOT SCALE DRAWING		SCHEMATIC			
		SIZE		DWG. NO. 2399	
		SCALE		SHEET 2 OF 3	

PARTS LIST



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES X.XX ± .005		CONTRACT NO.	
MATERIAL		APPROVALS	DATE
FINISH		DRAWN	
DO NOT SCALE DRAWING		CHECKED	
		ISSUED	
PHILLIPS SCIENTIFIC MODEL #706		SIZE	SCALE
SCHEMATIC		FSCM NO.	DWG. NO.
		2399	2399
		REV.	SHEET
			3 OF 3

PARTS LIST - MODEL 706 ECO NO. 1001

Ident.	Qty.	Part Number	Description
R1	16	001027R0	27 ohms 5% CF 1/8
R2	16	00010300	.3" 0 ohms spacer
R3	16	001051R0	51 ohms 5% CF 1/8
R4	16	00101000	100 ohms 5% CF 1/8
R5	16	00108200	820 ohms 5% CF 1/8
R6	16	00101001	1.0K ohms 5% CF 1/8
R7	16	00105100	510 ohms 5% CF 1/8
R8	16	00101800	180 ohms 5% CF 1/8
R9	16	00101001	1.0K ohms 5% CF 1/8
R10	16	00102200	220 ohms 5% CF 1/8
R11	16	00101001	1.0K ohms 5% CF 1/8
R12	16	00101800	180 ohms 5% CF 1/8
R13	16	00108200	820 ohms 5% CF 1/8
R14	16	00101501	1.5K ohms 5% CF 1/8
R15	1	00101001	1.0K ohms 5% CF 1/8
R16	16	00106801	6.8K ohms 5% CF 1/8
R17	1	00651100	40.2 <del>10</del> ohms 1% RN55C $\frac{1}{4}$ W
R18	1	00654530	453 ohms 1% RN55C
R19	1		0 ohms Lead Jumper
R20	1	00651001	2.0K ohms 1% RN55C
R21	1	00654320	432 ohms 1% RN55C
R22	1	00653921	3.92K ohms 1% RN55C
R23	1	00106802	68K ohms 5% CF 1/8
R24	1	00101001	1.0K ohms 5% CF 1/8
R25	1	00101001	1.0K ohms 5% CF 1/8
R26	16	00654990	499 ohms 1% RN55C
R27	1	00102700	270 ohms 5% CF 1/8
R28	8	00102201	2.2K ohms 5% CF 1/8
R29	8	00104701	4.7K ohms 5% CF 1/8
R30	16	00101001	1.0K ohms 5% CF 1/8
R31	9	001051R1	51 ohms 5% CF 1/8
R32	9		Trim Resistor CF 1/8 Hysteresis
R33	1	00106802	68K ohms 5% CF 1/8
R34	8	00010700	.7" 0 ohms spacer
R35	8	00010700	.7" 0 ohms spacer
R36	16	006551R1	51.1 ohms 190 RN55C
R37	16		Trim Resistor
R38	16	001051R1	51 ohms 5% CF 1/8
R39	1	00105100	510 ohms 5% CF 1/8
R40	1	00101000	100 ohms 5% CF 1/8
R41	1		Trim Resistor
R42	1	00102000	200 ohms 5% CF 1/8
R43	1	00106200	620 ohms 5% CF 1/8
R44	1	006552R3	52.3 ohms 1% RN55C
R45	1	00101000	100 ohms 5% CF 1/8
R46	1	00106200	620 ohms 5% CF 1/8
R47	1	00104701	4.7K ohms 5% CF 1/8
R48	1	00103300	330 ohms 5% CF 1/8
R49	1	00010700	.7" 0 ohms spacer
R50	1		Lead Jumper
R51	1	00101000	100 ohms 5% CF 1/8
R52	1	00108201	8.2K ohms 5% CF 1/8
R53	1	00101001	1.0K ohms 5% CF 1/8
R54	1		Trim Resistor

