OPERATOR'S MANUAL

NIM MODEL 4616

16 CHANNEL ECL/NIM/ECL CONVERTER

CE

Revised
June, 1997

(FAN 2004)

LeCroy

Innovators in Instrumentation

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CE CONFORMITY

CONDITIONS FOR CE CONFORMITY

Since this product is a subassembly, it is the responsibility of the end user, acting as the system integrator, to ensure that the overall system is CE compliant. This product was demonstrated to meet CE conformity using a CE compliant crate housed in an EMI/RFI shielded enclosure. It is strongly recommended that the system integrator establish these same conditions.

A T T E N T I O N

CRATE POWER SHOULD BE TURNED OFF DURING INSERTION AND REMOVAL OF UNIT TO AVOID POSSIBLE DAMAGE CAUSED BY MOMENTARY MISALIGNMENT OF CONTACTS.

SEE POCKET IN BACK OF MANUAL FOR SCHEMATICS, PARTS LIST ADDITIONAL ADDENDA WITH ANY CHANGES TO MANUAL.

A T T E N T I O N

GENERAL INFORMATION

PURPOSE

This manual is intended to provide instruction regarding the setup and operation of the covered instruments. In addition, it describes the theory of operation and presents other information regarding its functioning and application.

UNPACKING AND INSPECTION

It is recommended that the shipment be thoroughly inspected immediately upon delivery. All material in the container should be checked against the enclosed Packing List and shortages reported promptly. If the shipment is damaged in any way, please notify the Customer Service Department or the local field service office. If the damage is due to mishandling during shipment, you may be requested to assist in contacting the carrier in filing a damage claim.

WARRANTY

LeCroy warrants its instrument products to operate within specifications under normal use and service for a period of one year from the date of shipment. Component products, replacement parts, and repairs are warranted for 90 days. This warranty extends only to the original purchaser. Software is thoroughly tested, but is supplied "as is" with no warranty of any kind covering detailed performance. Accessory products not manufactured by LeCroy are covered by the original equipment manufacturers' warranty only.

In exercising this warranty, LeCroy will repair or, at its option, replace any product returned to the Customer Service Department or an authorized service facility within the warranty period, provided that the warrantor's examination discloses that the product is defective due to workmanship or materials and has not been caused by misuse, neglect, accident or abnormal conditions or operations.

The purchaser is responsible for the transportation and insurance charges arising from the return of products to the servicing facility. LeCroy will return all in-warranty products with transportation prepaid.

This warranty is in lieu of all other warranties, express or implied, including but not limited to any implied warranty of merchantability, fitness, or adequacy for any particular purpose or use. LeCroy shall not be liable for any special, incidental, or consequential damages, whether in contract, or otherwise.

PRODUCT ASSISTANCE

Answers to questions concerning installation, calibration, and use of LeCroy equipment are available from the Customer Service Department, 700 Chestnut Ridge Road, Chestnut Ridge, New York, 10977-6499, (914) 578-6030.

MAINTENANCE AGREEMENTS

LeCroy offers a selection of customer support services. For example, Maintenance Agreements provide extended warranty that allows the customer to budget maintenance costs after the initial warranty has expired. Other services such as installation, training, on-site repair, and addition of engineering improvements are available through specific Supplemental Support Agreements. Please contact the Customer Service Department for more information.

DOCUMENTATION DISCREPANCIES

LeCroy is committed to providing state-of-the-art instrumentation and is continually refining and improving the performance of its products. While physical modifications can be implemented quite rapidly, the corrected documentation frequently requires more time to produce. Consequently, this manual may not agree in every detail with the accompanying product and the schematics in the Service Documentation. There may be small discrepancies in the values of components for the purposes of pulse shape, timing, offset, etc., and, occasionally, minor logic changes. Where any such inconsistencies exist, please be assured that the unit is correct and incorporates the most up-to-date circuitry.

SOFTWARE LICENSING AGREEMENT

Software products are licensed for a single machine. Under this license you may:

- Copy the software for backup or modification purposes in support of your use of the software on a single machine.
- Modify the software and/or merge it into another program for your use on a single machine.
- Transfer the software and the license to another party if the other party accepts the terms of this agreement and you relinquish all copies, whether in printed or machine readable form, including all modified or merged versions.

