150-002

D CIRCUIT BOARDS.

OPERATION & MAINTENANCE MANUAL

BETA
PRODUCTS, INC.

INSTRUCTION MANUAL
BETALOG 512
SEQUENTIAL EVENTS RECORDER

FOR

FLUOR

By
Beta Products, Inc.
2029 McKenzie, #150
Carrollton, TX 75006
214-241-2200
TLX: 73-0701

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Date: 2-17-87

REV	DATE	INITIALS
A	2/87	[illegible]
B	6/87	[illegible]
C	7/87	[illegible]

Dwg. No.

S.O. No. 051756

NOTICE

The sequence of events recorder is supplied with a 1PPM OSC located on the backside of the power supply cover. (Ref Dwg 807609).

The 1PPM OSC has a battery backup to maintain system clock operation during short power outages.

The S.E.R. is shipped with the battery disconneted to prevent its discharge. When the S.E.R. is placed in service the battery should be connected by removing the power supply cover and installing a two pin jumper located on the printed circuit board.

Should the S.E.R. be removed from service for a prolonged period of time the jumper should be removed to prevent battery discharge.

PREFACE

The information in this document has been carefully checked and is believed to be entirely reliable. BETA reserves the right, however, to correct any inaccuracies found in this document. Further, BETA reserves the right to make changes to any products herein to improve reliability, function or design. BETA does not assume any liability arising out of the application or use of any product or circuit described herein, nor does it convey any license under its patent rights or the rights of others.

WARRANTY

BETA Sequential Events Recorder Systems are warranted to be free from all latent defects in material and workmanship under normal use and service. Should any device used in the system be found to be defective within three (3) years after delivery, BETA will repair such part and return the same to buyer F.O.B. BETA's plant, or will furnish F.O.B. BETA's plant a similar part to replace it, provided written notice of such defect is given to BETA within ten (10) days after the discovery of such defect and provided the original part is returned to BETA's plant with transportation charges prepaid, and then only when BETA's examination shall disclose to its satisfaction that such part is defective. No warranty is made with respect to lamp bulbs.

If buyer elects to have BETA Field Service work performed at buyer's location instead of returning the part to BETA's plant, buyer will be billed for transportation, food, lodging and miscellaneous expense at actual cost.

This warranty shall not apply to any part which has been repaired or altered outside of BETA's factory so as, in BETA's judgment, to affect its performance, or which has been subject to misuse, negligence or accident.

BETA Products makes no warranty whatever with respect to any attachments or apparatus that is added to the recorder system which is not of BETA Product's manufacture. BETA's liability under this warranty is limited solely to the price of goods found defective, and in no event shall BETA be liable for any consequential damages.

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1.0 GENERAL DESCRIPTION

1.1 FUNCTION

The BETAlog 512 Sequential Events Recorder (SER) is a versatile high speed distributed microprocessor based data acquisition system designed to monitor and record, in real time, changes of state of customer supplied field inputs with an accuracy of one millisecond.

This event information includes alarm and return to normal status; time in hours, minutes, seconds, and milliseconds; input address; and up to 60 characters of descriptive legends. Event information can be recorded on a printer or printer terminal, displayed on a CRT monitor, or transmitted to a remote computer or distributed control system via RS-232C ASCII data links.

1.2 EQUIPMENT DESCRIPTION

The basic system consists of one EIA 19" rack mountable chassis approximately 14 inches high and 15 inches deep containing the necessary logic cards, power supplies, terminals, and connectors to accommodate up to 512 field inputs in increments of 64 points. The system is capable of being expanded up to a total of 1024 inputs by the addition of an expansion chassis similar in size to the basic system.

The BETAlog 512 can contain up to seven RS-232C ports for communicating with peripheral devices such as CRT's, modems, printers, cassette recorders, Truetime clocks and keyboards. It also contains 8 auxiliary relays under software control with form "C" contacts available for customer use.

The BETAlog 512 is designed for optimum versatility and flexibility with minimum user hardware adjustments. The equipment operating configuration is accomplished by means of keyboard entries employing "user friendly" software commands. In addition, the operator can print various operating and configuration status reports and initiate a systems functional test.

1.3 ADJUSTABLE PARAMETERS (KEYBOARD INITIATED)

The following parameters may be implemented on a single point, multiple point or range of points basis:

A. Point Parameters

1. N.O./N.C. field contact input status
2. Alarm debounce filter, 1 millisecond to 65.535 seconds
3. Return-to-Normal debounce filter, 1 millisecond to 65.535 seconds
4. Selectable input point disable
5. Alarm assignment to output ports
6. Return-to-normal assignment to output ports
7. Descriptive legend, 60 characters per input, alarm
8. Descriptive legend, 60 characters per input, return-to-normal optional
9. Legend background color for CRT option
10. Critical alarm designation

B. System Parameters

1. Input/Output device type: CRT, printer, cassette tape loader, clock, console, etc.
2. Output relays (synthesized points)
3. Time set
4. Battery back-up select (historical buffer)
5. Alarm or return to normal indent

C. Parameters for External Devices

1. Baud Rate (selectable from 50 to 19,200)
2. 7 or 8 bit data
3. Parity (odd, even, mark, space or none)
4. Red/Black or 2 color printing

1.4 OPERATOR-INITIATED SYSTEM REPORTS

A. Point Status Report (LS) - lists the following which are available on a single point, multiple point, or range of points basis.

1. Point Number
2. Point configuration (N.O. or N.C.)
3. Alarm debounce (ms)
4. Return-to-normal debounce (ms)
5. Point Enabled or Disabled
6. Critical point (Yes or No)

B. List Exceptions (LE) - Lists operator disabled points.

C. Alarm Summary (AS) - Lists all points in alarm, failed scanners, and failed RS-232 ports at the time of inquiry.

D. Time and Date (TI) - printed upon command.

E. Legend Report (LL) - lists all legends for points selected

F. List Historical Buffer (LH) - lists entire contents of historical buffer (1500 events, including legends).

G. List Historical Buffer Since Last Update (LU) - lists events since last LU request.

H. Output Report (LO) - lists input point assignment to output devices P0 through P6 for all selected points.

I. System Configuration Report (LC) - lists the following:

1. Configuration of all RS-232C ports
2. Preferred output ports
3. Lists scanner cards enabled
4. Which state is indented (alarm or normal)
5. Battery back-up state
6. Max point number in the system
7. Minutes after the hour the hourly time prints
8. Other information, depending on system configuration, may be printed

J. List Synthesized Points (LP) - lists configuration of selected synthesized points.

1.5 OPERATOR-INITIATED TEST FUNCTION

In Function test (FT) - all input points are placed in alarm and return-to-normal states. Any point not responding will be printed as a faulty point.

1.6 SYNTHESIZED POINTS

Synthesized points are used to program the eight auxiliary relays on the BETAlog 512. Synthesized points are designated by alpha characters A-H and are assigned inputs through keyboard initiated operator commands. Each synthesized point is internally assigned to the main controller auxiliary relays as follows:

Syn.	CRT Port*	Main Controller Relay	Optional Auxiliary Relay Panel
A	--	K8	K9
B	1	K4	K5
C	2	K7	K8
D	3	K3	K4
E	4	K2	K3
F	--	K6	K7
G	6	K1	K2
H	--	K5	K6

*Reference Section 4.7.7

Each synthesized point consists of the software "or" of any user defined field input group along with the "or" of several internal tests, if so desired. The internal tests are: FT (Functional Test), ST (Self Test), SF (clock sync fail), P0 through P6 (port failure) and PW (Power OK). This means that if any point in the software configuration table for synthesized point "A," for example, should go into alarm, the relay for that point will be activated. When all points return to normal, that relay will be reset.

There is also a "pulsed" mode of operation where the relay in a selected group is activated for a period of 250 milliseconds when any input within that group changes state.

There are five modes of synthesized point operation; three pulsed and two continuous. These are defined as follows:

	PA	Pulse on alarm
	PN	Pulse on return-to-normal
	PB	Pulse on both alarm and return-to-normal
	CA	Continuous on alarm
*	CN	Continuous on normal

* If using continuous on normal, relay will not operate until all assigned points (including internal diagnostics) are in the alarm state.

1.7 WATCHDOG TIMER

Upon the loss of processor power (+ 5VDC) or if a software lock up condition should occur, a contact closure between pins 4 and 8 of the nine-pin D-Shell connector (J2) will exist (Ref. Dwg. 409062). The main controller periodically resets a retriggerable timing circuit to maintain relay K1 on the logic backplane operated.

1.8 FUNCTIONAL DESCRIPTION (Ref. Fig.1 Block Diagram)

The block diagram of the 512 is shown in Fig. 1. All field inputs are routed to scanner cards in groups of 64 per card. Each group of 64 inputs is subdivided into two groups of 32 through the use of two 37 pin D-shell connectors mounted on the rear of each scanner (J2 and J3). These inputs are then optically coupled to the scanner electronics. Once every millisecond, the 64 field inputs are sampled by the scanner processor that is resident on each card. When a change of state is detected, the point address, real time, and alarm state are stored in temporary memory, which is also resident on each scanner. The scanner then initiates an interrupt to the main controller alerting the main controller that event information is available.

After a scanner interrupt, the main controller polls the scanners and initiates a transfer of event data from the scanner to the main controller via the logic backplane. The event data is stored in chronological order in a revolving 1500 point historical buffer. Each event then has a legend of up to 60 characters appended to it and is then directed to those output ports for which it has been enabled (up to seven RS-232C ports, zero through six).

The auxiliary controller is essentially an extension of the main controller containing RS-232C ports J3 through J6, IRIG B Port J5, and additional memory devices for storing optional return-to-normal legend data when required.

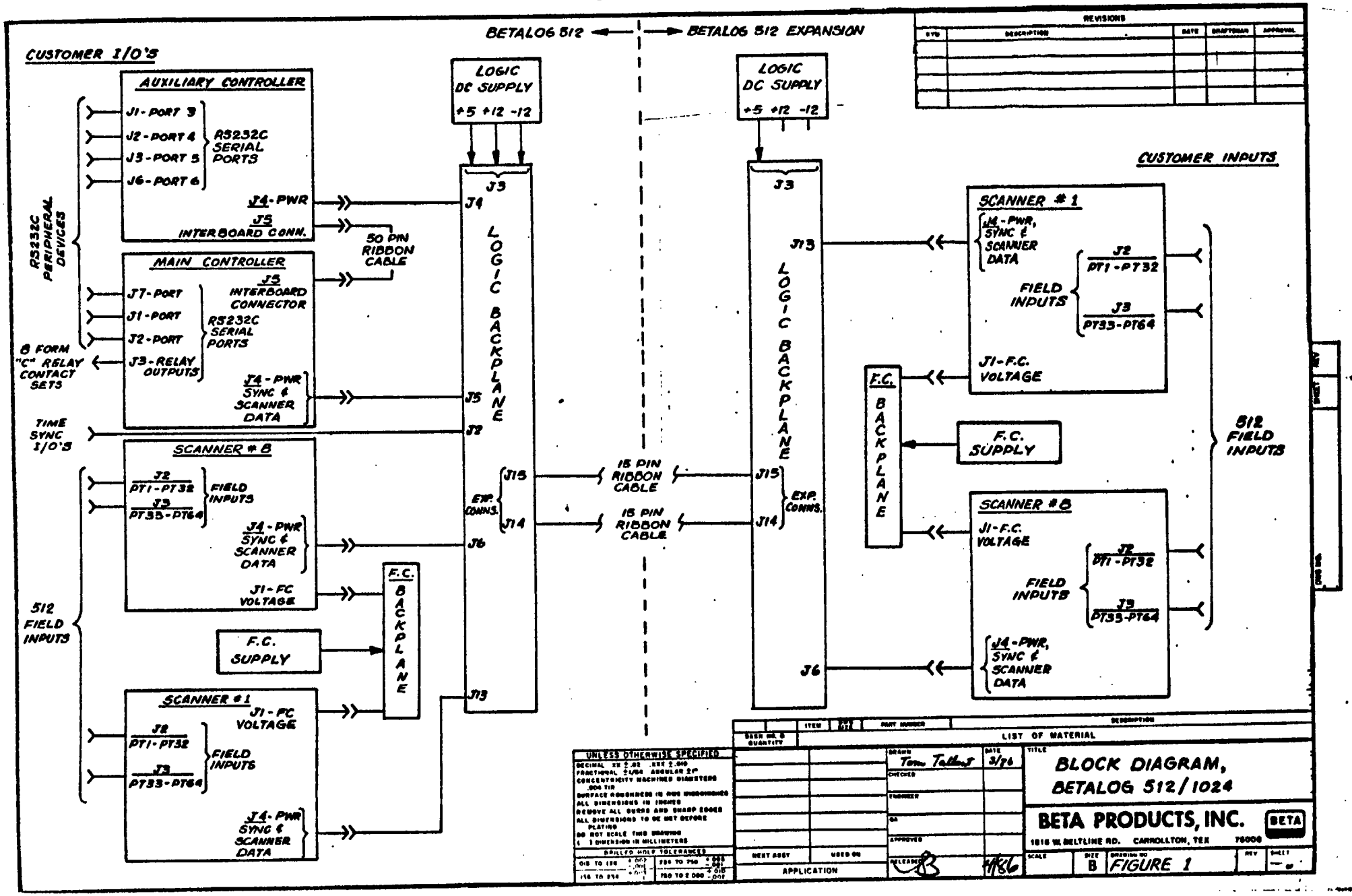
Eight software programmable auxiliary relays are located on the main controller card with their form "C" contacts available on J3 (Dwg. 409060, Sheet 4).

The logic backplane contains the data bus lines for handling all communications between the scanners and main controller and the logic power supply bus lines for power distribution to all cards.

Field contact power distribution to the scanners is accomplished by means of the field contact backplane.

When the system is expanded beyond 512 points, two 15 conductor cables are used to connect the logic backplane of the BETAlog 512 main chassis to the logic backplane of the expansion chassis to extend communications between the main controller and the additional scanner cards.

The expansion chassis is similar to the main chassis except for the absence of the controller cards.


BETALOG 512
BETALOG 512 EXPANSION
CUSTOMER I/O'S
AUXILIARY CONTROLLER
J1 - PORT 3
J2 - PORT 4
J3 - PORT 5
J6 - PORT 6
RS232C SERIAL PORTS
J4 - PWR
J5 INTERBOARD CONN.
RS232C PERIPHERAL DEVICES
50 PIN RIBBON CABLE
MAIN CONTROLLER
J5 INTERBOARD CONNECTOR
J7 - PORT
J1 - PORT
J2 - PORT
J3 - RELAY OUTPUTS
RS232C SERIAL PORTS
8 FORM "C" RELAY CONTACT SETS
J4 - PWR SYNC & SCANNER DATA
TIME SYNC I/O'S
SCANNER # 8
J2 PT1 - PT32
J3 PT33 - PT64
FIELD INPUTS
J4 - PWR SYNC & SCANNER DATA
J1 - FC VOLTAGE
512 FIELD INPUTS
F.C. SUPPLY
F.C. BACKPLANE
SCANNER # 1
J1 - FC VOLTAGE
J2 PT1 - PT32
J3 PT33 - PT64
FIELD INPUTS
J4 - PWR SYNC & SCANNER DATA
LOGIC DC SUPPLY +5 +12 -12
J3
LOGIC BACKPLANE
J4
J5
J8
J15
EXP. CONNS.
J14
J13
15 PIN RIBBON CABLE
15 PIN RIBBON CABLE
LOGIC DC SUPPLY +5 +12 -12
J3
LOGIC BACKPLANE
J15
EXP. CONNS.
J14
J6
CUSTOMER INPUTS
SCANNER # 1
J4 - PWR, SYNC & SCANNER DATA
FIELD INPUTS
J2 PT1 - PT32
J3 PT33 - PT64
J1 - F.C. VOLTAGE
F.C. BACKPLANE
F.C. SUPPLY
SCANNER # 8
J1 - F.C. VOLTAGE
FIELD INPUTS
J2 PT1 - PT32
J3 PT33 - PT64
J4 - PWR, SYNC & SCANNER DATA
512 FIELD INPUTS
REVISIONS
LIST OF MATERIAL
UNLESS OTHERWISE SPECIFIED
DRILLED HOLE TOLERANCES
NEXT ASSY
USED ON
APPLICATION
Tom Talbot
3/86
BLOCK DIAGRAM, BETALOG 512/1024
BETA PRODUCTS, INC.
1616 W. BELTLINE RD. CARROLLTON, TEX 75006
SIZE B
FIGURE 1

1.9 SPECIFICATIONS

1.9.1 Electrical

Source voltage	90-264VAC 50/60HZ 100-264VDC
Power Comsumption BETAlog 512 Chassis	100 VA nominal
Power Consumption Expansion Chassis	75 VA nominal
Field Input Current and Voltage	0.5 ma @ 24VDC 0.5 ma @ 48VDC 0.5 ma @ 125 DC

NOTE: Field input voltage can be internally or externally supplied.

Outputs

A. Up to six (6) RS-232C ports

B. Eight (8) form "C" relay outputs

Contact rating	2A @ 30VDC .5A @ 125VAC

C. Watchdog Timer Output Relay Contact Rating: 2A @ 30VDC, .5A @ 125VAC

1.9.2 Mechanical

Dimensions	
BETAlog 512 Chassis	19"W x 13.969" H x 15.28" D
Expansion Chassis	19"W x 13.969" H x 15.28" D
Weight each chassis	Approximately 30 pounds

1.9.3 Input Detection

Resolution	1 millisecond

1.9.4 External Time Sources

System Clock Accuracy	
A. Standard	25 ppm
B. Optional	1 ppm
Clock Synchronization	
A. Satellite Synchronized Clock: True Time Model 468-DC	Available through an RS-232C port
Accuracy	+/-1.5 milliseconds of NBS time
B. IRIG B Synchronized Clock: True Time Model SF-DC	Available through RS-232C port
Accuracy	+/-1.5 milliseconds of source time
C. IRIG B Input	Port 5 on aux controller card (309075)
Accuracy	+/-1 milisecond of source time
D. 50/60 Hz Line	
E. Hourly pulse input	Available on any selected input point number
Accuracy	Dependent on Source

1.9.5 Environmental

A. Humidity - 0% to 95% non-condensing

B. Temperature Range - 0 degrees C to 50 degrees C

C. Surge Withstanding Capability - meets IEEE 587-1980

1.10 GENERAL EQUIPMENT FEATURES

Circuit design minimizes the effect of electrical noise pick-up on the input leads. Alarm input lead wires may be unshielded when run with other instrumentation and control cables. Input circuits have been type-tested to meet IEEE 587-1980 SWC requirements.

An optical coupler input is utilized for each point providing complete electrical isolation (input to output) of 2KV minimum.

Protection is provided to prevent surges and overvoltages in the purchaser's primary power supply from damaging the semi-conductor elements or interfering with correct operation of the equipment.

Printed circuit boards (PCB's) are epoxy-fiberglass, and all PCB and signal connectors are gold plated.

Logic design employs the use of microprocessor-based controllers to provide high reliability, low cost and ease of serviceability. Standard components from well established manufacturers guarantee long-term replacement availability should repairs be required.

2.0 INSTALLATION AND CONNECTIONS

2.1 RECEIPT INSPECTION

Upon receipt, inspect the SER components for any physical damage which may have occurred in transit. If damage is found, refer to the Warranty in the front of this manual for recommended claim procedure. Retain packing material for possible future use. Check packing list and confirm that all items are enclosed.

2.2 INSTALLATION

The BETALOG 512 SER system and optional panels are designed to mount on standard 19 inch racks. Installation consists of placing the unit in the desired position on the rack and securing it with four mounting screws (No. 8 or No. 10 as your rack requires).

If the expansion chassis is required, it should be located as close as possible to the main chassis so that the interconnecting cables to J14 and J15 on each chassis do not exceed 36" in length.

2.3 INPUT POWER WIRING

Primary power is connected to TB1 in accordance with drawing 806898 using a minimum #16 AWG wire.

2.4 FIELD INPUTS

Field contact inputs are connected to J2 and J3 on each input scanner card in accordance with the Wire List 806700. Each connector will accept 32 field inputs for a total card input of 64 points.

Solder-cup type 37 pin "D" shell connectors are recommended using #20 AWG stranded hook-up wire. Lead lengths are not critical between the SER input connectors and remote terminations.

2.5 LINE SYNCHRONIZATION

A. An external 50/60 Hz input to the 9 pin D-shell connector (J2) on the rear panel will synchronize the clock to this frequency. Connect 110 to 240 VAC across pins 5 and 9 to accomplish this function.

2.6 WATCHDOG TIMER

Upon the loss of processor power (+5VDC) or if a software lock up condition should occur, a contact closure between pins 4 and 8 of the nine pin D-shell connector (J2) will exist. These contact ratings are the same as those for the auxiliary relays (ref. Sec. 1.9.1). The main controller periodically resets the retriggerable one-shot, U1, to maintain relay K1 operated.

2.7 RS-232C PORTS 0 THROUGH 6

Ports 0 through 6 with auxiliary controller 309061, and ports 0 through 4 and 6 with auxiliary controller 309075 consist of E.I.A. standard RS-232C 25-pin female D-shell connectors with the following pin out:

	Pin #	Description	Signal Flow
	1	Chassis Ground	Tied to Chassis Frame
	2	Receive DATA (RXD)	Input to SER
	3	Transmit DATA (TXD)	Output from SER
	4	Clear to Send (CTS)	Input to SER
	5	Request to Send (RTS)	Output from SER
	6	Data Terminal Ready (DTR)	Output from SER
	7	Signal Ground	Tied to Logic Gnd.
*	8	Data Carrier Detect (DCD)	Output from SER
	19	Pull-up (3K to +12V)	-
	20	Data Set Ready (DSR)	Input to SER

* Used only on port 0, 1, 2. Is normally disabled (contact factory for information on how to enable)

NOTE: Port 5 on the 309075 auxiliary controller is a fiber optics port which is used in conjunction with Beta digital fault recorder equipment to provide a digital fault monitor system.

External devices are assigned and configured to ports 1-6 by operator-initiated keyboard commands.

Port "0" located on the front of the main controller is reserved as a systems console port and is configured by means of the dipswitch located just above the port connector. Tables 1 through 3 below define the possible port "0" configurations:

Table 1

Parity Type	Switch Number * 1	2	3
None	C	C	C
Odd	C	C	O
Even	C	O	O
Space	O	O	O
Mark	O	C	O

Table 2

# OF Data Bits	Switch Number 4 *
7	O
8	C

Table 3

Baud Rate	Switch Number * 5	6	7	8
50	C	C	C	O
75	C	C	O	C
110	C	C	O	O
134.5	C	O	C	C
150	C	O	C	O
300	C	O	O	C
600	C	O	O	O
1200	O	C	C	C
1800	O	C	C	O
2400	O	C	O	C
3600	O	C	O	O
4800	O	O	C	C
7600	O	O	C	O
9600	O	O	O	C
19200	O	O	O	O

* O = Open
C = Closed

NOTE: Port 0 must be used in order for the system to operate properly. If the "system console" function is to be transferred to one of the rear RS-232C ports in place of Port 0, this can be accomplished by configuring a rear port as a "systems console" through Port 0 and then moving the RS-232 cable from Port 0 to the configured port. A factory supplied "dummy plug" must be plugged into Port 0 to insure proper system operation.