PARTS LIST - MODEL 706 ECO No. 1001

<u>Ident.</u>	<u>Qty.</u>	<u>Part Number</u>	<u>Description</u>
R55	1	00101001	1.0K ohms 5% CF 1/8
R56	1		Trim Resistor
R57	1	00108201	8.2K ohms 5% CF 1/8
R58	1	00656810	681 ohms 1% RN55C
R59	1	00102201	2.2K ohms 5% CF 1/8
R60	1	00652210	221 ohms 1% RN55C
R61	1		Trim Resistor
R62	1	00103901	3.9K ohms 5% CF 1/8
R63	1	00101500	150 ohms 5% CF 1/8
R64	1	00105101	5.1K ohms 5% CF 1/8
R65	1	00342R00	2.0 ohms 5% 2W MOF
R66	1	003439R0	39 ohms 5% 2W MOF
R67	1	00342400	240 ohms 5% 2W MOF
R68	1		Trim Resistor
R69	1		Trim Resistor
R70	1	05105001	5K Pot
R71	1	05105002	50K Pot
R72	8	00011000	1" 0 ohms spacer
R73	16		Trim Resistor
R74	1		Trim Resistor
C1	9	10151003	.1 mfd ceramic mono cap
C2	9	10151003	.1 mfd ceramic mono cap
C3	9	10151003	.1 mfd ceramic mono cap
C4	1	10153303	.33 mfd ceramic mono cap
C5	9	10151003	.1 mfd ceramic mono cap
C6	7	10151003	.1 mfd ceramic mono cap
C7	9	10151003	.1 mfd ceramic mono cap
C8	1	10151003	.1 mfd ceramic mono cap
C9	1	10151003	.1 mfd ceramic mono cap
C10	16	101015P0	15 pfd ceramic disk cap
C11	1	10151003	.1 mfd ceramic mono cap
C12	8	10151003	.1 mfd ceramic mono cap
C13	16	10151003	.1 mfd ceramic mono cap
C14	1	10791006	100 mfd @ 3v Tantalum cap
C15	1	10153303	.33 mfd ceramic mono cap
C16	16	10151003	.1 mfd ceramic mono cap
C17	16	10151003	.1 mfd ceramic mono cap
C18	16	10151003	.1 mfd ceramic mono cap
C19	3	10612207	2200 mfd @ 10v Electrolytic cap
C20	2	10612207	2200 mfd @ 10v Electrolytic cap
C21	1	10612207	2200 mfd @ 10v Electrolytic cap
C22	1	10523305	33 mfd @ 16v Electrolytic cap
C23	1	10523305	33 mfd @ 16v Electrolytic cap
C24	1	10151003	.1 mfd ceramic mono cap
C25	1	10151003	.1 mfd ceramic mono cap
C26	1	10151003	.1 mfd ceramic mono cap
C27	1	10622206	220 mfd @ 16v Electrolytic cap
C28	1	10622206	220 mfd @ 16v Electrolytic cap
C29	16	13000029	Johanson 9629 variable trim cap
C30	1	10523305	33 mfd @ 16v Electrolytic cap