SERVICE PROCEDURE

Products requiring maintenance should be returned to the Customer Service Department or authorized service facility. If under warranty, LeCroy will repair or replace the product at no charge. The purchaser is only responsible for the transportation charges arising from return of the goods to the service facility. For all LeCroy products in need of repair after the warranty period, the customer must provide a Purchase Order Number before any inoperative equipment can be repaired or replaced. The customer will be billed for the parts and labor for the repair as well as for shipping. All products returned for repair should be identified by the model and serial numbers and include a description of the defect or failure, name and phone number of the user. In the case of products returned, a Return Authorization Number is required and may be obtained by contacting the Customer Service Department at (914) 578-6030.

TECHNICAL DATA

LeCroy

688AL DUAL, 8 INPUT NIM/TTL, TTL/NIM
4616 16 INPUT ECL/NIM/ECL

- Converts One Standard Logic Level to Another
- High Speed
- NIM Packaging
- High Density
- Direct Coupled

FOR TRANSLATION OF COMMON LOGIC SIGNALS

Logic level translators are simple units which are very easy to operate and translate/convert logic signals from one standard (i.e., NIM or TTL or ECL) to another one of these standards.

The Model 688AL and the Model 4616 are high performance NIM modules designed for maximum flexibility.

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FEATURES

High Speed - Both modules have greater than 100 MHz capability.

Simple Operation - Both modules easily solve a common problem by converting logic signals into other standard levels.

High Density - Each unit has 16 separate translator channels.

Maximum Flexibility - NIM modules can be used in NIM bins or in CAMAC crates with the addition of the Model 4501A NIM-to-CAMAC adapter.

FUNCTIONAL DESCRIPTION

Both LeCroy level translators are NIM modules offering high performance, speed and maximum flexibility. These units operate by simply connecting the input and output level desired and easily solve the common problem of translating between different logic standards.

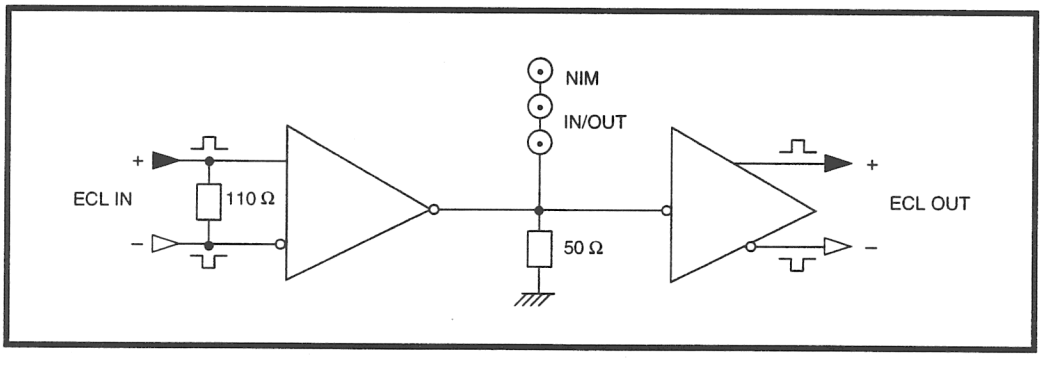
The Model 688AL Level Adapter provides 8 channels of direct-coupled NIM-to-TTL and 8 channels of TTL-to-NIM conversion in a single-width NIM module. Standard negative TTL notation is used to be compatible with unterminated CAMAC and slow NIM logic levels.

The NIM-to-TTL section accepts either normal or complementary NIM logic levels (logical "0" = 0 to -2 mA; logical "1" = -12 to -32 mA) at each of its eight 50 Ω inputs. The eight outputs switch between 0 V and +2.5 V for a time equal to the input signal duration. The polarity of the outputs is controlled by two front-panel switches common to two groups of four channels and provides either normal or complementary operation. Up to 50 mA at +2.5 V is delivered from each output, making the TTL drive capability compatible with terminated, direct-coupled 50 Ω cable. The low level clamp capability is 100 mA, or approximately 60 standard TTL loads. Direct-coupled, the 688AL is free from any rate effects and has no limitations on duty cycle.