2.7.1 IRIG B Interface

When IRIG B interface is required, the optional Auxiliary Control Card 309075-001 is used to accommodate these inputs. The IRIG B coax cable plugs into J3, located at the rear of the card.

2.8 TERMINAL PANELS (OPTIONAL)

Terminal panels provide a means of connecting customer wiring to terminal blocks rather than "D" shell connectors. The optional panels are installed as follows:

2.8.1 Field Input Terminal Panel (P/N 805986)

Field Input Terminal Panels connect to the input connectors of the BETAlog 512 through ribbon cables with 37 pin connectors (one cable for each 32 points). One field input terminal panel is required for each scanner. These connectors are appropriately labeled on the terminal panel and BETAlog unit for each group of 32 points from point 1 through point 1024.

2.8.2 Auxiliary Relay Terminal Panel (P/N 806801)

The Auxiliary Relay Terminal Panel connects to J3 of the main controller through a ribbon cable and 25 pin "D" shell connector. The terminal blocks are appropriately labeled N.O. C N.C. for each synthesized point A through H.

2.8.3 Synchronization/Watchdog Timer Terminal Panel (P/N 806815)

The Synchronization/Watchdog Timer Terminal Panel connects to J2 on the rear of the BETAlog 512 main chassis through a ribbon cable and 9 pin "D" shell connector. The 50/60 Hz input voltage connects to terminals 1 and 2, and the watchdog timer contact outputs are on terminals 8 and 9. Outputs 3-7 are for future use.

2.9 UNIVERSAL INTERFACE PANELS (OPTIONAL)

The function of the Universal Interface Panel is to interface the BETAlog SER equipment to various voltage inputs, polarities and levels instead of the regular "contact change" inputs.

2.9.1 Universal Interface Panel (P/N 806525, Connector/Input)

Field inputs are connected to J1 and J2 located on the rear of the Universal Interface Panel. Each connector accepts 16 inputs. A ribbon cable from J1 on the side of the panel can connect to any input connector (J2 or J3) on any of the BETAlog 512 input scanner cards.

Drawing 806897 lists the pin numbers on the two input connectors for each of the differential points 1 through 32.

2.9.2 Universal Interface Panel (P/N 806374, Terminal Input, 3.5" Panel)

This panel is similar to the above except that input terminals are mounted on the rear panel in place of the two connectors. The terminals are labeled inputs 1-32 for the dash 1 version and 33-64 for the dash 2 version.

2.9.3 Universal Interface Panel (P/N 806241, Terminal Input, 10.5" Panel)

This panel is similar to 2.9.1 and 2.9.2 except for packaging. This panel mounts vertically on the rack using 10.5" of panel space but requires less than 2" depth.

2.9.4 Universal Interface Panel (P/N 806981, Terminal Input, 3.5" Panel)

This panel is similar to 2.9.2 except that the terminals are mounted on the front panel. The terminals are labeled inputs 1-32 for the dash 1 version and 33-64 for the dash 2 version.

3.0 OPERATION

3.1 INITIAL START-UP PROCEDURE

3.1.1 Hardware

A. Check to be sure the main power is off before removing or installing any cards. Remove the main controller card and position the clock battery jumper E6 to the jumpered position. This was disconnected at the factory before shipment in order to conserve the battery. (Ref. Dwgs. 309060 and 409060).

B. Switch S1 is factory set and should not require changes. Settings are defined as follows:

	Open	Closed	
S1-1	Rev A & above	Rev -	Controller card revision level
S1-2	Auto	Manual	Daylight savings time correction
S1-3	Yes	No	Port 0 Color console
S1-4	---	---	Not used

C. E3 determines 50/60 Hz clock synchronization. It is factory set and should not require changing. Jumper settings are as follows:

50Hz	Both jumpers in the horizontal position B-B
60Hz	Both jumpers in the vertical position A-A

D. Reinstall the main controller card.

E. Check all external wiring.

F. Remove all field inputs from J2 and J3 on the scanner cards.

G. Remove all peripheral devices from ports 0-6.

H. Apply power to unit.

All LED indicators except the second from the bottom one on the front of the main controller should be on.

I. Check the +5V and +/- 12V for 5.15 +/- 0.05 and +/- 12.00 +/- 2.00 volts respectively. (These were factory set and should not require any adjustment.)

J. Turn power off.

I. Connect a KSR-type printer terminal (or equal) to Port 0 on the front of the main controller card.

K. Connect all other devices to their designated ports. Set the dipswitches, located on the front of the main controller card, in accordance with Tables 1, 2 and 3 in Section 2.7 to conform to the port 0 terminal device parameters.

L. Turn power on.

The terminal should display the following message:

```
BETAlog 512 version *ww.w release *ww www wwww
System down xx xxx xxxx yy:yy:yy
System up xx xxx xxxx yy:yy:yy
Station Name
Station Number_____
```

NOTE: xx:xx:xx and YY YYY YYYY could be any characters since the date and time have not been set.

* w indicates version and release date

At this point, the BETAlog 512 is ready to have its operating parameters configured to meet specific customer requirements. This is accomplished through keyboard commands on the terminal device connected to Port 0 which is always designated "Systems Console." These commands are described in detail in Section 4.0.

3.1.2 Equipment Configuration

There is essentially no set order for entering the "Modify" commands that affect system operating parameters except for "Modify Configuration" (MC). This command includes specifying the number of system inputs which can affect the execution of other commands. The MC command should precede any other "M" command except MP. A suggested sequence of programming equipment operating parameters is as follows:

NOTE: It is recommended that the field inputs not be connected to the scanner cards during the set-up procedure to avoid input status changes from interferring with the programming process.

0. Modify Password

1. Time Set (TS)

2. Modify Configuration (MC)

3. Modify Status (MS)

   NOTE: Any point programmed normally closed (NC) will print out as an alarm when this command is completed.

4. Modify Legends (ML)

5. Modify Port Assignments (M0, M1, M2, M3, M4, M5, and M6)

6. Edit Synthesized Points (EP)

7. Save on Tape (ST) and Restore Memory from Tape (RT) if cassette option and spare controller cards are available.

The BETAlog 512 should now be fully configured and ready for operation when the field inputs are reconnected to J2 and J3 of each scanner card.

3.2 EVENT PRINTOUT

The following is an example of a typical event printout. Note that the return-to-normal message (N) is indented two spaces from the alarm message (A).

```
A16:14:52.625 #098 #2 CONDENSER LEVEL HIGH
  N16:15:30.980 #098 #2 CONDENSER LEVEL HIGH
```

The above example states that at 14 minutes, 52.625 seconds after 1600 hours (4 PM), point number 98 went into an alarm condition. Then at 15 minutes, 30.980 seconds after the hour, point 98 returned to normal. The legend for point 98 is "#2 CONDENSER LEVEL HIGH." Return-to-normal data is indented 2 spaces. Alarm data is left justified.

Use of the modify system configuration (MC) command allows the operator to select either an indented alarm or an indented return-to-normal message.

3.3 HOURLY DATE AND TIME PRINTOUTS

Date and time are automatically printed out, once an hour, at a preselected number of minutes past the hour. The time of printout is selected as part of the Modify Configuration (MC) command (see paragraph 4.7.2). Example:

6 Mar 1986 2:30:00

The above hourly printout occurred 30 minutes and zero seconds past the hour of 2 on 6 March 1986.

NOTE: Date and time are also stored in the historical buffer each time it is printed out.

3.4 STATION NAME AND NUMBER PRINTOUT

A header consisting of the station name and number, date and time is automatically printed out, once per printer page, to assure page identification. Example:

Carrollton 1 6 Mar 1986 17:25:24

The above printout identifies the station as Carrollton #1 with the printout occurring at 25 minutes and 24 seconds past the hour of 1700.

3.5 TIME QUALITY DISPLAY

When a satellite synchronized clock or an IRIG B input is configured into the BETAlog 512, a time quality character is displayed at the end of all time messages on printers and terminals, and also on the time display of the CRT option. The following clock information is provided:

ASCII CHARACTER	WORST CASE ERROR
?	More than +/- 500 ms
#	More than +/- 50 ms
*	More than +/- 5 ms
.	More than +/- 1 ms
m	Less than +/- 1 ms
e	The synchronization pulse arrived before the S.E.R. was ready to accept it (early). The S.E.R. is currently synchronized to the satellite clock to within +/- 20 ms. The next synchronizing attempt (a minute later) should synchronize it to within +/- 1 ms.
1,2,3,4,5, or X	The numeric characters 1 through 5 indicate the number of times the S.E.R. requests a time sync pulse (one request per minute). If the clock does not respond after 5 attempts, an X appears and the port is declared off line. In the case of IRIG B, numeric characters 1-5 and X indicates an auxiliary control card failure.

3.6 COLOR CRT AND CONTROL PANEL

3.6.1 CRT Functions

The high resolution color CRT monitor displays all alarm and return-to-normal events with their color legends. The legend color is assigned when the legends are entered by the Modify Legend command (ML), and may be any of the eight colors listed in the two center columns of buttons on the CRT control panel. (Ref. Dwg. 806509).

3.6.1.1 Display of Alarms

When an alarm occurs, the time in hours, minutes, seconds and milliseconds followed by the input point number, flashes from black to white on a red background. An "A" preceding the time information indicates an alarm condition. The legend for that alarm point is displayed directly to the right of each alarm and is in the background color selected.

A return-to-normal event is displayed on a green background as described above except an "N" precedes the time information.

An alarm or return-to-normal must be acknowledged (ACK) to change it from a flashing state to a steady on condition. Then the reset button on the CRT control panel is used to extinguish alarms that have been acknowledged and returned to normal. The reset button will not operate until the displays have been acknowledged and are in the steady on state. It should be noted that only the alarms that are showing on the CRT can be acknowledged and reset. If more alarms occur than page one on the CRT can display, the older alarms (or returns-to-normal) are stored on higher pages in memory while the most recent events appear at the top of page one on the CRT display. When the events that are on the screen are cleared, any unacknowledged events that may be on higher numbered memory pages move to the CRT display and then can be acknowledged and reset. The page number being displayed is shown at the bottom left side of the CRT display just above the red fail block. If any points are not acknowledged, a flashing display of "Unack" appears in the red fail block on the bottom right side of the CRT display.

3.6.1.2 Port Status

The operational ports P0-P6 are displayed at the bottom of the CRT in the green block. If one of them fails, the port number moves up to the red block. The bottom right hand section of the green block also displays the functions that have been selected on the CRT control panel. If the operator wishes to sort alarms having a blue legend, he presses the Alarm button and the blue button on the CRT control panel. The display on the CRT green block shows "Alarm Blue."

3.6.1.3 Unack and Locked Messages

The two messages that can appear in the red block (right side) are Unack and Locked. The "Unack" indicates there are events, either on the screen or on memory pages, that have not been acknowledged. The "Locked" message is displayed when the operator presses the Lock button on the CRT control panel. This locks all alarm/return-to-normal events in their present state, locks in the current page being displayed, and disables all other buttons on the CRT control panel until it is actuated a second time. The date and time display, as well as the display of any port that fails, will not be inhibited by the lock button.

3.6.1.4 Clock Status

When a satellite or IRIG B synchronized clock is configured into the BETAlog 512, two single character status fields, located directly to the right of the time display, provide the clock information listed in paragraph 3.5.

3.6.2 Control Panel Buttons

The functions of the buttons on the CRT control panel are as follows:

ACK - Changes an event (alarm or return to normal) from a flashing state to steady on.

RESET - Clears events that return to the normal state after they have been acknowledged.

1ST PAGE - Recalls the events from the 1st page of memory and displays them on the screen.

PAGE UP - Advances the CRT display by one page toward the most recent events each time it is actuated.

PAGE DN - Scrolls down the CRT display by one page toward the oldest events each time it is actuated.

ALARM - Displays alarm events only. Can be used in conjunction with color buttons below.

NORMAL - Displays return-to-normal events only. Can be used in conjunction with color buttons below.

LOCK - Freezes the display of events on the screen and disables other buttons on the CRT control panel.

COLOR - (Two center columns) Used to select the events by a legend color for display on the CRT. These may be used alone or in conjunction with the "Alarm" button or "Normal" button. Example: If Red is selected, all events with red legends are displayed. If Cyan and Alarm are actuated, all alarms with a cyan legend are displayed. If Green and Normal are selected, all returned to normal events with a green legend are displayed. If there are no events found with the color selected, there is no display.

The color selector buttons, ALARM, NORMAL and LOCK buttons are dual action commands that are pressed once to actuate and a second time to release. Please note that a display will appear in the bottom right corner of the CRT when one of these is actuated and will remain until it is deactivated. The other buttons, ACK, RESET, 1ST PAGE, PAGE UP, and PAGE DN are single action commands.

4.0 OPERATOR COMMANDS

4.1 GENERAL

All communication between the operator and the BETAlog 512 SER is achieved through a keyboard printer terminal (KSR) or a keyboard CRT terminal connected to the RS-232C "System Console" Port 0 or to any of the remaining ports that have been operator assigned to function as a systems console port. All commands are initiated with two keyboard characters plus a carriage return (cr). The terminal display system will respond with the station name, station number, date and time. Commands that require additional information respond with "user friendly" prompts on the printer or CRT terminal.

NOTE: When a keyboard CRT terminal is used as a "Systems Console," reports that exceed 20 lines of information will scroll down until the last 20 lines are displayed. In order to halt the scroll to view earlier sections of the report, the operator should press the "Control" and "s" keys simultaneously. To continue, the "Control" and "q" keys should be pressed.

4.2 OPERATOR PROMPTS

Prompts are usually in the form of questions requiring an operator response. Incorrect responses result in repetition of the question until a proper response is entered.

4.2.1 System Password

A. The following commands are password protected: EL, EP, LC, LE, LH, LL, LO, LP, LS, LU, M0, M1, M2, M3, M4, M5, M6, MC, ML, MP, MS, RT, ST, TS.

B. As required, the system will prompt with:

PASSWORD?

C. The operator must respond with the current system password followed by RETURN (cr). If an incorrect password is entered, the function will terminate immediately. The initial password entered is BETA. Refer to the Modify Password (MP) command description later in this manual to change the choice of password.

4.2.2 Multipoint, Range or Single

This feature allows the operator to list or modify point data for a single point, range of points, or individually selected points (multipoint). The prompt will appear as follows:

MULTIPOINT, RANGE OR SINGLE?

If the operator responds with:

M (cr)

to perform the feature on individually selected points (multi-point), the system will prompt with:

POINT?

The operator then enters the first point number for which the feature is to be performed followed by (cr). The system will perform the feature and prompt for the next desired point until a (cr) is entered with no point number in response to the POINT? prompt. Points can be selected in any order.

If the operator responds with:

R (cr)

to perform the feature on a range of points, the system will prompt for the start and end points and perform the feature on all points in the range of points selected.

If the operator responds with:

S (cr)

to perform the feature on a single point, the system will prompt for the point number and perform the feature on the point selected.

If the operator responds with anything other than M (cr), R (cr), S (cr), or (cr), the system will again prompt with:

MULTIPOINT, RANGE OR SINGLE?

until a valid response is received. (If only a (cr) is entered, the default input S will be selected).

4.2.3 Duplicate Data

The system allows the operator to enter duplicate status and legend information when using the modify commands in the MULTIPOINT or RANGE mode. When the system has completed the prompts for the first point being modified with the feature, it will prompt:

SAME DATA (Y, N)?

If the operator enters Y (cr), the new data entered for the feature will be repeated for all points in a range or each point selected with multipoint. If the operator enters N (cr), the system will prompt for new data for each point. The operator must enter either Y (cr) or N (cr) in response to the same data prompt. If anything else is entered, the feature will respond with:

SAME DATA (Y, N)?

(If only (cr) is entered, the default input N will be selected).

4.3 FUNCTION COMPLETE MESSAGE

All operator-initiated functions (features) will print XX COMPLETE at the completion of the function, where XX is the 2 character key of the feature.

4.4 TIME SET AND TIME CHECK

A. The Set Time & Date (TS) feature allows the time and date to be set by the operator. Enter the correct date and time as shown in the following command description. An example of the TS feature is as follows:

Operator Action	Display or Ptr Message
TS (cr)	>TS STATION NAME Station Number _____ 28 Aug 1985 12:45:52 Password?
Enter password (cr)	Enter Date MM/DD/YY?
03/15/85 (cr)	Enter Time HH:MM:SS
11:05:30 (cr)	TS COMPLETE

B. Execution of the Print Time & Date (TI) feature results in the printout of the current date and time. The password is not required for this report. An example of the Print Time & Date (TI) feature is as follows:

Operator Action	Display or Ptr Message
TI (cr)	>TI STATION NAME Station Number 28 Aug 1985 12:45:52 TI complete

4.5 LIST MENU (FEATURES AVAILABLE) (LM)

Execution of the List Menu feature lists the 2 letter keys of the features available on the SER. An example of the List Menu feature is as follows:

Operator Action	Display or Ptr Message
LM (cr)	>LM STATION NAME Station Number 28 Aug 1985 12:45:52 List menu AS Alarm Summary EL Edit Legends EP Edit Synthesized Points FT Functional Test LC List System Configuration LE List Exceptions (points disabled) LH List Historical Buffer LL List Legends LM List Menu LO List Output Assignments LP List Synthesized Points LS List Status LU List Events from historical buffer since last LU MC Modify System Configuration

(Second column)

ML Modify Legends
MP Modify Password
MS Modify Status
M0 Modify Port 0 Output Assignments
M1 Modify Port 1 Output Assignments
M2 Modify Port 2 Output Assignments
M3 Modify Port 3 Output Assignments
M4 Modify Port 4 Output Assignments
M5 Modify Port 5 Output Assignments
M6 Modify Port 6 Output Assignments
RT Restore NVM from Tape
ST Save NVM to Tape
ST Save NVM to Tape
TI Print Current Time
TS Time Set

LM Complete

4.6 HELP COMMAND (LIST MENU) HE

Execution of the "Help" command lists the menu.

Operator Action	Display or Ptr Message
HE (cr)	>HELP STATION NAME Station Number 28 Aug 1985 12:45:51 List menu

AS Alarm Summary
EL Edit Legends
EP Edit Synthesized Points
FT Functional Test
LC List System Configuration
LE List Exceptions (points disabled)
LH List Historical Buffer
LL List Legends
LM List Menu
LO List Output Assignments
LP List Synthesized Points
LS List Status
LU List Events from historical buffer since last LU

(Second column)

MC	Modify System Configuration
ML	Modify Legends
MP	Modify Password
MS	Modify Status
M0	Modify Port 0 Output Assignments
M1	Modify Port 1 Output Assignments
M2	Modify Port 2 Output Assignments
M3	Modify Port 3 Output Assignments
M4	Modify Port 4 Output Assignments
M5	Modify Port 5 Output Assignments
M6	Modify Port 6 Output Assignments
RT	Restore NVM from Tape
ST	Save NVM to Tape
TI	Print Current Time
TS	Time Set
HE	Complete

4.7 MODIFY COMMANDS

Modify commands configure the Betalog 512 operating parameters to satisfy specific customer requirements. They are used to set up the equipment initially and can be used to modify existing programs.

4.7.1 Modify Password (MP)

This command allows an operator to change the password. The system password may be up to 6 characters in length. Only printable characters are recognized. The system will disregard any control characters used in the password.

The MP command works as follows:

Operator Action	Display or Ptr. Message
MP (cr)	>MP STATION NAME Station Number _____ 28 Aug 1985 12:45:52 Password?
Enter current password (cr)	Modify Password New password?
Enter New password (cr)	MP Complete

4.7.2 Modify System Configuration (MC)

Execution of the Modify System Configuration (MC) feature allows the operator to:

(a) modify the RS-232C port assignments (except Port 0, since that is reserved for the system console),

(b) to assign the number of data bits, parity, and baud rates,

(c) to assign a backup port number in case the assigned printer port fails,

(d) to assign a port as a preferred port*,

(e) to enable and disable scanner cards,

(f) to indent either alarm or return to normal messages,

(g) to inform the processor that separate return to normal messages will be employed (optional),

(h) to configure the BETAlog to accept an hourly sync pulse,

(i) to assign which input point will be the sync input,

(j) to assign the minute (0 through 59) that the hourly time printout will occur. If 60 is assigned, no print out will occur, or if 62 is assigned the hourly print time will only occur at mid night.

(k) to inform the processor that the optional battery-backed RAM is enabled or disabled

(l) to define the maximum number of points in the system,

(m) and to assign station name and station number.

If battery-backed RAM is enabled (by "Y" operator entry), then the RAM contents will not be cleared during the power up initialization routine, thus preserving the events in the historical buffer. Upon power up, any field status changes that exist since the last display (or printout) will be displayed (and printed) at that time. Time tags on the status changes are not appended however, since the time of change is not known. Blank spaces appear where the time tags would be normally displayed. If battery-backed RAM is disabled, then upon power up (after a power loss), all existing alarm states are displayed, again, with blank spaces for time tags.

*A preferred port is one which will insure that any event assigned to that port is printed before it leaves the Historical Buffer.

An example of the MC feature is as follows:

Operator Action	Display or Ptr. Message
MC (cr)	>MC
	STATION NAME
	Station Number _____
	28 Aug 1985 12:45:52
Enter Password (cr)	Password?
	Modify system configuration
	Port number to modify? 1
1 (cr)	Port assignment? P
P (cr)	Color print? N
N (cr)	Strip printer? Y
Y (cr)	Data bits (7, 8)? 8
8 (cr)	Parity (O, E, N, M, S)? N
N (cr)	Baud rate? 600
600 (cr)	Backup port number? 0
0 (cr)	Is this a preferred port? Y
Y (cr)	Port number to modify? 2
2 (cr)	Port assignment ? CA
CA	Port number to modify?
(cr)	Scanner(s) to enable?
(cr)	Scanner(s) to disable?
(cr)	Alarm indent? N
N (cr)	Separate return legends? Y
Y (cr)	Hour sync pulse? Y
Y (cr)	Point number for hour sync pulse? 1
1 (cr)	Minute for hour time print? 30
30 (cr)	Battery back-up RAM? Y
Y (cr)	Max point number? 256
256 (cr)	Station name? BETA
BETA (cr)	Station number? 1
1 (cr)	

NOTE

AFTER THE STATION NUMBER HAS BEEN ENTERED, THE BETALOG 512 WILL RESET AND THE FOLLOWING MESSAGE WILL BE DISPLAYED:

```
BETAlog 512 version  1.8 release 10 Feb  1986
System down xx xxx xxxx yy:yy:yy:
System up xx xxx xxxx yy:yy:yy
BETA
Station Number 1
>
>
>LC
```

In this example, the printer is assigned to Port 1. It was not selected as a 2 color printer. It was identified as a strip printer. The printer operating characteristics of (8) data bits, no parity, and 600 baud were programmed into Port 1. Port 0 was selected as the backup to Port 1. Port 1 was selected as a preferred port.