PARTS LIST - MODEL 706 ECO No. 1001

<u>Ident.</u>	<u>Qty.</u>	<u>Part Number</u>	<u>Description</u>
D1	16	20202835	2835 Schottky Diode
D2	16	20004448	IN4448 Diode
D3	16	20004448	IN4448 Diode
D4	11	20004448	IN4448 Diode
D5	1	20004004	IN4004 Diode
D6	1	20004448	IN4448 Diode
D7	1	20004448	IN4448 Diode
L1	16	14000001	Henry Bead
L2	1	14000003	Slim Bead
L3	1	14000003	Slim Bead
L4	1	15000000	Power Inductor
L5	1	15000000	Power Inductor
L6	1	15000000	Power Inductor
L7	1	15000000	Power Inductor
L8	1	15000000	Power Inductor
L9	8	14000006	Multi-Hole Shield Plate
T1	1	15500002	Power Transformer
CRI	1	2030KBL04	Bridge Rectifier
Q1	1	24005771	2N5771 Transistor
Q2	1	24003906	2N3906 Transistor TO-92 PNP
Q3	1	24003906	2N3906 Transistor TO-92 PNP
Q4	1	24003906	2N3906 Transistor TO-92 PNP
Q5	1	24003904	2N3904 Transistor TO-92 NPN
Q6	16	2420R93R	BFR93R
Q7	16	2420R930	BFR93
Q8	8	2420R92R	BFR92R
Q9	8	2420R920	BFR92
Q10	8	2420R92R	BFR92R
Q11	8	2420R920	BFR92
Q12	8	2420R930	BFR93
Q13	8	2420R93R	BFR93R
Q14	8	2420R920	BFR92
Q15	8	2420R92R	BFR92R
Q16	8	2420T93R	BFT93R
Q17	8	2420T930	BFT93
Q18	8	2420T920	BFT92
Q19	8	2420T92R	BFT92R
Q20	8	2420R920	BFR92R
Q21	8	2420R92R	BFR92R
Q22	1	2420R930	BFR93
Q23	1	2420R93R	BFR93R
Q24	1	2420R92R	BFR92R
Q25	1	2420R920	BFR92

PARTS LIST -

MODEL 706

ECO No. 1001

<u>Ident.</u>	<u>Qty.</u>	<u>Part Number</u>	<u>Description</u>
U1	1	3020F412	LF412CN I.C.
U2	1	3020F412	LF412CN I.C.
U3	8	38006821	PS006821 I.C.
U4	8	38006970	PS006970 I.C.
U5	1	3010337T	LM337T Regulator -5.2R
	16	40000016	16 Pin DIP Socket
	1	40000008	8 Pin DIP Socket
	48	40100000	RF Connector
	48	40100001	Lock Washer
	31	40100002	Solder Lug
	48	40100003	Spanner Nut
	17	40100004	Shield
	1	40200000	NIM Connector Block
	1	40200001	NIM Connector Shield
	9	40200002	NIM Elect. Pin
	2	40200003	NIM Female Guide Pin
	1	40200004	NIM Male Guide Pin
	1	40200005	NIM Male Guide Pin Gold Plate
	1	40200006	#4 Lock Washer Gold Plate
	1	40200007	#4-40 Hex Nut Gold Plate
TP1	1	40950001	Test Points
	1	40950002	Solder Lugs
Sl	1	50000000	Slide Switch
	1	58000102	Back Panel
	1	58000103	Right Side Cover
	1	58000104	Left Side Cover
	2	58000105	Square Rail
	2	58000106	Round Rail
	1	58007080	Front Panel
	4	65025603	2-56 x 3/16" Flat Head Screws
	6	65044003	4-40 x 3/16" Flat Head Screws Undercut
	7	65144006	4-40 x 3/8" Round Head Phillips Screws
	3	65944004	4-40 x 1/4" Fillister Head Screws
	10	65944005	4-40 x 5/16" Fillister Head Screws

PARTS LIST - MODEL 706 ECO No. 1001

<u>Ident.</u>	<u>Qty.</u>	<u>Part Number</u>	<u>Description</u>
	3	67044000	4-40 Hex Nuts
	3	68000104	#4 Lock Washer
	8	68000500	1/16" Nylon Spacer
	2	68000602	Shoulder Washer Nylon
	1	68000601	Shoulder Washer Nylon
	1	68001002	Spacer Nylon
	2	72000012	3/4" Roll Spacer
	2	73000000	Rivets
	2	73010000	Stand Off
	2	73010001	Captive Screws
	1	75000001	TO-220 Insulating Washer
	1	75000000	TO-3 Insulating Washer
	1	75000002	TO-3 Plastic Cover
	1	8500706A	Model 706 Rev. A Printed Circuit Board