The TTL-to-NIM section accepts standard negative TTL logic levels (logical "1" = 0 to + .8 V; logical "0" = > 2 V) at each of its eight inputs. The minimum input duration for a full output is 10 nsec. The output from each channel is a standard NIM logic level which switches between 0 V and -16 mA (- 800 mV into 50 Ω) during an output. Rise times and fall times are < 3 nsec and the output width is approximately equal to the duration of the input signal. Two front-panel switches common to two groups of four channels provides either normal operation (TTL logical "1" IN gives NIM logical "1" OUT) or complementary operation.

The Model 4616 is simultaneously an ECL-to-NIM and NIM-to-ECL converter, specially designed to fill the gap between ECL circuitry and NIM electronics. The 4616 is designed so that each channel can be used for both applications. When ECL complementary pulses have to be converted, the circuit provides three NIM outputs and an additional ECL output. When a NIM pulse has to be converted, it is sent in one of the NIM outputs (now used as an input) while the other two NIM outputs are unconnected. Thus, the circuit provides a single complementary ECL output. The accompanying diagram shows the basic circuit configuration of one channel.

The 4616 is a 16 channel ECL/NIM/ECL translator which is fully compatible with other ECLine circuits. Three NIM outputs and one ECL output per channel are available and will operate up to 150 MHz. The inputs are direct coupled and are free from rate effects.



Model 4616 Equivalent Circuit Diagram (one channel)

Model 688AL

NIM-TO-TTL SECTION

No. of Channels: 8.

INPUT

Impedance: 50 Ω ±5%; reflections < 10% for rise time > 2 nsec.
Quiescent DC Level: 0 V.
Input Signal: Normal (logical "0" = 0 to -2 mA; logical "1" = -12 to -32 mA) or complementary fast NIM logic levels.
Input Protection: ±5 V.
Minimum Input Width: < 10 nsec.

OUTPUT

Signal Levels: Standard negative TTL logic levels: logical "1" ≤ 0.4 V, logical "0" > +2.5 V.
High Level Drive Capability: 50 mA at +2.5 V (compatible with terminated, direct-coupled 50 Ω cable).
Low Level Clamp Capability: 100 mA at 0 ±500 mV (60 standard TTL loads, or 50 Ω to +5 V).
Rise Time and Fall Time: < 10 nsec.
Output Duration: Approximately equal to input duration.
Output Impedance: < 5 Ω.
Duty Cycle Limitations: None.

GENERAL

Delay: Approximately 12 nsec.
Logic Polarity: Two front-panel switches, each common to four channels, provide normal operation (logical "1" IN gives logical "1" OUT) or complementary operation.

TTL-TO-NIM SECTION

No. of Channels: 8.

INPUT

Input Signal: Standard negative TTL logic levels (logical "1" = 0 to +0.8 V, requires -1.6 mA maximum; logical "0" = > 2 V, requires +100 µA maximum).
Minimum Input Duration: < 10 nsec.
Input Protection: ±5 A for 0.5 µsec, clamping at +7 V and -1 V.

OUTPUT

Signal Levels: Logical "0", open circuit; logical "1", -16 mA.
Output Duration: Approximately equal to input duration.
Rise Time and Fall Time: < 3 nsec.
Duty Cycle Limitations: None.

GENERAL

Delay: Approximately 6 nsec.
Logic Polarity: Two front-panel switches, each common to four channels, provide normal operation (logical "1" IN gives logical "1" OUT) or complementary operation.
Packaging: NIM single-width module; Lemo connectors.
Power Requirements: 280 mA at +6 V; 30 mA at +12 V; 300 mA at -6 V.

Model 4616

INPUT

ECL Inputs: 16, one per section, in a 2 x 17 pin connector; accepts complementary ECL levels; typical threshold 200 mV.
NIM Inputs: 16, one per section, Lemo-type connector, to be chosen out of the three Lemo-type connectors in the channel; the other two have to be kept unconnected; input impedance 50 Ω ±5%; reflections < 10% for input rise times > 2 nsec.