A cassette was assigned to Port 2. (All parameters are automatically set to conform to the BETA supplied Braemar MTL-II Cassette Recorder).

No scanners were enabled, no scanners were disabled. Return to normal messages will be indented. The BETAlog 512 was configured to accept separate return to normal messages, and to accept an hourly sync pulse with point #1 as the sync input. The hourly time printout was selected to occur at 30 minutes past the hour. Battery-backed RAM was selected and the total point count was identified as 256. The station name was BETA and the station number was 1.

NOTES

1. Refer to Table 5 for the list of port assignment mnemonics for various peripheral devices.

2. Reference Section 2.7 Table 1 for the available parity options, Table 2 for the number of data bits, and Table 3 for the available baud rate options.

3. The station name can be up to 60 characters.

4. The station number can be 0 to 255.

5. In order to select color printouts, refer to Table 6 for the list of printer color selection escape sequences coded in decimal form. These are required when a color printer is selected and the prompt "Alarm or return-to-normal color escape sequence (decimal)?" appears.

TABLE 5

Peripheral Mnemonic	Peripheral Device	Port Assignment**
CR	CRT	All except 0,5
CO	Console	All except 5
CA	Cassette	All except 0,5
CL	Clock	All except 0,5
P	Printer	All except 0,5
U	Unused	---
I*	IRIG B	Port 5, J3
AN	Serial Annunciator	All except 0, 5
IF	Fiber Optices (Master Station)	Port 5

Those ports that are assigned to a CRT or a cassette are automatically configured with the following parameters: no parity, 8 data bits and a 9600 baud rate. Consequently, those associated prompt messages are deleted for such port assignments. The port assignment mnemonic "U" provides a means for clearing a previously assigned port.

*Available only with the optional IRIG B Auxiliary Control Card 309075-001. The port assignment is port number 5.

**Port 5 available as an assignable RS-232C port when optional auxiliary control card 309061-001 card is used.

TABLE 6

Printer Color Selection
Color Escape Sequence in Decimal Form

Genicom 200 RB:

Color	Escape Sequence (Decimal)
Red	27-51
Black	27-52

Epson JX-80

Color	Escape Sequence (Decimal)
Black	27-114-48
Magenta	27-114-49
Cyan	27-114-50
Violet	27-114-51
Yellow	27-114-52
Orange	27-114-53
Green	27-114-54

Note: Only alarms designated as critical will print in color. See Modify Status command paragraph 4.7.4.

4.7.3 Modify Port Assignments (M0, M1, M2, M3, M4, M5, M6 or M7)

Execution of the Modify Port Assignments (M0, M1, M2, M3, M4, M5, M6, or M7) allows the operator to enable/disable output of Alarm or Return-to-Normal events to the RS-232 ports 0 through 6 respectively. (M0 and M6 identify the front RS-232 ports; M1 through M5 correspond to rear ports 1 through 5). An example of an M0 status change is as follows:

Operator Action	Display or Ptr. Message
M0 (cr)	>M0
	STATION NAME
	Station Number
	28 Aug 1985 12:45:52
	Password?
Enter password (cr)	Modify output
	Multipoint, Range, Single (M, R, S)? R
R (cr)	Start point? 1
1 (cr)	End point? 5
5 (cr)	Alarm enab (Y,N)? Y
Y (cr)	Same data (Y,N)? Y
Y (cr)	Return enab (Y,N)? N
N (cr)	Same data (Y,N)? Y
Y (cr)	M0 complete

In the above example, the points 1 to 5 Return-to-Normal message will be deleted from front panel Port 0.

NOTE: RS232C ports 0, 1, and 2 are located on the main controller card. RS-232C ports 3, 4, 5, and 6 are located on the 309061 auxiliary controller card. On the 309075 auxiliary controller card, port 5 is the fiber optics port and is used only in the Hathaway digital faults monitor configuration. When the fiber optics port is configured "FI", the M5 command controls the events sent to the master station.

4.7.4 Modify Status (MS)

Execution of the Modify Status (MS) feature allows the operator to change the normally open/closed status, the alarm debounce and return debounce times, and the active/disabled status of the point(s) selected. Use the LS command to determine the present status. An example of the MS feature is as follows:

Operator Action	Display or Ptr. Message
MS (cr)	>MS STATION NAME Station Number 28 Aug 1985 12:45:52 Password?
Enter Password (cr)	Modify status Multipoint, Range, Single (M, R, S)? M
M (cr)	Point? 11
11 (cr)	Normal status (Opn, Clsd)? C
C (cr)	Critical Alarm? N
N (cr)	Alarm debounce (msec)? 15
15 (cr)	Return debounce (msec)? 17
17 (cr)	Point enable (Y,N)? Y
Y (cr)	Same data (Y,N)? Y
Y (cr)	Point? 13
13 (cr)	Point? 14
14 (cr)	Point? 17
17 (cr)	Point? 24
24 (cr)	Point? 26
26 (cr)	Point? 29
29 (cr)	Point? 33
33 (cr)	Point?
(cr)	MS complete

In the preceding example, points 11, 13, 14, 17, 24, 26, 29 and 33 were all changed to have the same data. They are all normally closed, non-critical alarms*, have 15 ms alarm debounce, 17 ms return debounce, and are enabled.

*Critical alarm designation is for color printing.

4.7.5 Modify Legend (ML)

Execution of the Modify Legend (ML) feature allows the operator to enter new legends for the point(s) selected. An example of the ML is as follows:

Operator Action	Display or Ptr. Message
ML (cr)	>ML STATION NAME Station Number 28 Aug 1985 12:45:52 Password?
Enter Password (cr)	Modify legends Multipoint, Range, Single (M, R, S)? R
R (cr)	Start point? 25
25 (cr)	End point? 27
27 (cr)	A 25 Alarm Legend 25 Legend data? TEST LEGEND
Test Legend (cr)	Color? CYAN
CYAN	Same data (Y,N)? Y
Y (cr)	ML complete

In the example above, the legends for points 25, 26, and 27 were changed from the default legends (Alarm Legend pnt #) to "TEST LEGEND" and the color to CYAN. The available legend background colors are: black, red, green, yellow, blue, magenta, cyan or white. The operator must enter the first four characters for the desired color. The machine will disregard other characters. The legend data itself is black with all background colors except black and blue. The legend data color is white if a black or blue background is selected. Legends may be up to 60 characters in length, including spaces.

NOTE: The separate return-to-normal legend is an optional feature not necessarily provided in all systems.

NOTE: When a color CRT display is used, a more pleasing legend field results when a space used before and after each legend.

NOTE: Legends must never exceed 60 characters, including spaces.

4.7.6 Edit Legend (EL)

Execution of the Edit Legend command allows the changing of characters in alarm legends already stored in nonvolatile memory. Normally this is done in the "single point" mode to change only a word or letter, but there is the capability to change data on multipoints or a range of points. The first example shows the change from 5 to 6 in alarm legend number 1. The second example shows the change of legend color for points 1 through 5 from red to green. Legend data may also be changed on a range of points or multipoint. An example would be if the first 5 points started with #5 Brkr and it was necessary to change all of them to #6. The operator would select the "range mode" and change all of them by entering the old and new numbers and answering "yes" to the "same data" question. The examples are as follows:

Operator Action	Display or Ptr. Message
EL (cr)	>EL STATION NAME Station Number _____ 28 Aug 1985 12:45:52 Password?
Enter Password (cr)	Edit legends Multipoint, Range, Single (M,R,S)? S
S (cr)	Point? 1
1 (cr)	A 1 #5 Bkrk Trip From? 5
5 (cr)	To? 6
6 (cr)	Color? Red
Red (cr)	EL complete
EL (cr)	EL Password?
Enter Password (cr)	Edit legends 13:36:43 Multipoint, Range, Single (M, R, S)? R
R (cr)	Start point? 1
1 (cr)	End point? 5
5 (cr)	A 1 #6 Brkr Trip From?
(cr)	Color? Green
Green (cr)	Same Data (Y,N)?
Y (cr)	EL Complete

NOTE: Care must be taken not to add enough characters to exceed the 60 character limit. (see 4.7.5)

4.7.7 Edit Synthesized Points (EP)

The Edit Synthesized Points Command allows the operator to change the configuration of synthesized points A-H and provides a trigger command "T" to a Hathaway DAU. Refer to Section 1.6 of this manual for a description of the synthesized points. Each synthesized point A-H can be programmed to operate in the pulse mode (P) or the "or" mode (O). Any number of input points can be assigned to any of the synthesized points and any of the diagnostic functions FT (Functional Test), ST (Self Test), P0, P1, P2, P3, P4, P5, P6 (Port Fail), SF (Clock Sync Fail), and PW (Power OK) can also be assigned to any synthetic point. It is recommended that the PW (Power OK) function be individually assigned to a synthesized point, since that point will be activated as long as internal power is O.K. A power failure deactivates the point.

If a CRT is assigned to a certain port through the Modify Configuration command and a horn has been selected, the synthesized relay corresponding to that port will automatically be selected as the CRT horn, whether it has been enabled or not, through the Edit Synthesized points command. The relationship of the synthesized points to RS-232C ports is that synthesized points B through G correspond to ports 1 through 6, respectively. For example, if a CRT was assigned to port 1 and a horn was selected, relay B would be the CRT horn. It is important that the operator insure no other functions have been assigned to synthesized relays that are to be used with a CRT. Normally, synthesized points A and H can be assigned to miscellaneous functions such as functional test and power OK without interfering with other outputs.

When synthesized point "T" is selected, a trigger is sent to the DAU when any selected point goes into the alarm condition for more than 4 milliseconds if port 5 is configured "FI"

In the following example, points 1-5 are set for the continuous on alarm mode (CA) and will operate relay A; relay B is set for pulse on alarm mode (PA) and will operate with point 23; and relay C is set for pulse on both mode (PB) and will operate with points 1, 3, 5, 22.

Operator Action	Display or Ptr Message
EP (cr)	>EP STATION NAME Station Number 28 Aug 1985 12:45:52 Password?
Enter Password (CR)	Edit synthesized points Synthesized point? A
A (cr)	Enable or disable synthesized point (E,D)? E
E (cr)	Mode (PA, PN, PB, CA, CN)? CA
CA (cr)	Multipoint, Range, Single (M, R, S)? R
R (cr)	Starting point? 1
1 (cr)	End point? 5
5 (cr)	Add or delete point (A, D)? A
A (cr)	Synthesized point? B
B (cr)	Enable or disable synthesized point (E,D)? E
E (cr)	Mode (PA, PN, PB, CA, CN)? PA
PA (cr)	Multipoint, Range, Single (M, R ,S)? S
S (cr)	Point? 23
23 (cr)	Add or delete point (A,D)? A
A (cr)	Synthesized point? C
C (cr)	Enable or disable synthesized point (E,D)? E
E (cr)	Mode (PA, PN, PB, CA, CN)? PB
PB (cr)	Mulipoint, Range, Single (M, R, S)? M
M (cr)	Point? 1
1 (cr)	Add or delete point (A,D)? A
A (cr)	Point? 3
3 (cr)	Add or delete point (A,D)? A
A (cr)	Point? 5
5 (cr)	Add or delete point (A, D)? A
A (cr)	Point? 22
22 (cr)	Add or delete point (A, D)? A
A (cr)	Point?
(cr)	Synthesized point? EP complete

4.8 OPERATOR-INITIATED SYSTEM REPORTS

Report commands generate reports on the following:

Functional Test

Alarm Summary

Historical Review

Equipment Configuration

4.8.1 Functional Test (FT)

The Functional Test (FT) feature verifies that all active inputs are being processed and accepted by the input logic. The Functional Test (FT) feature is initiated two ways: manually by the operator, or automatically every hour, on the hour. If an input does not respond to the Functional Test (FT) signal in the alarm or normal state, the point will be printed as faulty. An example of the operator-initiated Functional Test (FT) feature is as follows:

Operator Action	Display or Ptr Message
FT (cr)	>FT STATION NAME Station Number 28 Aug 1985 12:45:52 Functional test FT complete

NOTE: In this example there were no faulty circuits. There will be no printout except time and date at the conclusion of the Functional Test if no faults are detected. Password is not required.

4.8.2 Alarm Summary (AS)

Execution of the Alarm Summary (AS) will result in the printout of all points currently in alarm status, failed scanners, or any failed RS-232C port. This report does not require use of the password. The alarm summary is performed automatically at each 2400 hours. An example of the Alarm Summary (AS) printout follows:

Operator Action	Display or Ptr. Message
AS (cr)	>AS STATION NAME Station Number 28 Aug 1985 12:45:52 Alarm summary 21 Compressor Pressure High 256 Oil Reservoir Low 511 Bearing Temp High Port Status Scanner Status AS Complete

4.8.3 Historical Display (LH)

Execution of the List Historical display feature allows the operator to access the most recent 1500 events. Events may be selectively accessed as a function of three separate parameters: (1) a function of up to any 10 point addresses or all points; (2) a function of a designated start time and stop time or no time limitation; and (3) a function of up to a designated number of the most recent events or all events. Each parameter may be used individually or collectively. An example of the (LH) command is as follows:

Operator Action	Display or Ptr. Message
LH (cr)	>LH STATION NAME Station Number 28 Oct 1986 13:27:41 Password?
Enter Password (cr)	List historical buffer Point numbers (All, or up to ten point numbers) ? A
A (cr)	Time (All, or start time)? 13:15
13:15 (cr)	Stop time? 13:30
13:30 (cr)	Number of historical events (1 to 1500, or all)? 4

4 (cr)	A 13:16:35.041#...1 Oxygen Low A 13:20:26.037#...12 Breaker 12 Tripped A13:28:15.022#...23 Breaker 17 Tripped N 13:29:45.051#...65 Bearing Temp Normal LH Complete

In the above case, the (LH) printout is limited to any 4 events occurring between 13 hours 15 minutes and 13 hours 30 minutes.

If a new alarm occurs during this listing, it will report when it occurs (in the middle of the list) and will not be a part of the list.

4.8.4 Historical Display Since Last Update (LU)

This report lists all events that have occurred since the last (LU) report was requested. This report is totally independant of the (LH) report and is not affected by any of the (LH) selected parameters.

Operator Action	Display or Ptr. Message
LU (cr)	>LU STATION NAME Station Number 28 Aug 1985 12:45:52 Password?
Enter Password (cr)	List historical buffer update A 04:39:25.827 #129 Feeder Trip A 04:42:06.128 #231 Oil Press Low N 05:23:35.739 #231 Oil Press OK LU complete q

If a new alarm occurs during this listing, it will report when it occurs (in the middle of the list) and will not be a part of the list.

4.8.5 List Status (LS)

Execution of the List Status (LS) feature results in the printout, on a per point basis, the normally open/closed status; the alarm delay (debounce) and return delay times in milliseconds; whether or not the point is enabled; and if the point is designated as critical. An example of the LS feature is as follows:

Operator Action	Display or Ptr. Message
LS (cr)	>LS
	STATION NAME
	Station Number _____
	28 Aug 1985 12:45:52
	Password?
Enter Password (cr)	Status list
	Multipoint, Range, Single
R (cr)	(M, R, S)? R
9 (cr)	Start point? 9
15 (cr)	End point? 15

Point	State	Alarm	Return	Enable	Critical
9	NO	10	10	Y	N
10	NO	10	10	Y	N
11	NO	15	17	N	Y
12	NO	10	10	Y	N
13	NO	15	17	N	Y
14	NO	15	17	N	Y
15	NO	10	10	Y	N

LS complete

If a new alarm occurs during this listing, it will report when it occurs (in the middle of the list) and will not be a part of the list.

13:30 (cr)	Number of historical events (1 to 1500, or all)? 4
4 (cr)	A 13:16:35.041#...1 Oxygen Low A 13:20:26.037#...12 Breaker 12 Tripped A13:28:15.022#...23 Breaker 17 Tripped N 13:29:45.051#...65 Bearing Temp Normal LH Complete

In the above case, the (LH) printout is limited to any 4 events occurring between 13 hours 15 minutes and 13 hours 30 minutes.

If a new alarm occurs during this listing, it will report when it occurs (in the middle of the list) and will not be a part of the list.

4.8.4 Historical Display Since Last Update (LU)

This report lists all events that have occurred since the last (LU) report was requested. This report is totally independant of the (LH) report and is not affected by any of the (LH) selected parameters.

Operator Action	Display or Ptr. Message
LU (cr)	>LU STATION NAME Station Number _____ 28 Aug 1985 12:45:52 Password?
Enter Password (cr)	List historical buffer update A 04:39:25.827 #129 Feeder Trip A 04:42:06.128 #231 Oil Press Low N 05:23:35.739 #231 Oil Press OK LU complete q

If a new alarm occurs during this listing, it will report when it occurs (in the middle of the list) and will not be a part of the list.

4.8.5 List Status (LS)

Execution of the List Status (LS) feature results in the printout, on a per point basis, the normally open/closed status; the alarm delay (debounce) and return delay times in milliseconds; whether or not the point is enabled; and if the point is designated as critical. An example of the LS feature is as follows:

Operator Action	Display or Ptr. Message
LS (cr)	>LS
	STATION NAME
	Station Number _____
	28 Aug 1985 12:45:52
	Password?
Enter Password (cr)	Status list
	Multipoint, Range, Single
R (cr)	(M, R, S)? R
9 (cr)	Start point? 9
15 (cr)	End point? 15

Point	State	Alarm	Return	Enable	Critical
9	NO	10	10	Y	N
10	NO	10	10	Y	N
11	NO	15	17	N	Y
12	NO	10	10	Y	N
13	NO	15	17	N	Y
14	NO	15	17	N	Y
15	NO	10	10	Y	N

LS complete

If a new alarm occurs during this listing, it will report when it occurs (in the middle of the list) and will not be a part of the list.

4.8.6 List Exception (LE)

Execution of the List Exception (LE) feature will result in the printout of all points which have been operator disabled by use of the MS command.

An example of the List Exceptions (LE) is as follows:

Operator Action	Display or Ptr. Message
LE (cr)	>LE STATION NAME Station Number _____ 28 Aug 1985 12:45:52 Password?
Enter Password (cr)	List exceptions Points disabled Multipoint, Range, Single (M, R, S)? R
R (cr)	Start point? 1
1 (cr)	End point? 512
512 (cr)	13 14 17 24 26 29 33 LE complete
In this example, points are disabled.	13, 14, 17, 24, 26,29 and 33

4.8.7 List Legends (LL)

Execution of the List Legends (LL) feature results in the printout of the legend data stored in EEPROM. An example of the List Legends (LL) feature is as follows:

Operator Action	Display or Ptr. Message
LL (cr)	>LL STATION NAME Station Number 28 Aug 1985 12:45:52 Password?
Enter Password (cr)	List legends Multipoint, Range, Single
R (cr)	(M, R, S)? R
1 (cr)	Start point? 1
5 (cr)	End point? 5 A 1 blue Alarm Point 1 A 2 blue Alarm Point 2 A 3 blue Alarm Point 3 A 4 blue Alarm Point 4 A 5 blue Alarm Point 5 LL complete

If the multipoint (M) feature were used, the computer would display "NEXT POINT?" as an operator prompt. The operator would then key in the next point number followed by (cr) to list the legend assigned to that point or simply perform (cr) to finish the report.

If a new alarm occurs during this listing, it will report when it occurs (in the middle of the list) and will not be a part of the list.

4.8.8 List Configuration (LC)

Execution of the List Configuration (LC) feature results in the printout of the seven port configurations, back-up ports, preferred ports,the status of each of the scanner cards, Alarm or Normal indention, whether or not the optional battery-backed RAM is implemented, and the number of points in the system, and the time the hourly printout occurs.

Operator Action	Display or Ptr. Message
LC (cr)	>LC STATION NAME Station Number _____ 28 Aug 1985 12:45:52 Password?
Enter Password (cr)	Configuration list

Configuration List

Port	Parity	Data Bits	Baud Rate	Assignment	Backup Port
0	space	7	1200	console	0
1	space	7	600	strip printer	0
2	none	8	9600	cassette	
3	none	8	1200	printer	1
4		0		unused	
5		0		unused	
6		0		unused	

(Critical alarm color control sequence xx xxx xx)
(Normal color control sequence xx xxx xx)

Preferred ports 0
Scanners enabled 1 2 3 4
Normal indented
Hour sync on point 1
Battery backed-up RAM enabled
Max point in system = 256
Hourly time prints 0 minutes after the hour
LC complete

Information in parenthesis will print only if the applicable option is entered in MC command.
In addition, other information may be printed, depending on the system configuration.

4.8.9 List Output Assignments (LO)

Execution of the List Output Assignments (LO) feature results in the printout of the status of output devices P0, P1, P2, P3, P4, P5, P6 and MS and whether each of these devices will receive an Alarm (A), Return-to-Normal (N), or both Alarm and Return-to-Normal (AN) for each of the alarm points (40, 41, 42, etc.). Output devices P0 and P6 are the front panel RS232 ports; P1, P2, P3, P4 and P5 are output ports 1, 2, 3, 4, and 5 on the rear of the unit.

Operator Action	Display or Ptr. Message
LO (cr)	>LO STATION NAME Station Number 28 Aug 1985 12:45:52 Password?
Enter password (cr)	Output list Multipoint, Range, Single
R (cr)	(M, R, S)? R
40 (cr)	Start point? 40
50 (cr)	End point? 50

Port	P0	P1	P2	P3	P4	P5	P6	MS
40	AN	-N	--	--	AN	-N	AN	AN
41	AN	-N	--	AN	AN	-N	AN	AN
42	AN	-N	--	--	AN	-N	AN	AN
43	A-	-N	AN	AN	AN	-N	AN	AN
44	AN	-N	--	AN	AN	-N	AN	AN
45	AN	-N	--	--	AN	-N	AN	AN
46	A-	AN	--	--	AN	-N	AN	AN
47	A-	AN	--	AN	AN	-N	AN	AN
48	A-	AN	--	--	AN	-N	AN	AN
49	A-	AN	--	--	AN	-N	AN	AN
50	AN	AN	--	--	AN	-N	AN	AN

LO complete

Any point assignment to a CRT port will result in both Alarm and Return-to-normal messages being displayed, regardless of whether both are reported in this listing or not.

If a new alarm occurs during this listing it will report when it occurs (in the middle of the list) and will not be a part of the list.

MS lists the point assigned to the Master Station by the Modify Port Assignment command "M7"

4.8.10 List Synthesized Points (LP)

Execution of the List Synthesized Points (LP) allows the operator to obtain a printout of the status of any or all of synthetic points A through H. This consists of the point mode which can be PA, PN, PB, CA, CN, or CRT and whether the given relay is enabled or disabled. Refer to the following example and note that relay "A" is set for pulse on alarm mode and has field alarm points 1 through 8 assigned to it. It is enabled. Relay "A" will pulse when any of field alarms 1-8 appear. The following example shows that field alarm points 16 through 20 go to Point B and are in the continuous on alarm mode. It is enabled, and Relay "B" will operate if any field alarm point 16-20 trips. Synthesized point C is in the CRT mode. Relay D is disabled. To exit the listing, a carriage return (cr) may be actuated after any "Synthesized Point?" prompt. A example of the List Synthesized Points command is as follows:

Operator Action	Display or Ptr. Message
LP (cr)	>LP STATION NAME Station Number 28 Aug 1985 12:45:52 Password?
Enter Password (cr)	List synthesized point
A (cr)	Synthesized point? A Point A pulse enabled 1 2 3 4 5 6 7 8
B (cr)	Synthesized point? B Point B OR enabled 16, 17, 18, 19, 20
C (cr)	Synthesized point? C Point C CRT enabled
D (cr)	Synthesized point? D Point D pulse disabled
(cr)	Synthesized point? LP complete

4.9 PORTABLE DATA CASSETTE OPERATION

The tape loader interfaces with the Hathaway 7000 through any of the RS-232 connectors on the back panel or Port 6 on the front panel. The Modify Configuration command (MC) is used to tell the Hathaway 7000 which port will be used with the tape loader. A cable is provided for use with the unit. Power for the tape loader is obtained from a 120 VAC outlet.

4.9.1 Configuration

One of the ports of the Hathaway 7000 must be configured to accept the tape loader. Use the Modify Configuration command (MC) to set the configuration of the Hathaway 7000. For now, set Port 6 to be the cassette port as follows:

Operator Action	Display or Ptr. Message
MC (cr)	>MC
	STATION NAME
	Station Number _____
	28 Aug 1985 12:45:52
	Password?
Enter Password?	Port number to modify? 6
6 (cr)	Port assignment? CA
CA (cr)	Port number to modify?
(cr)	Enter scanner(s) to enable?
(cr)	Enter scanner(s) to disable?
(cr)	Alarm indent? Y
Y (cr)	Battery back-up RAM? Y
Y (cr)	MC complete

Verify that the Port 6 configuration is correct by using the List Configuration (LC) command. The configuration for Port 6 should read:

Port	Parity	Data Bits	Baud Rate	Assignment
6	None	8	9600	Cassette

4.9.2 Save on Tape (ST)

Insure Port 6 is configured to accept the tape loader. Interconnect Port 6 to the tape loader using cable 806560-001. Plug the cassette loader into an outlet. All white rocker switches on the loader should be off (blank end down) except for the 9600 switch which should be on. Turn on the tape loader power switch. The light emitting diodes should flash on and off in sequence indicating that the loader is operating properly. If this does not happen, turn the power switch off for a few seconds and back on. When the lights flash in sequence, the loader is ready to operate.

Put a blank cassette tape in the loader with side A up and close the cassette door. Wait until the tape stops moving and issue the Save on Tape command (ST). A header and the contents of the Hathaway 7000 non-volatile memory (NVM) are written on the tape. This may take several minutes. It may be necessary to turn the tape over during the procedure at the time requested by the printer. The data being saved is printed out during the operation. The tape automatically rewinds and the 7000 resets.

4.9.3 Restore Memory from Tape (RT)

Insure Port 6 is configured to accept the tape loader. Interconnect tape loader to Port 6, plug it in and turn it on. Insert a recorded cassette tape with side A up. Wait until the tape stops moving. Issue the Restore Tape command (RT). The header is read and printed by the 7000.

The time and date the tape was made is printed out and, at that time, the option is given to continue or not. If the operator finds it is the wrong tape, the procedure can be terminated at this time.

Other options during the restoration from tape allow the operator to decide whether a complete restoration is to be made or whether to omit a system configuration, point configuration or synthesized point configuration change. The tape must be turned over during the procedure when the printout requesting it appears. Upon completion of the procedure, the tape is rewound and the system is restarted.

NOTE: If the option to restore the system configuration is taken, this procedure rewrites everything in NVM. This includes the system password.

NOTE: During execution of ST and RT commands the system is disabled, and no field contact events will be captured.

5.0 MAINTENANCE AND TROUBLESHOOTING

5.1 GENERAL

The SER itself requires no periodic maintenance. Follow the recommendations of each manufacturer, however, for any maintenance required by each of the peripheral devices that are connected to the recorder.

Troubleshooting the SER consists of locating the failed board(s) and replacing them with known good boards. Use the internal diagnostic test routines, however, prior to resorting to any board-swapping procedure.

The BETAlog 512 has internal diagnostic test routines that check for proper operation of each scanner board and all field inputs as well as proper communication to external devices through Ports 0-6. If there is a failure, the appropriate error message will be printed or displayed on the CRT option. The failures that a user may experience will be given in the following paragraphs.

5.2 SYSTEM IS DOWN AND WILL NOT OPERATE

First check the LED indicators on the main controller. The bottom LED indicates the controller is functional. If it is on, the +5VDC power should be OK. Check for clock operation on the CRT. If the clock stops, this could be an indication the +12VDC or -12VDC has been lost. These voltages can be checked at the test jacks located on the front of the 512 unit or on the terminal board located on the rear of the SER if front panel test jacks are not provided. Lack of total operation could also mean the system is locked up and must be reset in order for it to operate again. This is done by turning the BETAlog power off for approximately a second and back on again. The power switch (if installed) on the front of the BETAlog can be used to do this. The printer should print "BETAlog 512," the date, time and current software version. The unit should function after this if the problem was caused by a system lockup. Such a loss of proper program execution or loss of +5VDC logic power is also indicated by a contact closure between pins 4 and 8 on the rear panel connector J2. This is the result of the activation of the watchdog timer circuitry located on the Logic Backplane PCB. Further reference to this important trouble-shooting tool will be made later.

If there is still a problem, the main controller board should be replaced. After that, the BETA Products Field Service Department should be contacted if the SER is still inoperative.

5.3 SCANNER FAIL - SCANNER SELF TEST

The printout example shown below indicates scanner #1 failed a self test. This test is conducted once a minute to check for proper communication between the scanner and the main controller. If this communication is lost, the printout occurs. A scanner that is not installed, a defective scanner, or an actual inability to communicate at the requested time due to other operations being performed may cause this failure. If the failure printout occurs, wait for 30 seconds and see if the scanner self test online printout occurs. If it does, everything is OK. If not, check the scanner card number as indicated by the printout.

10:55:15:000 #1 Scanner Failure

If the test is normal when it is run the next time, the following printout occurs:

10:55:45:000 #1 Scanner on line

5.4 FUNCTIONAL TEST FAILURE

A functional test of all inputs of the scanners is run automatically every hour on the hour, or manually by the operator, with command FT. This test also checks the scanner card test circuit to make sure it functions properly and that there is no interruption of the field contact voltage. The following is an example of a scanner tester failure on Scanner #6:

```
Functional Test 01 JAN 1985  17:54:35
T 17:54:35.457  #6 Functional tester failure on scanner
```

If the alarm occurs on a single scanner card, the problem is usually on the card itself. If all scanners indicate a failure, the problem could be loss of field contact voltage. The field contact voltage can be checked with a voltmeter on the terminal board on the 512 rear panel. Also check the fuse for the field contact supply.

A scanner card that is not properly seated in its slot and tightened down may also cause the scanner tester failure alarm. If a card is removed and reinstalled, make sure it is properly seated and tightened down with both thumbscrews on the card. **TURN POWER OFF** before removing or installing cards.

The scanner inputs are all tested for proper operation in both the alarm mode and normal mode. The following examples indicate the scanner input circuit for point #2 failed in the alarm mode (FA) and also in the normal mode (FN). This indicates a scanner card input circuit failure which could be the input optical coupler.

Failed in Alarm Mode

```
Functional Test
01 JAN 1985 17:59:48
FA 17:59:48.297 #2
ALARM LEGEND
```

Failed in Normal Mode

```
Functional Test
01 JAN 1985 18:00:27
FN 18:00:27.731 #2
NORMAL LEGEND

FT Complete
```

5.5 FAILED PORT INDICATION

A failed port can be indicated by either the operation of a synthesized point relay (if it was so assigned) or by a display on the optional CRT screen.

If any port (0-6) that has been assigned to an external device fails or communication is lost between it and the controller, the appropriate port number will appear in the fail (red) line on the bottom of the CRT. If the port that is assigned to the CRT fails, the message, of course, cannot be displayed. If there is a port failure, make sure the external device is actually connected and cables securely tightened. Make sure the device has power to it and that it is operational. Check to see that any printer that is connected has sufficient paper. Check the +12VDC and -12VDC power on the 512 unit. If the problem cannot be resolved, it will be necessary to bypass the failed port and assign another one to the device, using the Modify Configuration command (MC) or to replace the aux controller card if any of ports 3 through 6 have failed. If the problem is on ports 0 through 2, then the main controller board would need to be replaced unless it is isolated to an external connection or inoperative device.

5.6 WATCHDOG TIMER FAILURE

A watchdog timer failure (contact closure between pins 4 and 8 on J2 on the rear panel) is an indication the main controller is not generating a pulse to the watchdog timer every 10 seconds to indicate it is still functional or that the +5V processor power is lost. The probable cause is that the main controller has failed. A very remote possibility is that the processor is tied up processing events and unable to send the pulse when required. This would only happen on very unusual field alarm circumstances. If the watchdog timer fails, the following steps should be performed in the order given:

1. Check bottom LED on front of main controller. If it is off or the system appears to be locked up and will not operate, go to 2. If it is on, go to 4.

2. Reset system by turning power off for 1 or 2 seconds and then back on. If problem is resolved, go to 6. If not fixed, go to 3.

3. Check 5VDC power on rear panel terminal board or at test jack on front of 512 unit (if test jacks are provided). If OK, go to 4. If 5VDC has been lost, check 5VDC power supply. Replace as necessary. After replacement, adjust new power supply for 5.2V. If problem is solved, go to 6. If not, go to 4.

4. Replace main controller board. If problem is solved, go to 6. If not, go to 5.

5. The watchdog timer circuit on the logic backplane board is probably defective. Replace this board and, if the problem is not corrected, contact the BETA Products Field Service Department.

6. Restore system to normal operation.

5.7 SYSTEM PASSWORD IS LOST

Contact the BETA Products Field Service Department and give model number and serial number of unit. Someone can direct you how to restore the system if you can provide the above information.

5.8 REMOVAL AND INSERTION OF PC BOARDS

Prior to the removal (or insertion) of any PC board from (or to) the SER card cage, input power should be turned off to avoid possible damage to the electronics while power is present on either backplane. Prior to the removal of the main or aux controllers, downloading the system configuration data to the optional cassette recorder is recommended so that after installation of a new card, the configuration data can be readily uploaded to the new controller(s). If the optional cassette is not available, the system configuration data will have to be reprogrammed into the new controller card(s) or the appropriate EEPROM devices can be exchanged. Care must be taken to insure each device is positioned in the same exact locations.

NOTE: When changing scanner cards, jumper E4 must be in the left position when plugged into the main chassis, and in the right position when plugged into the expansion chassis. (See Dwg. 309058).

6.0 PRINTED CIRCUIT BOARD DESCRIPTION

6.1 MAIN CONTROLLER PCB ASSEMBLY 309060-001

Refer to schematic 409060 for the following discussion.

The main controller PCB contains the main 512 processor (a 68000, U24) battery-backed, data storage RAM, program storage PROM, legend and system configuration storage EEPROM, three RS-232C serial communication ports, one auxiliary relay port, a port to communicate with the scanner, a calendar clock device, and the I.C.'s used to select which of the above-mentioned devices are to be under processor control at any instant of time. In addition, this board contains timing and AC line synchronization, an interboard connector (J5) used to communicate with the auxiliary controller, and a test connector (J9) used for factory test.

The data storage RAM, U51 through U66, consists of 128K bytes with each IC containing 8K bytes. Battery backed RAM, U8 and U20, consists of 16K bytes with each IC containing 8K bytes. Battery backed RAM can be implemented by choosing it in the configuration and insuring that jumper E6 is installed. Contents consists of the 1500 point historical buffer and EEPROM status.

Program storage PROM consists of 192K. The main program is resident in U9, U13, U19 and U23 consisting of 128K with 32K bytes per IC. PROM locations U34 and U35 are reserved for future program storage.

Point legend data, N.O./N.C. field alarm states, alarm and return-to-normal debounce times, point disable status, scanner disable status, and port 1 through 6 configurations are all stored in EEPROM. The EEPROM is divided between the main controller and the auxiliary controller. The maximum EEPROM size on the main controller is 80K bytes with 8K bytes per IC. (U6, U7, U10, U11, U12, U16, U17, U18, U21, U22). The remaining EEPROM, if required, is contained on the auxiliary controller. The quantity of EEPROM for any given system depends on the number of scanner cards supplied for that system and if separate return-to-normal legends are used per drawing 806760.

Each RS-232C communication port is controlled by an ACIA (asynchronous communication interface adapter) under processor control. I.C's U30, U49 and U73 control ports 1, 2 and 0, respectively. Refer to Section 2.7 for port I/O pin function assignments. PIA (peripheral interface adapter) chip U68 performs two functions: it reads the dip-switch SW2, which defines port 0 configuration (ref. section 2.7) and it controls the eight auxiliary relays that are classified as synthesized points A through H. Part of LED array, DS1, is used to indicate visually the state of each synthesized point. The uppermost LED indicates that point A is activated, the next LED indicates that point B is activated and so on until point H is reached at the third LED from the bottom of the stack. Refer to section 1.6 for relay to point assignments. The last LED in the stack indicates a normal run condition if it is on.

The main controller communicates with the scanner cards via the logic backplane using part of PIA, U85. J4 on the main controller is bussed to all scanner cards upon insertion of the card into its assigned card cage slot.

A calendar clock I.C., U84, provides the main processor with month, day, year, hours, minutes and seconds data. If the optional battery-backed RAM is ordered, this clock chip can also be battery-backed by installing jumper E6. A one millisecond pulse is generated by dividing down the clock output from U84. This 1 ms pulse is bussed to all scanner cards so that each card can scan its 64 field inputs at that time in order to maintain the 1 ms resolution of field input status. A 2K Hz. signal is also generated and fed back to a digital comparator, U75, whose other input is 50 or 60 Hz. pulses from the logic backplane. If the divided down 2K Hz. is in phase with the line sync input, then the normal 1.048 MHz. pulses are gated through pin 6 of U88 to the calendar clock oscillator input. If speed up is required, then some 2.097 MHz. pulses are gated through pin 12 of U92 until pin 13 of U75 goes low. If slow down is reqired, then the oscillator inputs to the calendar clock cease until "in phase" is again asserted. If the 50/60 Hz. line sync input is not available or if the logic 5VDC is lost, then the nominal 1.048 MHz. clock is gated through pin 11 of U83 as the oscillator input.

All other I.C.'s serve as support chips for the above functions: U27 selects the current communication port, U91 selects the RAM pair being addressed, U1 and U2 select the EEPROM currently addressed or the calendar clock address or data currently on its multiplexed bus, and U14 and U15 select the PROM currently addressed.

With the exception of the RS-232C port drivers, all I.C.'s on the main controller are powered by 5VDC.

6.2 AUX CONTROLLER PCB ASSEMBLY 309061-001

Refer to schematic 409061 for the following discussion.

The auxiliary controller is an extension of the main controller, containing four additional RS-232C communication ports and additional EEPROM for legend and system configuration storage. Each EEPROM device contains 2K bytes of data. Although the board can contain 48 such devices, a maximum of 20 are installed on a full 1024 point system. Drawing 806760 itemizes the EEPROM usage depending upon the maximum point capacity for any given system.

Each RS-232C communication port is controlled by an ACIA under processor control. I.C.'s U20, U30, U46 and U65 control ports 3, 4, 5 and 6, respectively. Refer to Section 2.7 for port I/O pin function assignments.

Communication with the main controller is implemented through the short 50 pin ribbon cable which interconnects J5 on both ends.

All other I.C.'s serve as support chips for the above functions:

U36 selects the current communication port;
U24 through U29 select the EEPROM currently addressed;
U1 and U10 buffer signals from the main controller; and
U11 and U23 buffer the bi-directional data bus.

With the exception of the RS-232C port drivers, all I.C.'s on the auxiliary controller are powered by 5VDC.

6.3 AUX CONTROLLER PCB ASSEMBLY 309075-001

Refer to schematic 409075 for the following discussion:

The auxiliary controller is an extension of the main controller, containing three additional RS-232C serial communication ports, a fiber optic communication port, an IRIG-B BNC port, as well as additional EEPROM for return-to-normal legends. Each EEPROM device contains 8K bytes of data. Although the board can contain eight such devices, there may be fewer depending on the maximum number of points available in the system.

Each RS-232C communication port is controlled by an ACIA under microprocessor control. Integrated circuits U33, U34, and U36 control ports 3, 4, and 6 respectively. (Refer to section 2.7 for port I/O pin function assignments).

Communication with the main controller is implemented through the short 50 pin ribbon cable which interconnects J5 on the main and aux controllers.

All other I.C.'s serve as support chips for the above functions:

U18 selects the current communications port;
U6 and U7 select the EEPROM currently addressed;
U3, U4, and U5 buffer signals from the main controller; and,
U1 and U2 buffer the bi-directional data bus.

With the exception of the RS-232C port drivers, all I.C.'s on the auxiliary controller are powered by 5VDC.

In addition to the circuit described above, there are also the I.C.'s used to support port 5, which is the IRIG-B clock interface and the fiber optic interface. Both of the functions are handled via software control which is contained in U19, a 32K byte EEPROM read-only device. The code contained in U19 is executed by the MC68008 microprocessor, U21. U20 is an 8K byte RAM chip for the processor. The processor is responsible for operating the serial communications controller, U22. The SCC is responsible for serial communications for the fiber optic port. It transmits serial data via U45 and receives via U46 and interfaces with the data bus via U35, an ACIA.

The IRIG-B input (J3) is handled entirely through software.

J4 pins 5 and 6 are inputs from the scanners and are used to generate pulses for the interface with a Hathaway Digital Fault Recorder.

All other I.C.'s serve as support chips for the above functions.

6.4 POSITIVE COMMON SCANNER PCB ASSEMBLY 309058

Refer to schematic 409058 for the following discussion.

Each scanner card synchronously polls its inputs every millisecond to insure the resolution of field contact status to that time interval. Each scanner contains its own processor and memory to service and store the status of the 64 field inputs assigned to it. There are three versions of this card: one for 24 VDC field inputs, one for 48 VDC field inputs, and one for 125VDC input voltages. Other than resistive voltage divider differences on the input and test circuits, the boards are identical. Point configuration data (N.O./N.C. field alarm status, and scanner disable) as well as real time is periodically down loaded from the main controller to all scanner processors. After the occurrence of a valid field input stauts change, real time and the alarm state are stored in the scanner temporary memory. Each scanner then generates an interrupt to the main controller. After the main controller determines which scanners have generated interrupts and which one of those has the highest priority (based upon which one was last served), the field event data for that scanner are transferred to the historical buffer in the main controller.

The field inputs are connected to J2 and J3 with +FC available on pin 29 of each connector to provide the common voltage for the field devices activating this board. This board assembly is designed to meet IEEE 587-1980 surge withstand capability requirements on each input line.

Each input signal is diode "OR'd" with the "TEST ONE" switched +FC voltage that appears on the collector of Q2 whenever functional test occurs.

Each input is optically coupled to a tri-state buffer whose outputs are read under processor control. The processor reads 16 inputs per strobe as determined by enable signals PT0 through PT3. These signals are derived from the decoded inputs of U86.

Transistor Q3 is normally kept on by the base drive through R197 (except for the "OFF" state functional test, PA5 of U68 is high) in order to provide a return path to the FC supply for field inputs. This base drive is obtained from Q1 which is biased on (PA4 of U68 is high except during functional test) and which, in turn, maintains Q2 off. Jumpers E1 and E2 are to be removed ONLY when a customer supplied external field contact voltage is different from the voltage level supplied by the internal field contact source.

During the "ON" state functional test, PA4 of U68 is brought low (PA5 is maintained high). The activation of the optically coupled transistor turns Q1 off. Q2 becomes biased on driving Q3 on to maintain the return path for the FC supply. The "TEST ONE" line is now at the +FC potential which drives all input circuits on the scanner cards. A feedback input to PA6 on U68 informs the scanner processor that the functional test drive circuitry is performing properly.

During the "OFF" state functional test, both PA4 and PA5 of U68 are driven low. This places the "TEST ONE" line at +FC but turns Q3 off, thus shutting off the return line for the FC source. All scanner input circuits will, therefore, be inactive even though the +FC source is trying to drive them.

The scanner processor, U91, communicates with the main controller through PIA, U68 and the logic backplane PCB, via P4. Each board address (inputs PA0, PA1 and PA2 of U68) is hard wired on the logic backplane so that upon insertion of a scanner into any scanner card cage slot, that card will know its address when sending or receiving data from the main controller.

PA3 of U68 (pin 5) must be tied low via jumper E4 for all scanners in the basic 512 chassis and must be tied high for all scanners in the expansion chassis.

The data storage RAM, U81 and U83, consists of 16K bytes with each IC containing 8K bytes. RAM contents consist of point configuration data (N.O./N.C. point alarm states, alarm and return-to-normal debounce times, and point disable status) and scratchpad memory for past and present field input status for that card.

The program storage PROM (U80 and U82) can be implemented with either 8K byte chips (2764's) or 4K byte chips (2732's). If 2732's are used, then pin 12 of those devices must be inserted into pin 14 of the sockets for U77 and U79 in order to maintain I/O pin compatability.

All other I/C's serve as support chips for the above functions: U84 and U85 select the PROM chip currently addressed, the D-latched pair (U90) and its associated gates provide the 68000 with the necessary data acknowledge signal two clock pulses after a valid address occurs on the address bus ("A5" is asserted true), U89 is used to establish the priority of interrupt request "B" over that of interrupt request "A" and to generate the valid peripheral address (VPA) signal during communication with PIA, U68 (address bit A23 is high during that time).

A test connector, J9, is used for factory test. All I.C.'s on the scanner are powered by 5VDC.

6.5 NEGATIVE COMMON SCANNER PCB ASSEMBLY 309059

Refer to schematic 409059 for the following discussion.