OUTPUT

ECL Outputs: 16, one per section, in a 2 x 17 pin connector; ECL complementary levels (-0.8 V and -1.7 V); rise time 2 nsec typical.
NIM Outputs: 48, three bridged outputs per section, Lemo-type connectors; quiescently at 0 mV, < -700 mV into 3 x 50 Ω loads, maximum -1.2 V into 1 x 50 Ω load, during output; rise time 2 nsec typical.

GENERAL

Maximum Frequency: 150 MHz.
Minimum Pulse Width: ECL and NIM inputs/outputs 4 nsec.
Transit Times: ECL input to NIM output < 6 nsec. ECL input to ECL output < 10.5 nsec. NIM input to ECL output < 6.5 nsec.
Power Requirements: -6 V quiescently at 700 mA, with all loads connected and all channels activated 1.7 A maximum.

SELECTION CHART

Model	688AL	4616
Function	TTL→ NIM, NIM → TTL	ECL → NIM, NIM → ECL
Number of Inputs/Outputs	8 TTL/8 NIM 8 NIM/8 TTL	16 NIM or ECL Inputs/ up to 36 NIM or 16 ECL Outputs

TECHNICAL INFORMATION

(PARTS LIST, SCHEMATICS)

LeCroy-Company Confidential Data

4616 PARTS LIST

LeCroy-Company Confidential Data

PART NUMBER	DESCRIPTION REMARK	QTY PER
4616-1	COMPLETED BOARD 4616-1	1
4616-2	COMPLETED BOARD 4616-2	1
4616-3	LOOSE PARTS 4616-3	1

End of report. 3 Details encountered.

PART NUMBER	DESCRIPTION REMARK	QTY PER
102412470	CAP CERA DISC 100V 47 PF	8
106435103	CAP CERA MONO .01UF	23
142824685	CAP TANT DIP CASE 6.8 UF	12
161030000	RES COMP ZERO OHMS	1
161335102	RES CARBON FILM 1 K	8
161335122	RES CARBON FILM 1.2 K	11
161335220	RES CARBON FILM 22 OHMS	9
161335222	RES CARBON FILM 2.2 K	8
161335240	RES CARBON FILM 24 OHMS	8
161335300	RES CARBON FILM 30 OHMS	8
161335510	RES CARBON FILM 51 OHMS	8
161335511	RES CARBON FILM 510 OHMS	18
181457201	RES VARI CERMET 200 OHMS	1
190042560	RESISTOR NETWORK 56 OHMS	2
204042003	IC LINE RECEIVER MC10115P	2
204042016	IC 2-INPUT OR/NOR F10101P	2
230110005	DIODE SWITCHING 1N4448	18
235010005	DIODE RECTIFIER 1N4005	1
253010835	DIODE SCHOTTKY HP2835	9
270130401	TRANSISTOR NPN A401 SEND TO RSD PROD. FOR MATCHING.	8
270170001	TRANSISTOR NPN 2N5770	8
275170002	TRANSISTOR PNP 2N5771	3
276150194	TRANSISTOR PNP 2N5194	1
300020001	BEAD SHIELDING "1/2" SIZE	8
300050001	CHOKE FERRITE SINGLE LEAD	1
400030016	SOCKET IC SOLD TAIL DIP-16	6
402112001	CONN PC MTG NICKEL LEMO	24
403310016	CONN FLAT CABLE 16-POS	2
433221004	FUSE PICO II 125V 1 AMP	1
454110034	HDR SOLD TAIL/MALE 34	1
454310003	HDR SOLD TAIL/MALE 3	2
592011016	CABLE FLAT 16-COND	1
714616013	PC BD PREASS'Y 4616-1	1

End of report. 35 Details encountered.

PART NUMBER	DESCRIPTION REMARK	QTY PER
102412470	CAP CERA DISC 100V 47 PF	8
106435103	CAP CERA MONO .01UF	23
142824685	CAP TANT DIP CASE 6.8 UF	12
161335102	RES CARBON FILM 1 K	8
161335122	RES CARBON FILM 1.2 K	11
161335220	RES CARBON FILM 22 OHMS	9
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161335240	RES CARBON FILM 24 OHMS	8
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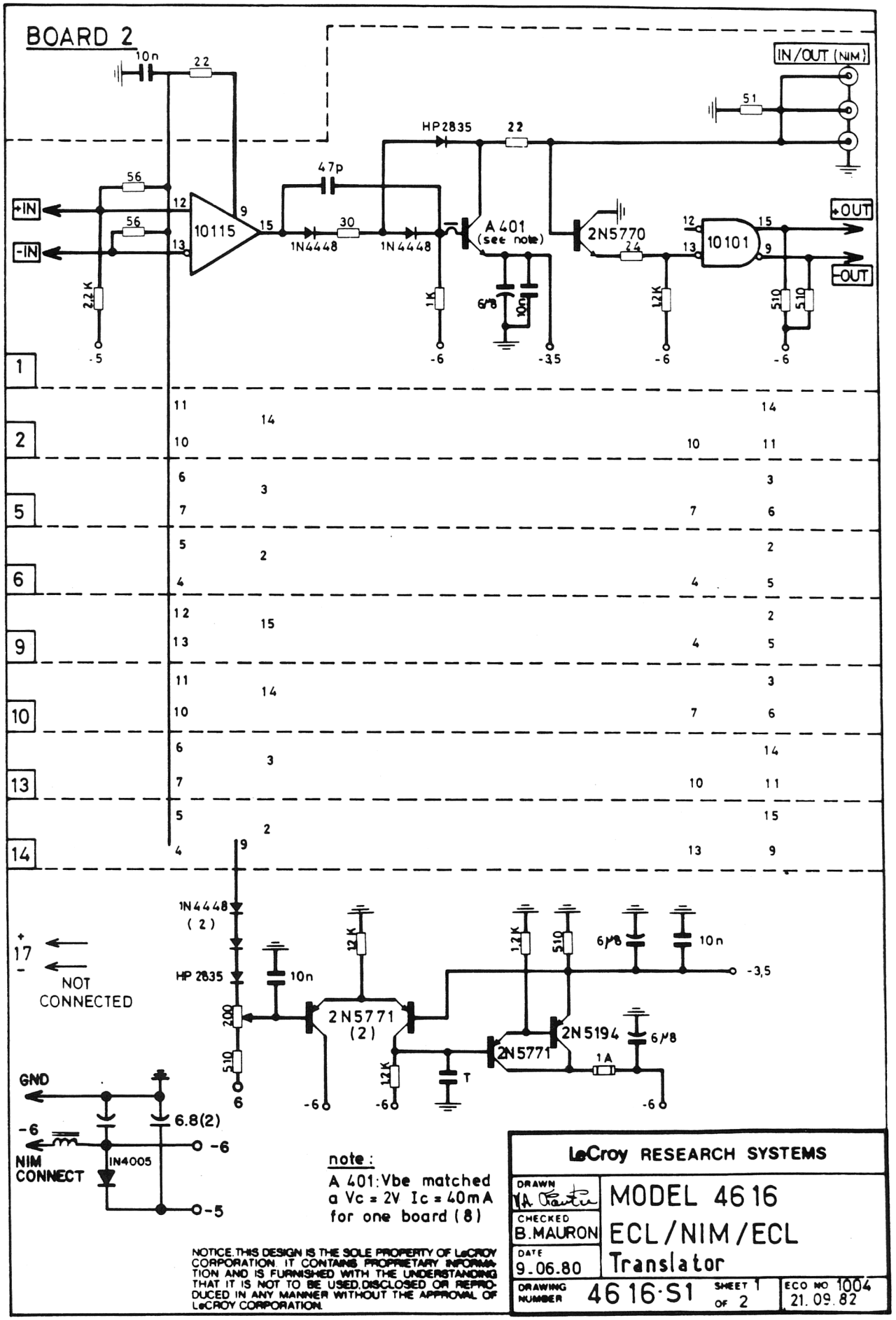
161335510	RES CARBON FILM 51 OHMS	8
161335511	RES CARBON FILM 510 OHMS	18
181457201	RES VARI CERMET 200 OHMS	1
190042560	RESISTOR NETWORK 56 OHMS	2
204042003	IC LINE RECEIVER MC10115P	2
204042016	IC 2-INPUT OR/NOR F10101P	2
230110005	DIODE SWITCHING 1N4448	18
235010005	DIODE RECTIFIER 1N4005	1
253010835	DIODE SCHOTTKY HP2835	9
270130401	TRANSISTOR NPN A401 SEND TO RSD PROD. FOR MATCHING.	8
270170001	TRANSISTOR NPN 2N5770	8
275170002	TRANSISTOR PNP 2N5771	3
276150194	TRANSISTOR PNP 2N5194	1
300020001	BEAD SHIELDING "1/2" SIZE	8
300050001	CHOKE FERRITE SINGLE LEAD	1
400030016	SOCKET IC SOLD TAIL DIP-16	6
402112001	CONN PC MTG NICKEL LEMO	24
403310016	CONN FLAT CABLE 16-POS	2
433221004	FUSE PICO II 125V 1 AMP	1
454110034	HDR SOLD TAIL/MALE 34	1
454310003	HDR SOLD TAIL/MALE 3	2
592011016	CABLE FLAT 16-COND	1
714616023	PC BD PREASS'Y 4616-2	1