Each scanner card synchronously polls its inputs every millisecond to insure the resolution of field contact status to that time interval. Each scanner contains its own processor and memory to service and store the status of the 64 field inputs assigned to it. There are three versions of this card: one for 24 VDC field inputs, one for 48 VDC field inputs, and one for 125VDC field input voltages. Other than resistive voltage divider differences on the input and test circuits, the boards are identical. Point configuration data (N.O./N.C. field alarm status, alarm and return-to-normal debounce times, point disable status, and scanner disable) as well as real time is periodically downloaded from the main controller to all scanner processors. After the occurrence of a valid field input status change, real time and the alarm state are stored in the scanner temporary memory. Each scanner then generates an interrupt to the main controller. After the main controller determines which scanners have generated interrupts and which one of those has the highest priority (based upon which one was last served), the field event data for that scanner are transferred to the historical buffer in the main controller.

The field inputs are connected to J2 and J3 with -FC available on pin 29 of each connector to provide the common voltage for the field devices activating this board. This board assembly is designed to meet IEEE 587-1980 surge withstand capability requirements on each input line.

Each input signal is diode "OR'd" with the "TEST ONE" switched -FC voltage that appears on the collector of Q2 whenever functional test occurs.

Each input is optically coupled to a tri-state buffer whose outputs are read under processor control. The processor reads 16 inputs per strobe as determined by enable signals PT0 through PT3. These signals are derived from the decoded inputs of U86.

Transistor Q3 is normally kept on by the base drive through R197 (except for the "OFF" state functional test, PA5 of U68 is high) in order to provide a return path to the FC supply for field inputs. This base drive is obtained from Q1 which is biased on (PA4 of U68 is high except during functional test) and which, in turn, maintains Q2 off. Jumpers E1 and E2 are to be removed ONLY when a customer supplied external field contact voltage is different from the voltage level supplied by the internal field contact source.

During the "ON" state functional test, PA4 of U68 is brought low (PA5 is maintained high). The activation of the optically coupled transistor turns Q1 off. Q2 becomes biased on driving Q3 on to maintain the return path for the FC supply. The "TEST ONE" line is now at the -FC potential which drives all input circuits on the scanner cards. A feedback input to PA6 on U68 informs the scanner processor that the functional test drive circuitry is performing properly.

During the "OFF" state functional test, both PA4 and PA5 of U68 are driven low. This places the "TEST ONE" line at -FC but turns Q3 off, thus shutting off the return line for the FC source. All scanner input circuits will,therefore, be inactive even though the -FC source is trying to drive them.

The scanner processor, U91, communicates with the main controller through PIA, U68 and the logic backplane PCB, via P4. Each board address (inputs PA0, PA1 and PA2 of U68) is hard wired on the logic backplane so that upon insertion of a scanner into any scanner card cage slot, that card will know its address when sending or receiving data from the main controller. In addition, PA3 of U68 (pin 5) must be tied low via jumper E4 for all scanners in the basic 512 chassis and must be tied high for all scanners in the expansion chassis.

The data storage RAM, U81 and U83, consists of 16K bytes with each I.C. containing 8K bytes. RAM contents consist of point configuration data (N.O./N.C. point alarm states, alarm and return-to-normal debounce times, and point disable status) and scratchpad memory for past and present field input status for that card.

The program storage PROM (U80 and U82) can be implemented with either 8K byte chips (2764's) or 4K byte chips (2732's). If 2732's are used, then pin 12 of those devices must be inserted into pin 14 of the sockets for U80 and U82 in order to maintain I/O pin compatability.

All other I/C's serve as support chips for the above functions: U84 and U85 select the PROM chip currently addressed, the D-latch pair (U90) and its associated gates provide the 68000 with the necessary data acknowledge signal two clock pulses after a valid address occurs on the address bus ("A5" is asserted true), U89 is used to establish the priority of interrupt request "B" over that of interrupt request "A" and to generate the valid peripheral address (VPA) signal during communication with PIA, U68 (address bit A23 is high during that time).

A test connector, J9, is used for factory test. All I.C's on the scanner are powered by 5VDC.

6.6 LOGIC BACKPLANE ASSEMBLY 309062

Refer to schematic 409062 for the following discussion.

The logic backplane provides for six distinct functions:

1. It interconnects the main controller with each scanner to create a path for scanner communications.

2. It provides hardwired addresses for each scanner card.

3. It busses power and ground to all of the cards.

4. It provides for a 50/60 Hz time sync input from an external source (optional).

5. An external source voltage or contact closure can sync a 512 or groups of 512 units to a master device (optional).

6. A watchdog timer is provided to warn of processor "lock-up" or loss of 5VDC power.

Pins 10 through 17 provide the 8 bit data path for scanner communications with the main controller. Note that the auxiliary controller does not communicate with any scanner. Pin 8 provides the signal to the scanner cards that data on the bus is ready for them to accept. Pin 9 provides the signal to the main controller that data on the bus is ready for it to accept. Pin 18 provides the one millisecond timing pulse from the main controller to all of the scanners to initiate the polling of all field inputs assigned to each scanner card. An 8MHZ clock signal can be produced on pin 19 via jumper E1 on the main controller. A clock signal is needed on the backplane when using earlier revision scanners. Current rev level scanners provide their own 8 MHZ clock signal. Pin 20 provides the power-on-reset pulse, both of which emanate from the main controller PCB.

Pins 5, 6 and 7 provide the hard wired address for each scanner so that each card knows who it is upon insertion into the backplane.

Pin 5 to the main controller contains the 50/60 Hz synchronization pulse; Pin 6 provides the CPU with the sync. pulse from an external device; and Pin 7 contains a CPU-generated signal which occurs every 10 sec. in order to pulse the watchdog timer re-triggerable one-shot and to provide one of the sources for timer synchronization of other devices.

Since communication between the auxiliary and main controller is implemented through a short 50 conductor q cable, only power and ground are picked up by the auxiliary controller from this backplane.

Connectors J14 and J15 are provided in order to expand a 512 scanner up to 1024 points. These two connectors and the appropriate cables provide the necessary interace to a second 512 chassis which contains only additional scanner cards for the expansion.

Power to the logic backplane is furnished through a connector from the DC supply that mates with P3.

6.7 FC BACKPLANE ASSEMBLY 309063

Refer to schematic 409063 for the following discussion.

The purpose of the field contact backplane is to bus the field contact supply source(s) to each of the scanner cards. Field contact source voltage is applied through a connector that mates with P1 and/or P2 where the positive sides of each supply are diode tied (via D1 andD2). This voltage, along with the supply return, is simply bussed to each scanner where it is picked up on P1 of each card and is used for the functional testing of all input circuits and is also output on J2 and J3 (Pins 29 and 30) of each scanner for use as field contact source power for each of the scanner input circuits.

6.8 UNIVERSAL INTERFACE PANEL

The Universal Interface Panel contains 32 identical circuits that convert an input voltage to a 1 milliamp current source to drive an optical coupler and output transistor.

Refer to Schematic 409068 and PCB assembly 309068 for positive common output. Only circuit #1 will be described, since the others are identical.

The input voltage comes into Pins 1 and 2 and input conditioning filter R49, R50 and C9 and fed to full wave bridge rectifier CR73, CR74, CR75 and CR76. The bridge rectifier will accept an AC input as well as either polarity DC.

With an input voltage applied, transistors Q25 and Q27 conduct and carry .5 milliamps of current each which turns on optical coupler U9 and output transistor Q26..

The purpose of CR78 and CR81 is to match the base emitter junction drop of the transistors Q25 and Q27 while diodes CR77 and CR80 set the voltage drop across emitter resistors R51 and R53. R51 and R53 each have .5 milliamps of current flow when the transistors are conducting.

Pin 29 connects to the +FC source voltage that is present on the positive common scanner PCB. Pin 20 connects to Input #1 of the scanner card to provide the alarm input when Q26 is switched on.

The negative common output UIC (ref. schematic 409069) employs the same input circuitry, as does the positive common unit. The only difference between the two PC boards lies in the hook-up of the output transistors. Rather than tying the collectors together as is done in the positive output UIC, all emitters are tied together and are connected to Pin 29 to receive the -FC source voltage that is present on the negative common scanner.

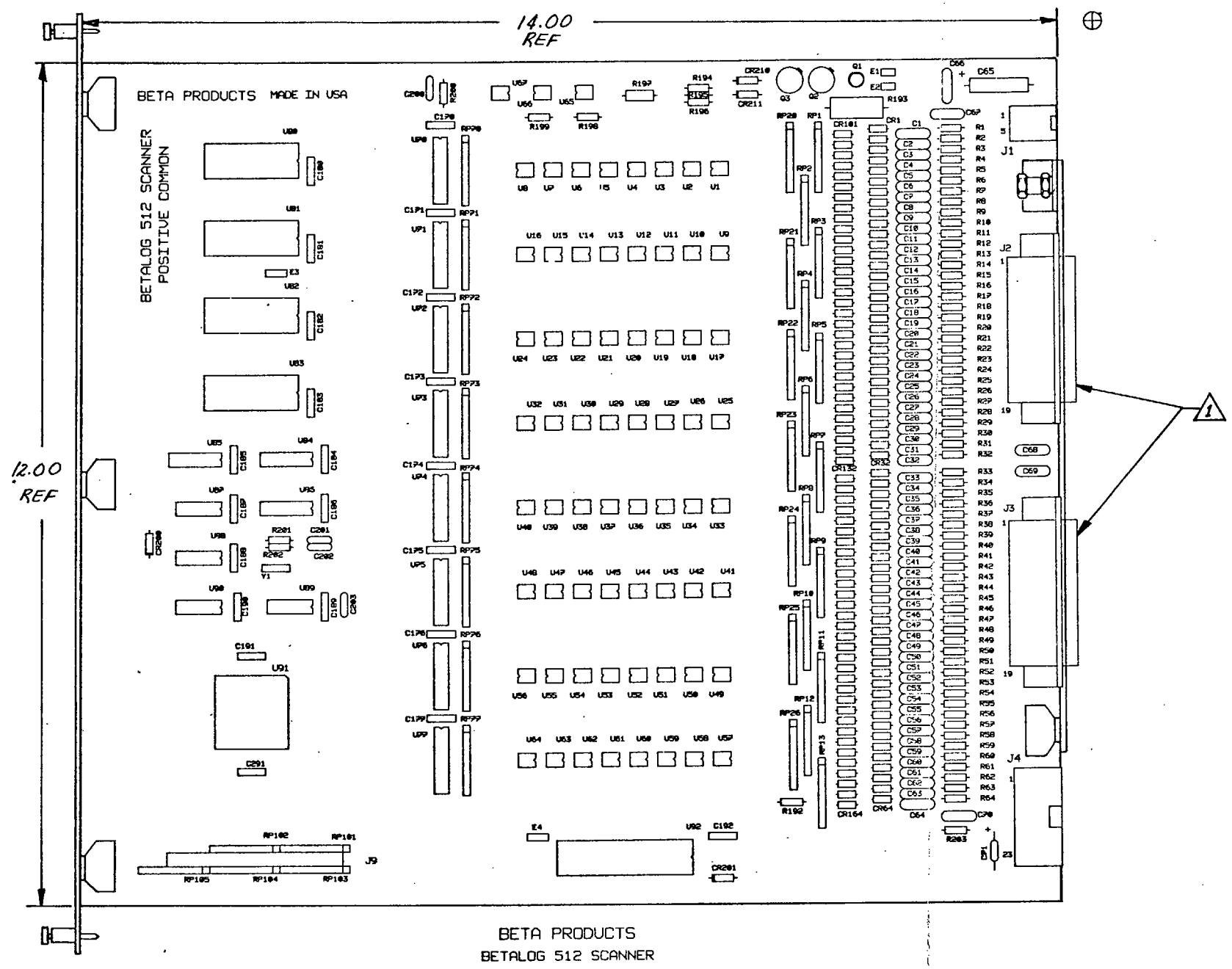
Each type of UIC panel will operate with all BETAlog field contact voltage ranges.

7.0 DRAWING LIST
950102

NUMBER	SIZE	TITLE
309058	D& A	PCB Assy, Pos Com Scanner
309060	D& A	PCB Assy, Main Controller
309061	D& A	PCB ASSY, Aux Controller
309062	D& A	PCB Assy, Logic Backplane
309063	C& A	PCB Assy, Field Contact Backplane
409058	D	Schematic, Pos Com Scanner PCB
409060	D	Schematic, Main Controller PCB
409061	D	Schematic, Aux Controller PCB
409062	D	Schematic, Logic Backplane PCB
409063	C	Schematic, Field Contact Backplane PCB
806580	D	Block Diagram, BETAlog 512/1024
806862	D	Wiring Dia. BL512 125V F.C. P/S
807512	D	Assy, BETAlog 512 Chassis
807536	A	Scanner Input Connector Tabulation
807520	D	Terminal Arrangement
807521	D	Cabinet Arrangement
807522	B	Power Input Panel
807564	C	Cabinet Wiring
807346	A	Operation Ground Detector
307748	D	Assy Ground Detector
807304	B	Assy Isol Switch Panel with Gnd Det
807307	B	Wiring Diagram Isol Switch Panel
807609	B	Assy, Power Supply Cover w/1PPM OSC
309093	A	Assy, 1PPM OSC
409093	B	Schematic, 1PPM OSC
807628	B	CRT Outline & Modem Wiring
806801	C	Assy, Relay Interface Panel

AF 14906

REVISIONS				
STN	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL
A	ECN 208243	6/25	[illegible]	
B	ECN 208287	7/85	[illegible]	
C	ECN 208525	10/85	[illegible]	
D	ECN 209129	9/26	[illegible]	
E	ECN 209232	11/26	[illegible]	



BETA PRODUCTS
BETALOG 512 SCANNER
POSITIVE COMMON
SILKSCREEN

NOTES:

1. SCREWS FOR MOUNTING J2 & J3 INSTALLED FROM COMPONENT SIDE OF PCB.

FOR LIST OF MAT'L SEE PL309058

-2	-1	ITEM	DRG SIZE	PART NUMBER	DESCRIPTION
DASH NO & QUANTITY				LIST OF MATERIAL	

		DRAWN	DATE 9/86
		CHECKED	9/26
		ENG'R'G	9/26
		QA	
	UNIV.	APPROVED	
NEXT ASSY	USED ON	RELEASED	9/26
APPLICATION			

TITLE: ASSY, 512 POSITIVE COMMON SCANNER PCB

BETA PRODUCTS, INC.
1416 UPFIELD DRIVE CARROLLTON, TEXAS 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
1:1	D	309058	E	1 of 1

DWG NO. 309058 REV E SHEET 1

SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL
L	ECN 209554	4/87		
K	ECN 209328	1/87		
J	ECN 209242	11/86		
H	ECN 209174	10/86		
G	ECN 209061 (NEW VERSION)	8/86		

REVISIONS

DASH NO. & QUANTITY | ITEM | PART NUMBER | DESCRIPTION

LIST OF MATERIAL

NEXT ASSY | USED ON

APPLICATION

DRAWN — DATE 8/86
CHECKED R. Mayo 8/86
ENGINEER R. Mayo 8/86
QA
APPROVED R. Mayo 8/86
RELEASED 8/86

TITLE
ASSY, POSITIVE COMMON SCANNER PCB

BETA PRODUCTS, INC.
2029 McKENZIE DR. CARROLLTON, TX 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
—	A	PL309058		1 of 3

PL 309058 Sh 2 of 2

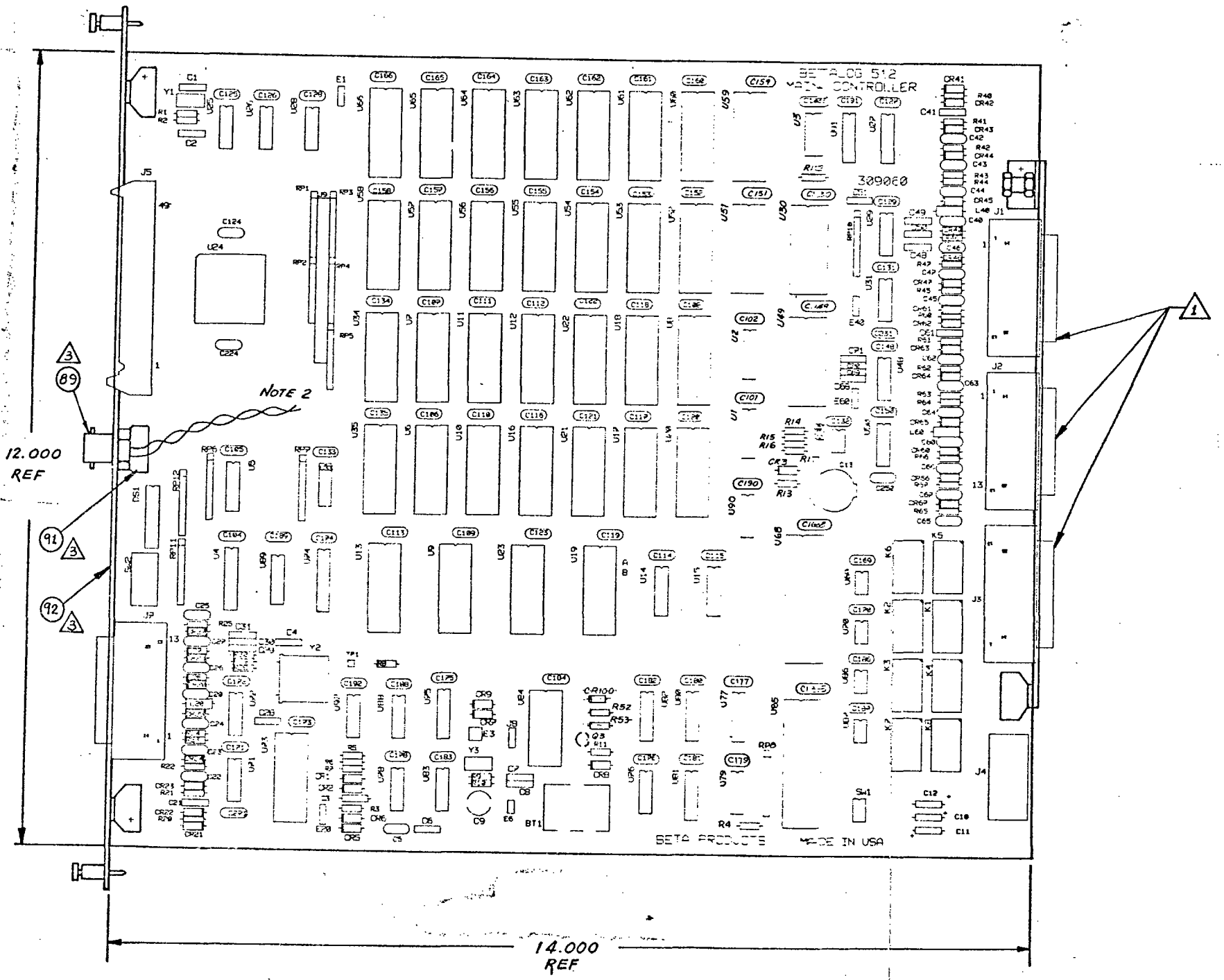
36	1	*	104040-302	Resistor 3000 1/2 W	R197
36	1	**	104040-103	Resistor 10 K 1/2 W	R197
36	1	***	104040-363	Resistor 36 K 1/2 W	R197
36	1	****	104040-753	Resistor 75 k 1/2 W	R197
37	1	*	104042-511	Resistor 510 2 W	R193
37	1	**	104042-122	Resistor 1200 2 W	R193
37	1	***	104042-332	Resistor 3300 2 W	R193
37	1	****	104042-752	Resistor 7500 2 W	R193
38	64	*	104148-333	Resistor 33 K 1/4 W	R1..64
38	64	**	104148-823	Resistor 82 K 1/4 W	R1..64
38	64	***	104148-244	Resistor 240 K 1/4 W	R1..64
38	64	****	104148-474	Resistor 470 K 1/4 W	R1..64
39	5		104195-002	Resistor SIP 4700 X 9	RP101..105
40	8		104195-021	Resistor SIP 47 K X 9	RP70..77
41	7		104195-270	Resistor SIP 27 K X 9	RP20..26
42	13		104195-275	Resistor SIP 10 K X 5	RP1..13
43	1		108232-002	Connector Banana F	
44	3		108233-002	Jumper	E1, 2, 4
45	2		108241-001	Connector 28 pin IC	U80, 82
46	1		108242-040	Connector 40 pin IC	U92
47	1		108414-006	Connector 6 pin RA M	J1
48	1		108414-024	Connector 24 pin RA M	J4
49	2		108505-037	Connector 37 pin RA F	J2, 3
50	2		112145-020	Connector 2 pin M	E1, 2 1X2 breakaway
51	1		112145-050	Connector 50 pin M	J9
52	2		112004-001	Insulator TO5 Transistor	Q3, 2
53	4		130000-009	Screw, PHP 4-40 X 5/16L	J2, 3
54	4		130031-019	Nut, hex 4-40	J2, 3
55	4		806347-001	Bracket	
56	1		806432-001	Panel rear	
57	1		806434-001	Panel front	
58	1		806480-001	Bracket	
59	REF		409058	Schematic	
60	4		134140-001	Washer, Loct ext tooth No.4	
61	19		130015-001	Screw, PHP 4-40 x 5/16 w/ext l/washer	
62	1		112145-020	Connector 3 Pin M	E4
63	4		116088-001	Lockscrew	J2,3

*	-001 24V FC
**	-002 48V FC
***	-003 125V FC
****	-004 250V FC

PL 309058 BetaLog 512 Positive Common Scanner Part List 25 JUN 87
Sh 1 of 2 Rev L

ITEM	QUAN	APL NUMBER	DESCRIPTION	REFERENCE
1	1	509058-002	PC board	
2	130	100000-024	Diode 1N4007	CR1..64, 101..164
3	2	100000-103	Diode 1N4148	CR210, 211 CR200, 201
4	1	100001-037	Transistor 2N3703	Q1
5	1	100001-031	Transistor 2N3439	Q3
6	1	100001-068	Transistor 2N5416	Q2
7	67	100151-113	IC MOC 8100	U1..67
8	2	100156-003	IC HM6264LP-15 RAM	U81, 83
9	2	100159-009	IC 2764 PROM	U80 ,82
10	1	100195-873	IC 68A21P	U92
11	1	100195-684	IC HD68000Y8	U91
12	1	100197-001	IC 74HC00	U87
13	1	100197-004	IC 74HCU04	U88
14	1	100197-074	IC 74HC74	U90
15	1	100197-132	IC 74HC132	U89
16	3	100197-138	IC 74HC138	U84..86
17	8	100197-244	IC 74HC244	U70..77
18	1	101003-001	Crystal 8 mHz	Y1
19	2	102001-030	Capacitor 30 PF SM	C201, 202
20	1	102001-038	Capacitor 270 PF disk	C203
21	4	102003-069	Capacitor 4700 PF 6 KV	C67..70
22	1	102005-082	Capacitor 5 MFD 350 V	C65
23	1	102025-002	Capacitor 0.01MFD disk	C200
24	64	102027-049	Capacitor 0.01MFD 1 KV	C1..64
25	1	102080-001	Capacitor 10 MFD 20 V	C71
26	1	102126-001	Capacitor 0.1 MFD 500 V	C66
27	22	102172-001	Capacitor 0.1 MFD 50 V	C170..177 C180..192, 291
28	2	104148-361	Resistor 360 1/4 W	R198, 199
29	1	104148-471	Resistor 470 1/4 W	R202
30	1	104148-362	Resistor 3600 1/4 W	R196
31	1	104148-103	Resistor 10 K 1/4 W	R194
32	1	104148-273	Resistor 27 K 1/4 W	R192
33	1	104148-363	Resistor 36 K 1/4 W	R195
34	1	104148-473	Resistor 47 K 1/4 W	R200
35	2	104148-105	Resistor 1 M 1/4 W	R201, 203

REVISION				
ITEM	DESCRIPTION	DATE	APPROVED	ENG. IN.
A	ECN 208104	4-85	LN	DR
B	ECN 208217	6-85	[illegible]	LP
C	ECN 208229	6-85	[illegible]	RM
D	ECN 208377	8-85	[illegible]	RM
E	ECN 208518	10/85	[illegible]	RM
F	ECN 209108	9/86	[illegible]	LD
G	ECN 209133	9/86	[illegible]	[illegible]
H	ECN 209236	11/86	[illegible]	[illegible]
J	ECN 209518	5/87	[illegible]	[illegible]
K	ECN 209543	6/87	[illegible]	[illegible]



NOTES:

1. SCREWS FOR MOUNTING J1, J2, J3, & J7 INSTALLED FROM COMPONENT SIDE OF PCB
2. ON -002 ASSY, WIRE ITEM 89 TO ITEM 90 USING #22 AWG TWISTED PAIR TEFZEL WIRE AS FOLLOWS:

FROM	TO	WIRE
ITEM 89	ITEM 90	COLOR
CENTER PIN	PIN 2	WHITE
GND PIN	PIN 3	BLACK

3. USE ONLY FOR -004 ASSY

FOR LIST OF MAT'L SEE PL309060

SCHEMATIC 409060

ITEM	QTY	PART NUMBER	DESCRIPTION

LIST OF MATERIAL

TOM TALLANT	3/86	ASSY, MAIN CONTROLLER PCB
UNIV.		BETA PRODUCTS, INC. 2004 McKINNEY DR.
		1:1 | D | 309060 | K | 1 OF 1

-004 ASSY - EXTERNAL CLOCK OSC.

1. DELETE Y3, C7, C8, C9, R9, R10, ITEM 76 & ONE OF ITEM 77

2. ADD: FOLLOWING ITEMS 89, 90, 91 & 92

SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL
M	ECN 209541	6/87		
L	ECN 209518	5/87		
K	ECN 209473	4/87		
J	ECN 209388	2/87	LIB	
I	ECN 209345	1/87		
H	ECN 209261	11/86		
G	ECN 209241	11/86		
F				
E	ECN 208795	3-86		
D	ECN 208379	8-85	LN	
C	ECN 208309	7-85	LN	
B	ECN 208218	6-85	LN	
A	ECN 208106	4-85	LN	

REVISIONS

NEXT ASSY	USED ON
309060	B/L512

APPLICATION

DASH NO. & QUANTITY | ITEM | PART NUMBER | DESCRIPTION

LIST OF MATERIAL

		DATE
DRAWN	TALLANT	2/85
CHECKED	LN	3-85
ENGINEER	J.R	3-85
QA	[illegible]	3-85
APPROVED	J.R	3-85

TITLE: ASSY, MAIN CONTROLLER PCB

BETA PRODUCTS, INC. BETA
1615 W. BELTLINE RD. CARROLLTON, TX. 75006

SCALE ~ | SIZE A | DRAWING NO. PL 309060 | REV M | SHEET 1 OF 3

PL 309060 BetaLog 512 MAIN CONTROLLER Part List 15 JUN 87
Sh 1 OF 3 REV M

ITEM	QUAN	APL NUMBER	DESCRIPTION	REFERENCE
1	1	509060-001	PC board	REV C
2	3	100000-097	Diode HP 5082-2835	CR3, 7, 9
3	5	100000-103	Diode 1N4148	CR1,2,5,6,8
4	24	104166-008	Transzorb 1N5384	CR20..27,R40..47 CR60..67
5	1	100154-010	LED 10-element DIP	DS1
6	1	100132-018	IC MC 146818 AP	U84
7	1	100132-068	IC MC 14568B	U75
8	1	100197-030	IC 74HC30	U33
9	4	100156-328	IC 27256 PROM	U9, 13, 19, 23
10	4	100164-002	IC MC 1472	U69, 70, 86, 87
11	A/R	100156-005	IC X2864A	
11	REF	A806760-001	ITEM 11 LOCATION CHART	USE DWG A806760 FOR QUANT.AND LOCATION
12	18	100156-003	IC HM6264LP-15	U8,20 U51..66
13	3	100194-488	IC 1488	U31, 50, 71
14	3	100194-489	IC 1489	U29, 48, 72
15	3	100195-655	IC MD65SC51AE	U30, 49, 73
16	2	100195-873	IC 68A21P	U68, 85
17	1	100195-684	IC HD68000R-8	U24
18	2	100197-001	IC 74HC00	U76, 83
19	1	100197-011	IC 74HC11	U90
20	2	100197-004	IC 74HCU04	U3, 25
21	2	100197-010	IC 74HC10	U28, 92
23	2	100197-074	IC 74HC74	U26, 88
24	1	100197-085	IC 74HC85	U80
25	1	100197-014	IC 74HC14	U78
26	6	100197-138	IC 74HC138	U1, 2, 14, 15, 27, 91
27	2	100197-147	IC 74HC147	U5, 89
28	1	100197-244	IC 74HC244	U74
29	1	100197-688	IC 74HC688	U4
30	2	100197-440	IC 74HC4040	U77, 82
31	1	100197-449	IC 74HC4049	U81
32	1	100197-475	IC 74HC4075	U79
33	1	101002-001	Crystal 4.194304 MHz	Y3
34	1	101003-001	Crystal 8.000 MHz	Y1
35	1	100137-012	Crystal 1.8432 MHz	Y2
36	1	102151-004	Capacitor 9-35 PF trim	C9
37	3	102001-030	Capacitor 30 PF SM	C1,2,4
38	2	102001-023	Capacitor 68 PF SM	C7, 8
39	1	102175-022	Capacitor 0.22FD 5V	C13
40	15	102027-330	Capacitor 330 PF disk	C21,28..31 C41,48..51 C61,68..71
41	1	102155-001	Capacitor 0.02 MFD disk	C6
42	105	102172-001	Capacitor 0.1 MFD 50 V	C20,22..27 C40,42..47 C60,62..67 C101..135 C148..166 C168..192 C224, 231, 250, 271

43	4	102080-001	Capacitor 10 MFD 20 V	C3, 10..12
44	13	104148-681	Resistor 680 1/4 W	R20,22,26,27,10,40, 42,46,47,60,62,66,67
45	2	104148-102	Resistor 1000 1/4 W	R11,13
46	1	104195-017	Resistor Pak 22K x 9	RP10
47	2	104148-222	Resistor 2200 1/4 W	R8,17
48	3	104148-302	Resistor 3000 1/4 W	R25,45,65
49	1	104148-471	Resistor 470 1/4 W	R1
50	2	104148-103	Resistor 10 K 1/4 W	R7, R52
51	3	104148-223	Resistor 22 K 1/4 W	R28..30
52	2	104148-473	Resistor 47 K 1/4 W	R5,15
53	1	104148-104	Resistor 100 K 1/4 W	R3
54	3	104148-105	Resistor 1 Meg 1/4 W	R2 ,6,9
55	1	Buss Wire 20AG Jumper		R12
56	9	104195-002	Resistor pack 4700 X 9	RP1..8, 11
57	1	104195-005	Resistor pack 330 X 9	RP12
58	1	104148-152	Resistor 1500 1/4W	R4
59	1	104513-150	15 K 1% 1/4W	R16
60	1	108232-002	Connector Banana F	
61	17	108241-001	Connector 28 pin IC	U34,35,6,7,10,11 16,12,21,22,17,18, 9,13,23,19,73
62	1	108414-024	Connector 24 pin RA M	J4
63	1	108411-024	Connector 2 pin M	E6
64	1	108411-024	Connector 3 pin M	J8
65	1	108411-024	Connector 4 pin M	E3 2X2 breakaway
66	1	108505-020	Connector 20 pin RA	DS1
67	3	108505-025	Connector 25 pin RA F	J1, 2, 7
68	1	108505-125	Connector 25 pin RA M	J3
69	1	108414-050	Connector 50 pin M RA	J5
70	1	112145-050	Connector 50 pin M	J9
71	1	110700-009	Switch 4 pos DIP	SW1
72	1	110700-018	Switch 8 pos RA DIP	SW2
73	8	120133-001	Relay HB1E-DC5	K1..8
74	1	120837-011	Battery 3.6 V NICAD	BT1
75	1	806433-001	Panel rear	
76	1	806436-001	Panel front	
77	4	806347-001	Bracket	
78	1	806480-001	Bracket	
79	8	130000-009	Screw, PHP 4/40 X 5/16L	J1,2,3,7
80	8	130031-019	Nut, Hex 4-40	J1,2,3,7
81	8	134140-001	Washer, Lock Ext Tooth #4	J1,2,3,7
82	20	130015-001	Screw, 4-40 x 5/16L w/star wshr	

PL 309060 SH 3 OF 3

83	REF	409060	Schematic	
84	1	104511-681	Resistor 681 1% 1/4W	R14
85	1	100129-211	IC ICL8211	U32
86	9	104148-221	Resistor 220r 1/4W	R21,23,24,41,43, 44,61,63,64
87	3	108233-002	Jumper	E3(2), E6(1)
88	8	116088-001	LOCKSCREW	J1, 2 ,3, 7
89	1	112100-008	Receptacle, BNC w/Isol Gnd Pin	J16
90	1	108207-003	Strip Conn, 3 pin	
91	1	806698-001	Bracket PCB MT	
92	1	806436-002	Panel, Front	
93	3	120380-100	Choke	L20, L40, L60

REV	DESCRIPTION	BY	DATE	APPROVED
A	ECN 208228		6/85	
B	ECN 208524		10/85	
C	ECN 209107		9/86	
D	ECN 209235		11/86	

BETALOG 512
309061
AUX CONTROLLER
BETA PRODUCTS
MADE IN USA
REV. A

12.00 REF

14.00 REF

NOTES:
1. INK STAMP REV LEVEL
2. SEE PARTS LIST PL309061 FOR MAT'L
3. SCREWS FOR MOUNTING CONNECTORS J1, J2 & J3 INSTALLED FROM COMPONENT SIDE OF PCB
4. SCHEMATIC 409061

DRAWN	TALANT	2/85	ASSY, AUXILIARY CONTROLLER PCB
CHECKED	LN	3-85	
ENGR		3-5-	
MFG		3-11	BETA PRODUCTS, INC.
APPROVED		3-15	
		3-15	— D 309061 D 1 1

309061

SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL
C	ECN 209472	4/87	~~[illegible]~~	PJMB
B	ECN 209238	11/86	~~[illegible]~~	MJM
A	ECN 208286	7-85	LN	[illegible]

REVISIONS

DASH NO. & QUANTITY	ITEM	PART NUMBER	DESCRIPTION
			LIST OF MATERIAL

NEXT ASSY	USED ON
309061	B/L512

APPLICATION

		DATE
DRAWN	Tallant	2/85
CHECKED	LN	3-85
ENGINEER	JAZ	3-85
MFG	Lynch	3-85
APPROVED		3-85
QUALITY		3-85

TITLE: ASSY, AUXILIARY CONTROLLER PCB

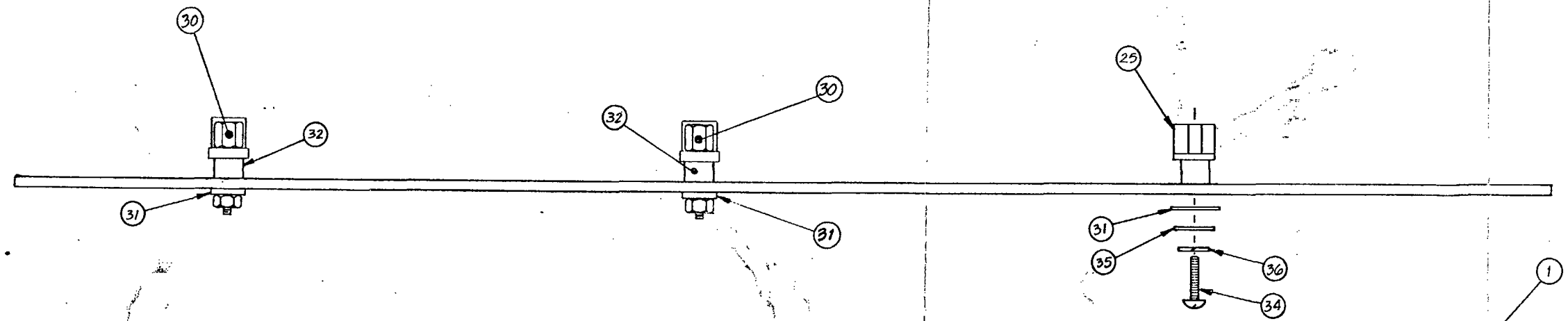
BETA PRODUCTS, INC. BETA
1616 W. BELTLINE RD. CARROLLTON, TX. 75006

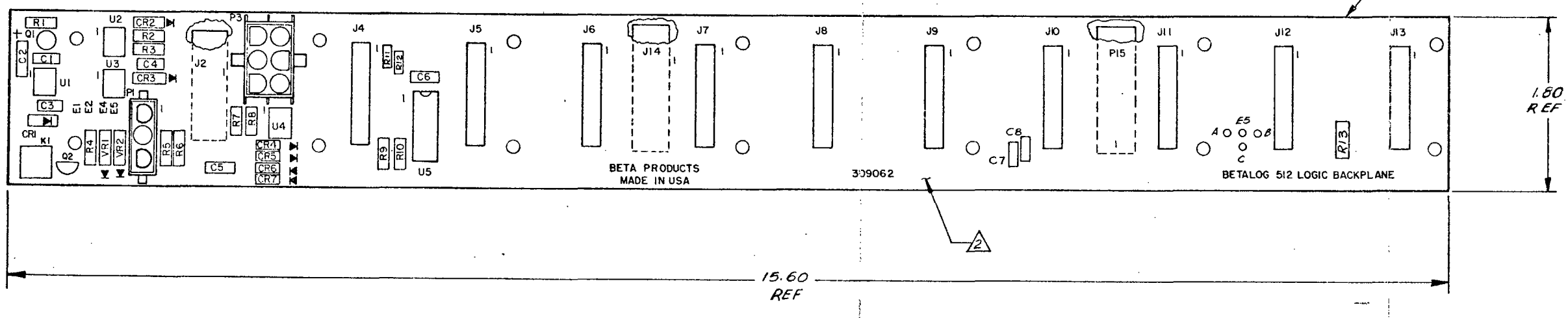
SCALE	SIZE	DRAWING NO.	REV	SHEET
~	A	PL309061	C	7.2

PL 309061 BetaLog 512 AUX CONTROLLER Part List 16 APR 87
Sh 1 OF 1 REV C

ITEM	QUAN	APL NUMBER	DESCRIPTION	REFERENCE
1	1	509061-001	PC board	
2	24	104166-008	Transzorb 1N6384	CR1..24
3 %	0	100171-001	IC X2816A	
3 %%	0	100171-001	IC X2816A	
3 %%%	20	100171-001	IC X2816A	U2..9, 12..19 U55, 56, 63, 64
4	4	100194-488	IC 1488	U22, 32, 48, 67
5	4	100194-489	IC 1489	U21, 31, 47, 66
6	4	100195-655	IC MD65SC51AE	U20, 30, 46, 65
7	1	100197-002	IC 74HC02	U33
8	1	100197-010	IC 74HC10	U37
9	2	100197-020	IC 74HC20	U34, 35
10	7	100197-138	IC 74HC138	U24..29, 36
11	2	100197-244	IC 74HC244	U1, 10
12	2	100197-245	IC 74HC245	U11, 23
13	24	102027-330	Capacitor 330 PF disk	C24..29, 36..41 C56..61, 82..87
14	1	102080-001	Capacitor 10 MFD 20 V	C88
15	43	102172-001	Capacitor 0.1 MFD 50 V	C1..23, 30..35, 42, 43 C52..55, 68, 69, 76..8
16	4	104148-302	Resistor 3000 1/4 W	R1..4
17	8	104148-223	Resistor 22 K 1/4 W	R5..12
18	1	108232-002	Connector Banana F	
19	4	108241-001	Connector 28 pin IC	U20, 30, 46, 65
20 %	0	108242-024	Connector 24 pin IC	
20 %%	0	108242-024	Connector 24 pin IC	
20 %%%	2	108242-024	Connector 24 pin IC	U2..9, 12..19 U55, 56, 63, 64
21	1	108414-024	Connector 24 pin RA M	P4
22	1	108414-050	Connector 50 pin M RA	P5
23	1	108414-052	Connector 50 pin F	J5
24	4	108505-025	Connector 25 pin RA F	J1..3, 6
25	1	806433-002	Panel rear	
26	1	806435-001	Panel front	
27	4	806347-001	Bracket	
28	1	806480-001	Bracket	
29	REF	409061	Schematic	
30	8	130000-009	Screw, PHP 4-40 x 5/16L	
31	8	130031-019	Nut, Hex 4-40	
32	8	134140-001	Washer, Lock Ext.Tooth No. 4	
33	19	130015-001	Screw, PHP 4-40 x 5/16 L. w/ext	
34	8	116088-001	Lockscrew	J1, 2, 3, 6
	%	AUX CONTROLLER for	BetaLog 128 B	
	%%		BetaLog 512	
	%%%		BetaLog 1024	

REVISIONS				
DIM	DESCRIPTION	DATE	DRAWN/CHKD	APPROVED
A	ECN 208303	7-85	HLT	
B	ECN 208837	2-86		
C	ECN 209097	9/86		
D	ECN 209106	9/86		
E	ECN 209531	6/87		





NOTES:

1. SEE PARTS LIST PL 309062 FOR MATERIAL
2. INK STAMP REV LEVEL
3. SCHEMATIC 409062
4. PART NO. 108327-001 (ITEM 30) CONSIST OF SCREW, WASHER, LOCK WASHER AND NUT.

		DRAWN J.W. FALLIANT	DATE 6 FEB '85	TITLE ASSY, LOGIC BACKPLANE PCB
		DESIGN JW		
PDP-11	BETALOG 512			BETA PRODUCTS, INC.
				1919 W BELTLINE RD CARROLLTON, TX
				SCALE — SIZE B DRAWING NO. 309062 REV E SHT 1

309062

QTY	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL
G	ECN 209530	6/87		
F	ECN 209463	4/87		
E	ECN 209096	9/86		
D	ECN 209045	9/86		
C	ECN 208930	5/86		
B	ECN 208859	3-86	T. T.	
A	ECN 208302	7-85	LN	

REVISIONS

DASH NO. & QUANTITY	NEXT ASSY	USED ON
	309062	B/L512

APPLICATION

ITEM	REV	PART NUMBER	DESCRIPTION

LIST OF MATERIAL

		DATE
DRAWN	TALLANT	2/85
CHECKED	LN	3-85
ENGINEER		3-85
QA		3-85
APPROVED		3-85
RELEASED		3-85

TITLE: ASSY, LOGIC BACKPLANE PCB

BETA PRODUCTS, INC.