End of report. 34 Details encountered.

PART NUMBER	DESCRIPTION REMARK	QTY PER
405112001	CONNECTOR BLOCK (PIN)	1
405212002	GUIDE PIN (MALE)	1
405213001	GUIDE PIN (MALE)	1
405312001	GUIDE PIN (FEMALE)	2
405613001	CONNECTOR HOOD	1
512471005	SPACER (LONG) FOR 4616	2
512471006	SPACER (SHORT) FOR 4616	2
540104101	WRAPAROUND NIM SIZE #1	1
540105011	BRACKET NIM WRAP SIZE #1	2
540109100	SWITCH HOLE PATTERN COVER	1
555611001	CAPTIVE SCREW 6-32	2
555621002	CAPTIVE SCREW RETAINER	2
560440005	SCREW PHILIPS 4-40X5/16	4
560440016	SCREW PHILIPS 4-40X1"	4
567256004	SCREW FLAT PHIL 2-56X1/4	4
567440004	SCREW FLAT PHIL 4-40X1/4	10
585141237	RIVET "POP" ALU 1/8X.237	2
724616003	FRONT PNL PREASSY 4616	1
734616001	SIDE NIM LEFT 4616	1
734616004	SIDE NIM RIGHT 4616	1

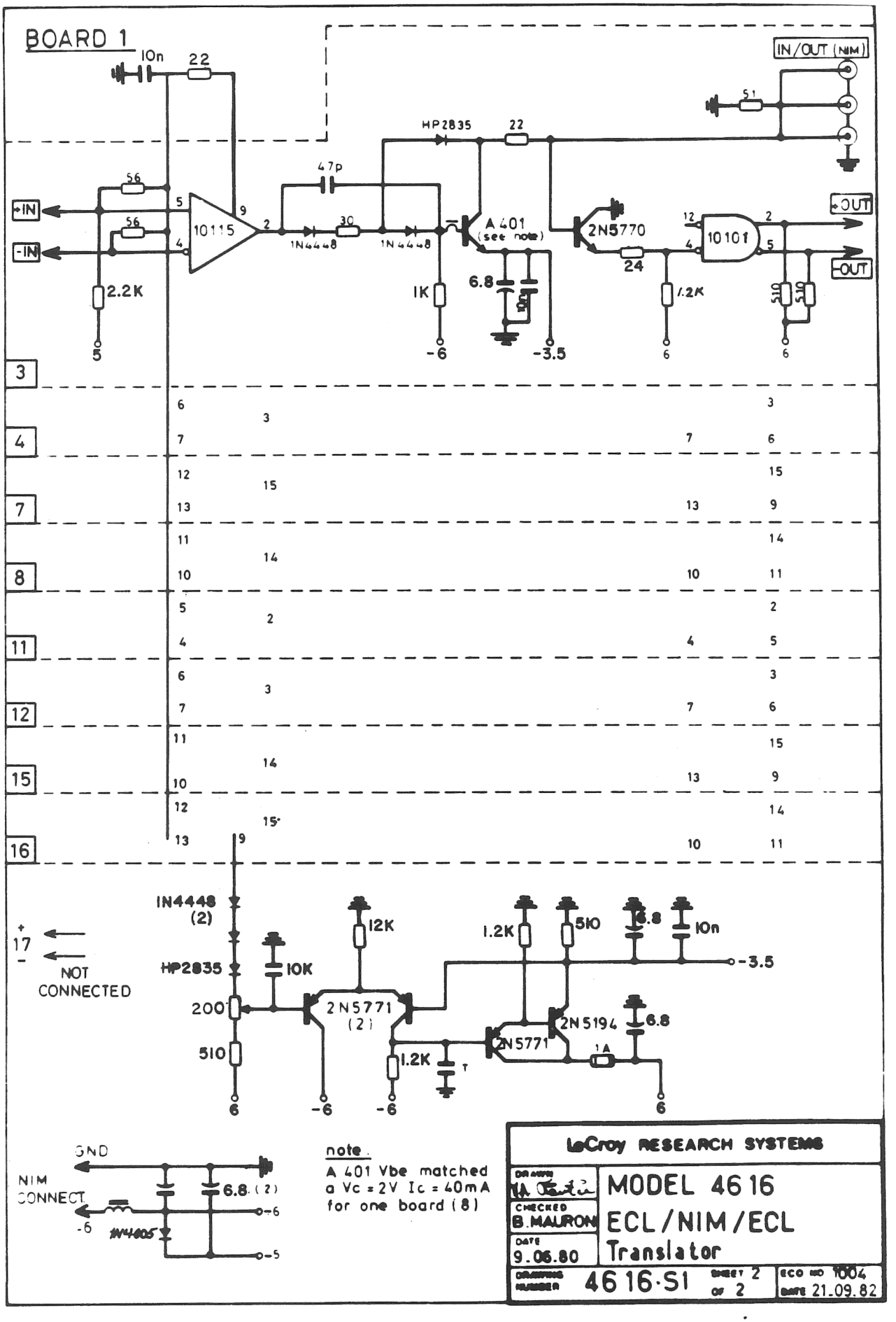
End of report. 20 Details encountered.



note :
A 401: Vbe matched