1615 W. BELTLINE RD. CARROLLTON, TX. 75006

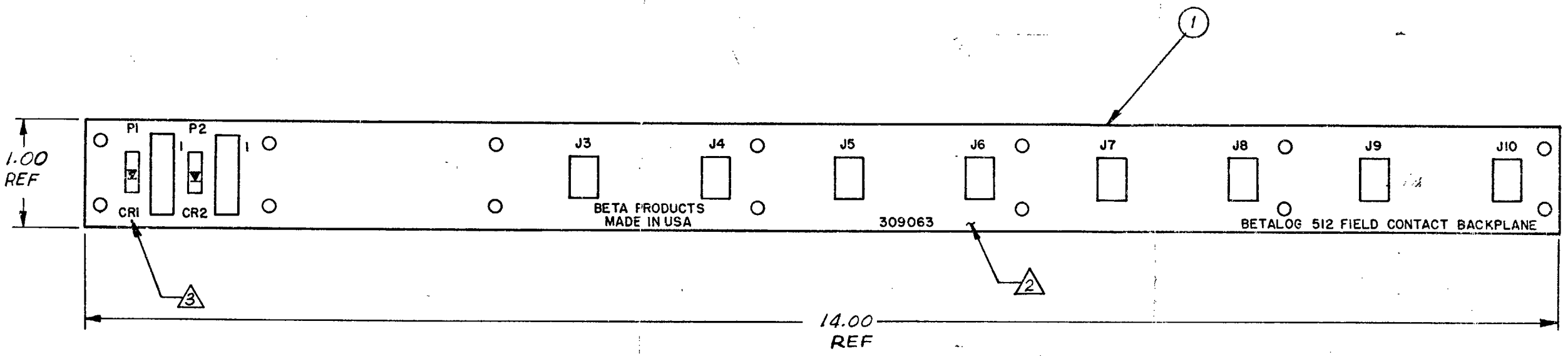
SCALE	SIZE	DRAWING NO.	REV	SHEET
~	A	PL309062	B	1 of 2

PL 309062
Sh 1 OF 1

BetaLog 512 LOGIC BACKPLANE Part List 10 JUN 87
REV G

ITEM	QUAN	APL NUMBER	DESCRIPTION	REFERENCE
1	1	509062-001	PC board	
2	6	100000-024	Diode 1N4007	CR2..7
3	1	100000-103	Diode 1N4148	CR1
4	1	100001-035	TRANSISTOR 2N3702	Q1
5	1	100001-078	TRANSISTOR VN10KM	Q2
6	3	100126-035	IC 4N35	U2..4
7	1	100197-002	IC 74HC02	U5
8	1	100140-001	IC 555	U1
9	2	102003-131	Capacitor 1000PF disk	C4, 5
10	1	102020-033	Capacitor 15 MFD 20 V	C2
11	1	102025-002	Capacitor 0.01MFD 50 V	C3
12	2	102172-001	Capacitor 0.1 MFD 50 V	C1, 6
13	2	102027-330	Capacitor 330 PF 1K V	C7, 8
14	1	104148-361	Resistor 360 1/4 W	R3
15	1	104148-362	Resistor 3600 1/4 W	R2
16	2	104148-103	Resistor 10 K 1/4 W	R9, 10
17	1	104148-123	Resistor 12 K 1/4 W	R8
18	1	104148-273	Resistor 27 K 1/4 W	R7
19	2	104040-623	Resistor 62 K 1/2 W	R5, 6
20	1	104148-105	Resistor 1 Meg 1/4 W	R1
21	2	104148-100	Resistor 10 1/4 W	R11, 12
22	1	104148-151	Resistor 150 1/4 W	R13
23	1	108505-028	Connector 9 pin F D-Sh	J2
24	1	108502-015	Connector 15 pin F D-Sh	J14
25	1	108502-115	Connector 15 pin M D-Sh	P15
26	1	108505-006	Connector 6 pin soc	P3
27	10	108505-024	Connector 24 pin F hdr	J4..13
28	1	120133-001	Relay HB1E-DC5	K1
29	REF	409062	Schematic	
30	4	108327-001	SCREW,HEX JACK 3/16 X 5/8L	
31	6	138156-001	WASHER,INSULATING, (FIBER)	
32	4	116007-004	STANDOFF, NYLON 4-40X1/4L	
33	1	108233-002	JUMPER	E5
34	2	130008-001	SCREW, PPH 4-40 X 3/8L	
35	2	131125-001	WASHER, FLASH NO. 4	
36	2	133132-001	WASHER, LOCK NO. 4	
37	1	112145-020	CONNECTOR	E5

REVISIONS				
ZONE	DESCRIPTION	DATE	APPROVED	
A	ECN 208064	3/85		
B	ECN 209105	9/86		



NOTES:

1. SEE PARTS LIST PL 309063 FOR MAT'L
2. INK STAMP REV LEVEL & DASH NO.
3. -001 ASSY IS SHOWN. REMOVE DIODE SYMBOL ON CR1 ONLY & REVERSE CR1 ORIENTATION FOR -002 ASSY.
4. SCHEMATIC 409063

DASH NO & QUANTITY	ITEM	DWG SIZE	PART NUMBER	DESCRIPTION
			LIST OF MATERIAL	
			806431	BETALOG 512
			NEXT ASSY	USED ON
			APPLICATION	

UNLESS OTHERWISE SPECIFIED
DECIMAL XX ± .02 XXX ± .010
FRACTIONAL 1/64 ANGULAR ±1°
CONCENTRICITY MACHINED DIAMETERS .004 TIR
SURFACE ROUGHNESS IN RMS MICROINCHES
ALL DIMENSIONS IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
ALL DIMENSIONS TO BE MET BEFORE PLATING
DO NOT SCALE THIS DRAWING
[ ] DIMENSION IN MILLIMETERS

DRILLED HOLE TOLERANCES	
.013 TO .138	.234 TO .750
.138 TO .234	.750 TO 2.000

DRAWN	TOM TALLANT	DATE 2-6-85
CHECKED	LN	3-12-85
ENGINEER		
QA		
APPROVED		
RELEASED		

TITLE: ASSY, FIELD CONTACT BACKPLANE PCB

BETA PRODUCTS, INC. BETA
1815 W BELTLINE RD CARROLLTON, TX 75006

SCALE	SIZE	DRAWING NO	REV	SHEET
~	C	309063	B	1 of 1

REV B
SHEET 1
DWG NO. 309063

A	ECN 208139	6/85	LN
B	ECN 208895	6/86	
C	ECN 209552	6/87	

U91
68000

+5V

SHT2...6 ← DØ...15

RP102 4700

RP101 4700

RP103 4700

15	RP102	3	27 D15
14		2	58 D14
13	RP101	10	68 D13
12		9	28 D12
11		8	59 D11
10		7	29 D10
9		6	60 D9
8		5	30 D8
7		4	31 D7
6		3	61 D6
5		2	32 D5
4	RP103	2	33 D4
3		3	62 D3
2		4	34 D2
1		5	35 D1
Ø		6	63 DØ

AS
U89 74HC132
U90 74HC74
U88 74HCU04
RP102
AS
DTACK
U87 74HCØØ
R201 1M
Y1 8MHZ
C201 30PF
C202 30PF
CLK
A23 SHT. 1
VPA
BGACK
BR
HALT
RESET
BERR
IPL2
IPL1
IPLØ

J4-20
C203 270PF
74HC132
74HCU04

IRQB
IRQA
SHT. 2

57	A23	RP102	4 23
26	A22		5 22
25	A21		6 21
24	A20		7 20
23	A19		19
54	A18		18
22	A17		17
21	A16		16
53	A15		15
20	A14	RP105	9 14
67	A13		8 13
52	A12		7 12
51	A11		6 11
50	A10		5 10
18	A9		4 9
49	A8		3 8
17	A7		2 7
16	A6	RP104	10 6
48	A5		9 5
15	A4		8 4
14	A3		7 3
47	A2		6 2
13	A1		5 1
64	UDS	RP103	7 → UDS
37	LDS		8 → LDS
65	R/W		9 → W
7	VMA	RP104	2 → VMA
8	E		3 → E

SHT. 2

A1...23 → SHT. 2

DO...15

23	→	23
22	→	25
21	→	27
20	→	29
19	→	31
18	→	33
17	→	35
16	→	37
15	→	39
14	→	41
13	→	43
12	→	45
11	→	48
10	→	46
9	→	44
8	→	42
7	→	40
6	→	38
5	→	36
4	→	34
3	→	32
2	→	30
1	→	28

15	→	21
14	→	19
13	→	17
12	→	15
11	→	13
10	→	11
9	→	9
8	→	7
7	→	5
6	→	3
5	→	1
4	→	2
3	→	4
2	→	6
1	→	8
Ø	→	10
UDS	←	12
LDS	←	14
W	←	16
VMA	←	22
E	←	24
RESET	←	20
BERR	←	26
CLK	←	18
+5V	←	47
	←	49
	←	50

J6 TEST CONNECTOR

40 56

NOTES:

1. ⚠

FIELD CONTACT INPUT VOLTAGE	R193 (2 W)	R197 (1/2 W)	R1-R64 (1/4 W)
24 V	510 Ω	3.0K	3.3K
48 V	1200 Ω	10K	82K
125 V	3.9K	36K	240K

SCHEMATIC, POSITIVE COMMON SCANNER PCB

BETA PRODUCTS, INC.

409058 C 1 6

409058 C

SYM	DESCRIPTION	DATE	APPROVED
	SEE SHEET 1		

U85
74HC138
20 1 — 21 2 — 22 3 — UDS 4 — 5 — +5V 6
15 → UPROM CS 0.FFFFE
14
13 → U RAM CS 200000....2FFFFE
12

U84
74HC138
20 1 — 21 2 — 22 3 — LDS 4 — 23 5 — +5V 6
15 → L PROM CS 1....FFFFF
14
13 → L RAM CS 200001....2FFFFF
12

U87
74HC00
TYPE 1 — 1 — 2 — 3 — CR200 → J4-2 (TRIG TYPE)
4 — 5 — 6 — TYPE Ø

U87
74HC00
W — 12 — 13 — 11 — R
AS

U86
74HC138
1 1 — 2 2 — 3 3 — LDS 4 — 23 5 — 22 6
15 Ø — 14 1 — 13 2 — 12 3
11 → TYPE Ø
10 → TYPE 1
P10..3 → SHT. 3..6

400000
400002
400004
400006
40000B
40000A

SHT. 1 A1..23

U80
2764/32
+5V +5V — 26 28
13 2 — 12 23 — 11 21 — 10 24 — 9 25 — 8 3 — 7 4 — 6 5 — 5 6 — 4 7 — 3 8 — 2 9 — 1 10
CS → L PROM CS
OE 22 → R
VPP 1 → +5V
PGM 27 → +5V
19 18 17 16 15 13 12 11 — 7 6 5 4 3 2 1 8 — 14

U82
2764/32
+5V +5V — 26 28
13 2 — 12 23 — 11 21 — 10 24 — 9 25 — 8 3 — 7 4 — 6 5 — 5 6 — 4 7 — 3 8 — 2 9 — 1 10
CS → U PROM CS
OE 22 → R
VPP 1 → +5V
PGM 27 → +5V
19 18 17 16 15 13 12 11 — 15 14 13 12 11 10 9 8 — 14

W
U81
6116/6264
+5V — 28
12 — 23 — 13 2 — 11 21 — 10 24 — 9 25 — 8 3 — 7 4 — 6 5 — 5 6 — 4 7 — 3 8 — 2 9 — 1 10
CS1 20 → L RAM CS
OE 22 → R
W 27 → W
CS2 26 → +5V
9 8 7 6 5 3 2 1 — 7 6 5 4 3 2 1 0 — 14

U89
6116/6264
+5V — 28
23 — 2 — 11 21 — 10 24 — 9 25 — 8 3 — 7 4 — 6 5 — 5 6 — 4 7 — 3 8 — 2 9 — 1 10
CS1 20 → U RAM CS
OE 22 → R
W 27 → W
CS2 26 → +5V
9 8 7 6 5 3 2 0 — 15 14 13 12 11 8 — 14

PER/DIR A C00001
CONTROL A C00003
PER/DIR B C00005
CONTROL B C00007

A1..23
DØ..15
SHT. 1

+5V U92 6821 — 20

CB2	19	SLIDATA → 9
CB1	18	SRDATA → 8
PB7	17	BD7 → 10
PB6	16	BD6 → 11
PB5	15	BD5 → 12
PB4	14	BD4 → 13
PB3	13	BD3 → 14
PB2	12	BD2 → 15
PB1	11	BD1 → 16
PBØ	10	BDØ → 17
CA1	40	ONE MILLISECOND → 18
PA2	4	BOARD ADDRESS 2 → 5
PA1	3	BOARD ADDRESS 1 → 6
PAØ	2	BOARD ADDRESS Ø → 7
PA3	5	→ 19
PA7	9	CR201 TRIG → 1

J4 SCANNER DATA

IRQA 38 IRQA
IRQB 37 IRQB
RESET 34 RESET
E 25 E
R/W 21 R/W
VMA 28 CS2
23 24 CS1
22 22 CSØ
2 35 RS1
1 36 RSØ
7 26 D7
6 27 D6
5 28 D5
4 29 D4
3 30 D3
2 31 D2
1 32 D1
Ø 33 DØ

POSITIVE COMMON FUNCTIONAL TEST

R200 47K → +5V
U83 4N35 — C200 0.01
PA6 8 — 4 3 5 1 2
R194 10K
FC+ — C68 4700PF 6KV — J2-29, J3-29
FC- — C69 4700PF 6KV — J2-30, J3-30
+5V R198 360 — U65 MOC8100 — TOP (B C E)
FC+ — CR211 IN4007 — E2 — P1-1,2 FC+ SUPPLY
PA4 6 — Q1 2N3703 — Q2 2N5416 — R193 — TEST ONE → SHT. 3..6
R195 3GK — R196 36GØ
C65 5 mfd 350 VDC
+5V R199 360 — U66 MOC8100
R197 — FCRTRN → SHT. 3..6
Q3 2N3439 — CR210 IN4007
C66 0.1 500V — C67 4700 P — C70 6KV
PA5 7 — FC- — E1 — J1-5,6 FC- SUPPLY
R203 1M

UNLESS OTHERWISE SPECIFIED
DECIMAL .XX ± .010 .XXX ± .005
FRACTIONAL ½64 ANGULAR ± °
CONCENTRICITY MACHINED DIAMETERS .004 TIR
SURFACE ROUGHNESS IN RMS MICROINCHES
ALL DIMENSIONS IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
ALL DIMENSIONS TO BE MET BEFORE PLATING
DO NOT SCALE THIS DRAWING
[ ] DIMENSION IN MILLIMETERS

DRAWN TALLANT 4-1-86
CHECKED
ENGINEER
MFG APPROVAL
QUALITY APPROVAL

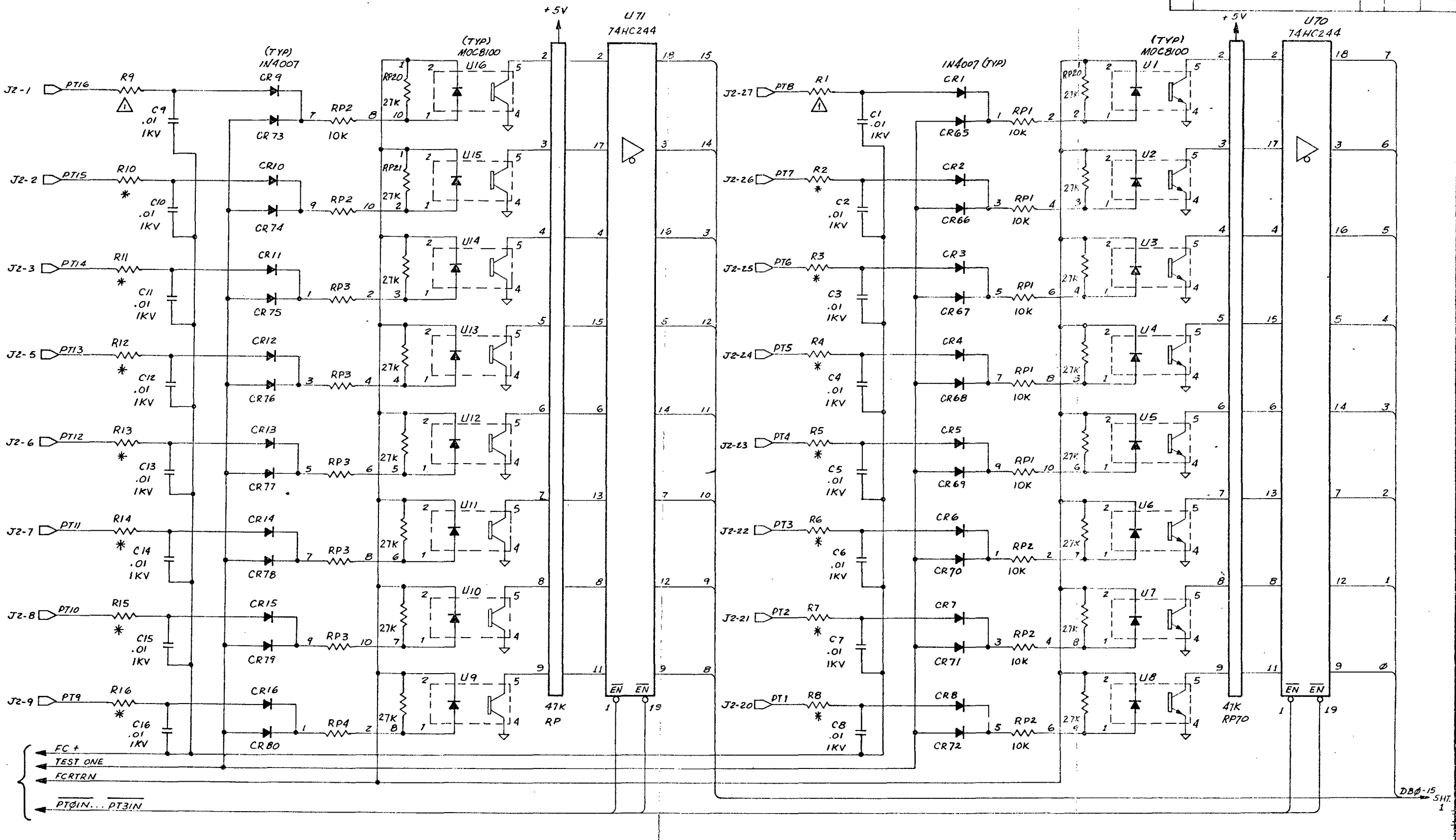
TITLE: SCHEMATIC, POSITIVE COMMON SCANNER PCB

BETA PRODUCTS, INC. (BETA)
7474 W. BELTLINE RD. CARROLLTON, TX. 75006

SIZE D | DRAWING NO. 409058 | REV C | SHEET 2 | 2-6

409058

SEE SHEET 1



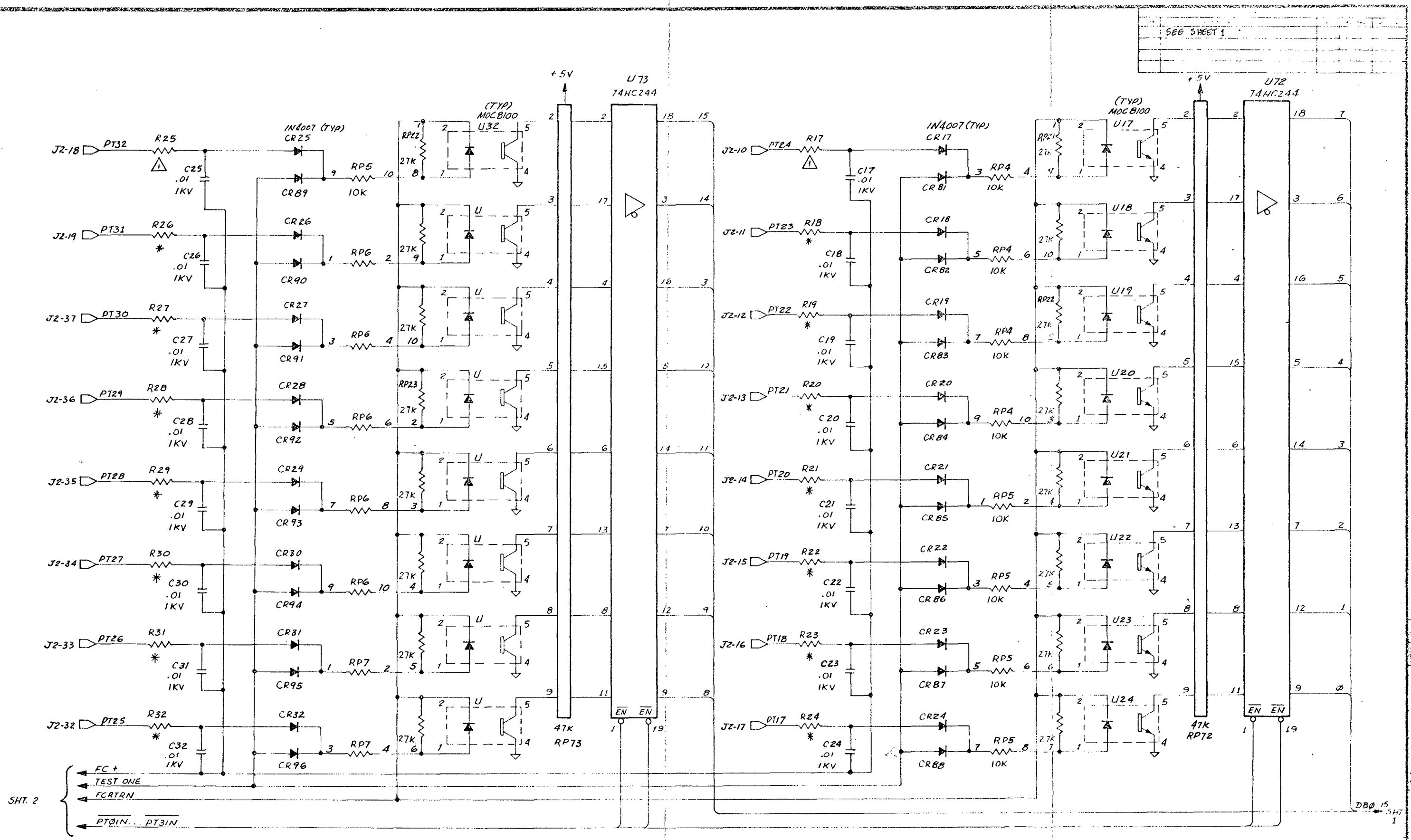
SCHEMATIC, POSITIVE COMMON SCANNER PCB

BETA PRODUCTS, INC.

409058 C 3 6

SHEET 3 OF 3

409058

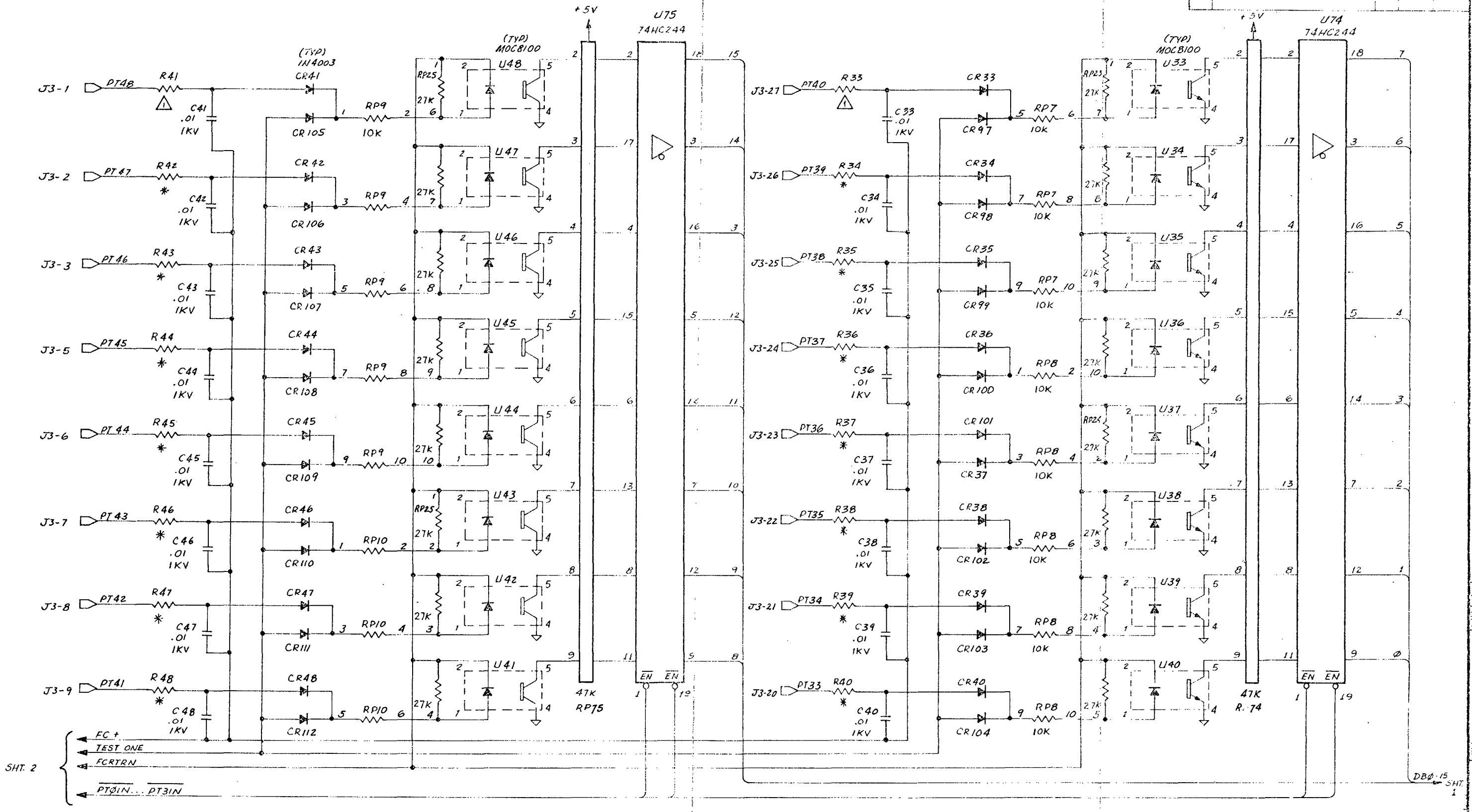


SCHEMATIC, POSITIVE
COMMON SCANNER PCB

BETA PRODUCTS, INC.