a Vc = 2V Ic = 40mA
for one board (8)

LeCroy RESEARCH SYSTEMS

DRAWN	MODEL 4616
CHECKED B.MAURON	ECL/NIM/ECL
DATE 9.06.80	Translator
DRAWING NUMBER 4616-S1	SHEET 1 OF 2
ECO NO 1004 21.09.82	


BOARD 1
10n
22
IN/OUT (NIM)
51
HP2835
22
47p
56
+IN
5
10115
9
2
56
-IN
4
1N4448
30
1N4448
A 401
(see note)
2N5770
12
10101
2
+OUT
4
5
-OUT
24
2.2K
1K
6.8
1.2K
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-6
-3.5
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10
11
IN4448
(2)
+
17
-
NOT
CONNECTED
HP2835
10K
12K
1.2K
510
6.8
10n
-3.5
200
2N5771
(2)
2N5194
6.8
510
2N5771
1.2K
1A
6
-6
-6
6
GND
NIM
CONNECT.
6.8 (2)
-6
1N4005
-6
-5
note.
A 401 Vbe matched
a Vc = 2V Ic = 40mA
for one board (8)
LeCroy RESEARCH SYSTEMS
DRAWN
CHECKED
B. MAURON
DATE
9.06.80
MODEL 4616
ECL/NIM/ECL
Translator
DRAWING NUMBER
4616-S1
SHEET 2 OF 2
ECO NO 1004
DATE 21.09.82