~ D 409058 C 4 6

409058 4 C



SCHEMATIC, POSITIVE
COMMON SCANNER PCB
BETA PRODUCTS, INC.

409058 C 5

SEE SHEET 1

+5V

U77
74HC244

(TYP)
IN4007
CR57

(TYP)
MOCB100
U64

J3-18 PT64 R57 C57 .01 1KV CR121 RP12 10K RP26 27K U64

J3-19 PT63 R58 * C58 .01 1KV CR122 RP12 27K U63

J3-37 PT62 R59 * C59 .01 1KV CR123 RP12 27K U62

J3-36 PT61 R60 * C60 .01 1KV CR124 RP12 27K U61

J3-35 PT60 R61 * C61 .01 1KV CR125 RP13 27K U60

J3-34 PT59 R62 * C62 .01 1KV CR126 RP13 27K U59

J3-33 PT58 R63 * C63 .01 1KV CR127 RP13 27K U58

J3-32 PT57 R64 * C64 .01 1KV CR128 RP13 27K U57

47K
RP77

EN EN

FC +
TEST ONE
FCRTRN
PTØIN... PT3IN

SHT 2

+5V

U76
74HC244

(TYP)
MOCB100
U49

IN4007 (TYP)
CR49

J3-10 PT56 R49 * C49 .01 1KV CR113 RP10 10K RP25 27K U49

J3-11 PT55 R50 * C50 .01 1KV CR114 RP10 27K U50

J3-12 PT54 R51 * C51 .01 1KV CR115 RP11 27K U51

J3-13 PT53 R52 * C52 .01 1KV CR116 RP11 27K U52

J3-14 PT52 R53 * C53 .01 1KV CR117 RP11 27K U53

J3-15 PT51 R54 * C54 .01 1KV CR118 RP11 27K U54

J3-16 PT50 R55 * C55 .01 1KV CR119 RP11 27K U55

J3-17 PT49 R56 * C56 .01 1KV CR120 RP12 27K U56

47K
RP76

EN EN

DBØ-15 SHT 1

					SCHEMATIC, POSITIVE COMMON SCANNER PCB
					BETA PRODUCTS, INC.
					D 409058.C 6

409058

C 6 407058

SCHEMATIC BETALOG SI2
MAIN CONTROLLER
BETA PRODUCTS, INC.

4050060 SHEET 1 REV G

REV	DESCRIPTION	DATE	APPROVED
D	ECN 20872 (NEW VERSION)	5/84	
E	ECN 20931S	10/84	
F	ECN 20937I	4/21	
G	ECN 20964A	6/17	

SEE SHEET 1

SHT. 1 A1....23

U13 27256 — UPPER PROM ØCS

U9 27256 — UPPER PROM 1CS

U34 27256 — UPPER PROM 2CS

U23 27256 — UPPER PROM ØCS

U19 27256 — LOWER PROM 1CS

U35 27256 — UPPER PROM 2 CS

SHT. 1 DØ...15

U66 HM62264

U65 U64 U63 U62 U61 U60 U59 U58 U57 U56 U55 U54 U53 U52 U51

RAMØCS RAM1CS RAM2CS RAM3CS RAM4CS RAM5CS RAM6CS RAM7CS

U3 74HCU04 — UDS

U3 74HCU04 — LDS

CR3 5082-2835

R13 1000

C13 0.22 F

R14 681Ω

R15 47k

R16 15 k

U32 ICL8211

R17 2200

PWR FAIL

U8 HM6264

U20 HM6264

URAMBCS

LRAMBCS

A1....23

DRAWN	Tom Tallant	DATE	2-86
			4-86
			7-86
BETALOG	512		
500060			7-86

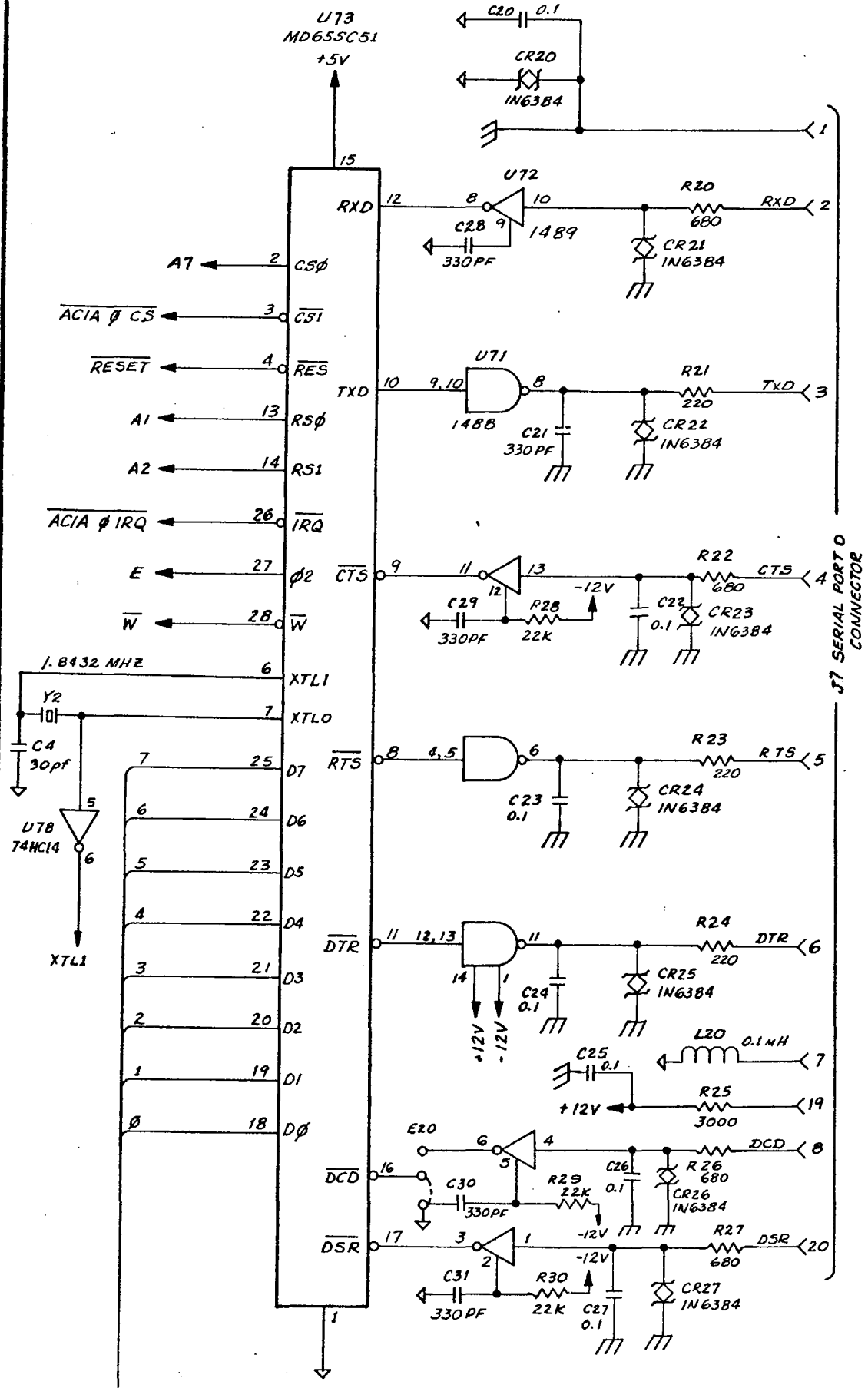
SCHEMATIC BETALOG 512 MAIN CONTROLLER

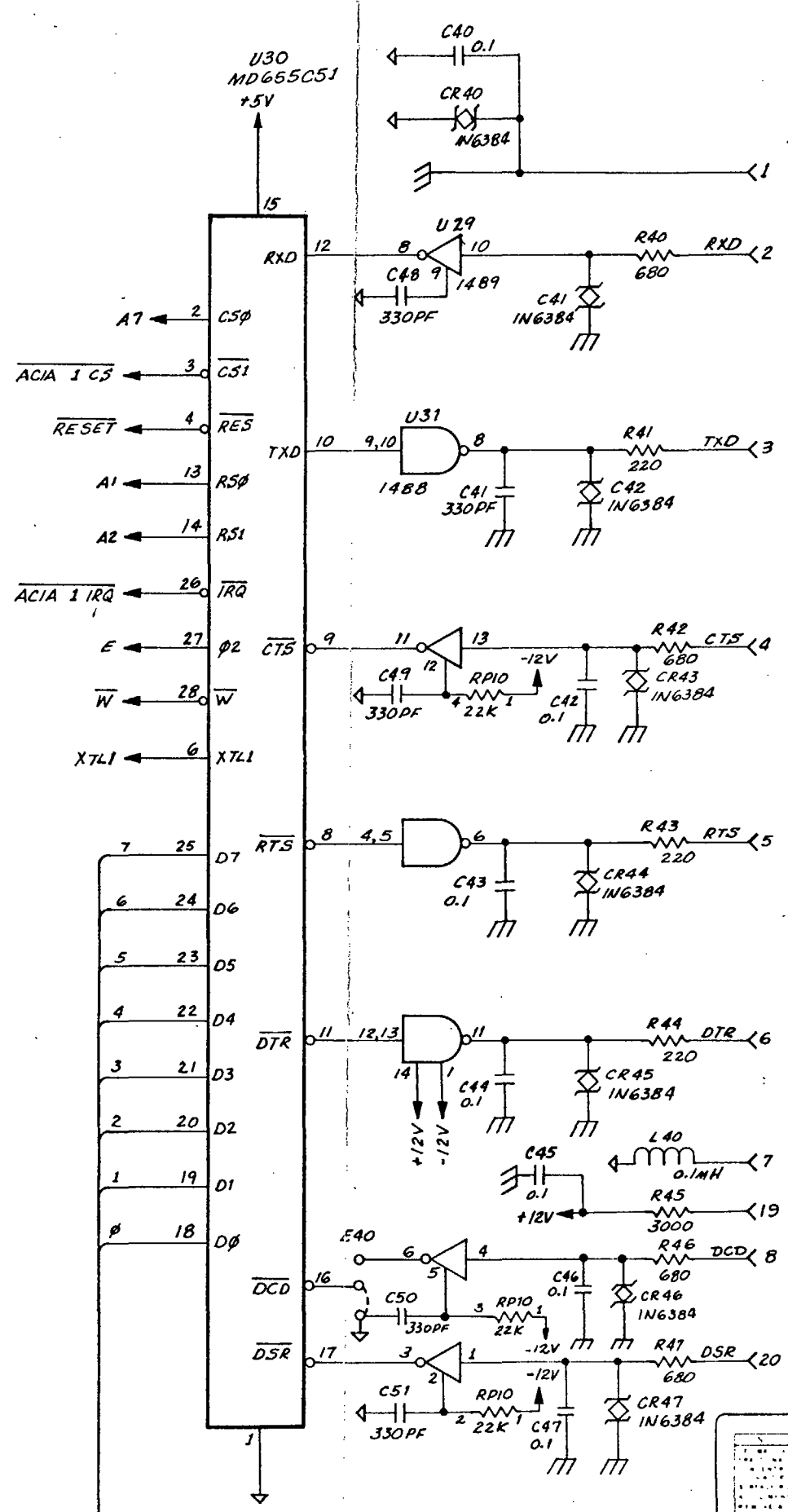
BETA PRODUCTS, INC. BETA

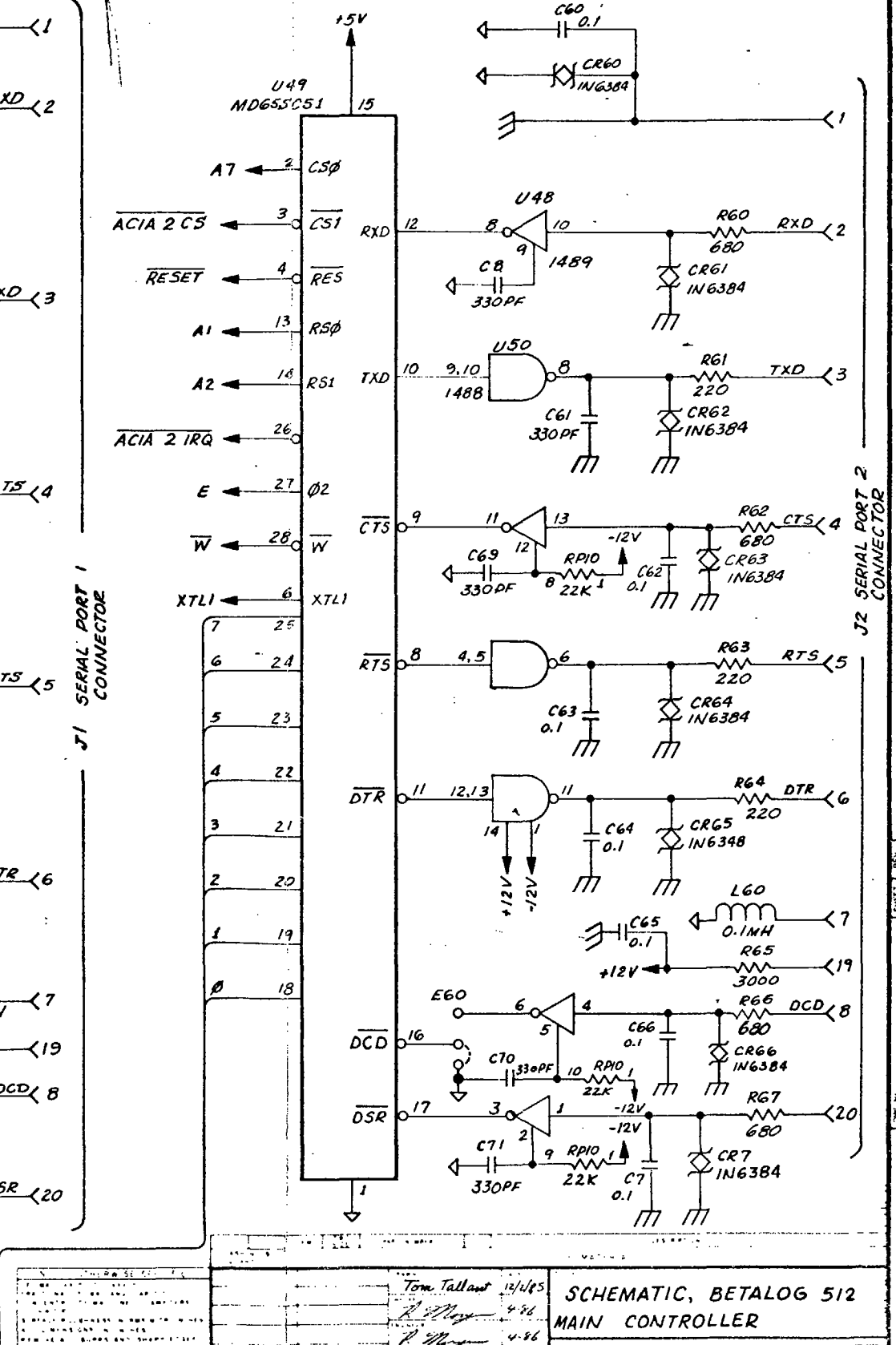
DENTON, TX. 76205

D 500060 6 2.5

SHT 6 SHEET 2 OF 2 DWG 500060







Tom Tallant	12/1/85	SCHEMATIC, BETALOG 512 MAIN CONTROLLER	
R Mayo	4-86		
R Mayo	4-86		
R Mayo	4-86	BETA PRODUCTS, INC.	BETA
	5/86	~ D 409060 G 3 5	

SHEET 3 REV G
409060

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL

SHT. 1 A1...23

X2864

U7 +5V — UPPER EEPROM 3 CS — 50000-53FFF
U11 +5V — UPPER EEPROM 4 CS — 54000-57FFF
U12 +5V — UPPER EEPROM 5 CS — 58000-58FFF
U22 +5V — UPPER EEPROM 6 CS — 5C000-5FFFF
U18 +5V — UPPER EEPROM 7 CS — 4C000-4FFFF

U6 +5V — LOWER EEPROM 3 CS — 50000-53FFF
U10 +5V — LOWER EEPROM 4 CS — 54000-57FFF
U16 +5V — LOWER EEPROM 5 CS — 58000-58FFF
U21 +5V — LOWER EEPROM 6 CS — 5C000-5FFFF
U17 +5V — LOWER EEPROM 7 CS — 4C000-4FFFF

SHT. 1 D0...15

U85 6821

+5V — RA 1500 — SW DATA → 9; SR DATA → 8; BD7 → 10; BD6 → 11; BD5 → 12; BD4 → 13; BD3 → 14; BD2 → 15; BD1 → 16; BD0 → 17

TIME SYNC OUT → 7

1000 HZ

SW1

4700 RP8 +5V

DS1 — RP12 330 — +5V

U81 74HC4049

UNLESS OTHERWISE SPECIFIED			
DECIMAL .XX ± .02 .XXX ± .010			
FRACTIONAL ± 1/64 ANGULAR ± 1°			
CONCENTRICITY MACHINED DIAMETERS .004 TIR			
SURFACE ROUGHNESS IN AMS MICROINCHES			
ALL DIMENSIONS IN INCHES			
REMOVE ALL BURRS AND SHARP EDGES			
ALL DIMENSIONS TO BE MET BEFORE PLATING			
DO NOT SCALE THIS DRAWING			
( ) DIMENSION IN MILLIMETERS			
DRILLED HOLE TOLERANCES			
.013 TO .156	+.002 -.001	.234 TO .750	+.005 -.001
.156 TO .234	+.003 -.001	.750 TO 2.000	+.005 -.002

DASH NO. & QUANTITY	ITEM	DWG SIZE	PART NUMBER	DESCRIPTION
309060	6L512			
NEXT ASSY	USED ON			
APPLICATION				

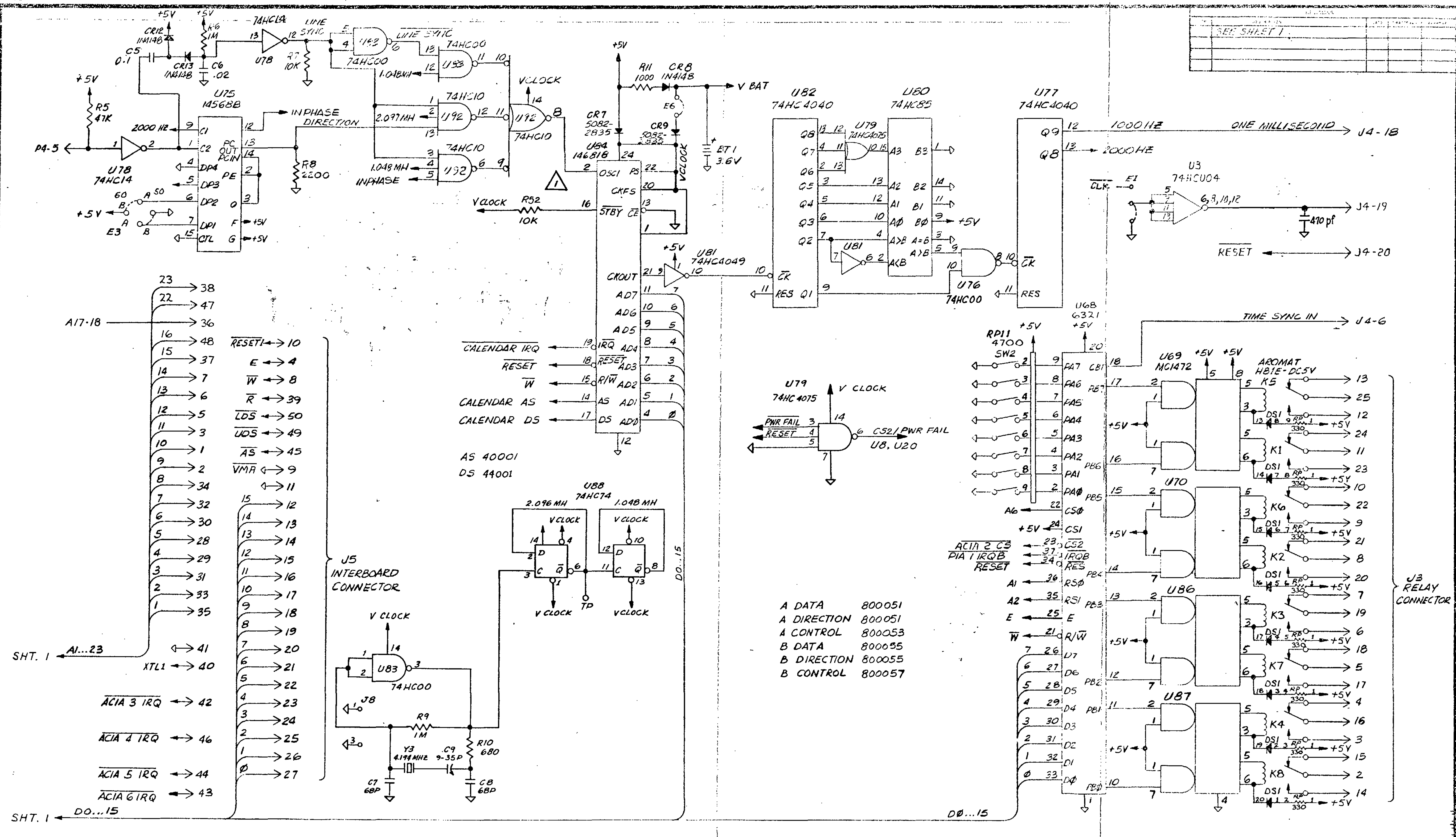
LIST OF MATERIAL

DRAWN	TOM TALLANT	4/7/86
CHECKED		4-86
ENGINEER		4-86
QA		
APPROVED		
RELEASED		

TITLE: SCHEMATIC, BETALOG 512 MAIN CONTROLLER

BETA PRODUCTS, INC. BETA
1615 W. BELTLINE RD. CARROLLTON, TX. 75006

SCALE ~ SIZE D DRAWING NO. 409060 REV G SHEET 4 of 5



NOTES:

1. R52 TIED HIGH

SCHEMATIC BETALOG 512
MAIN CONTROLLER
ESTA PRODUCTS, INC.

DWG NO 409060 | SHEET 5 | REV G

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPR.
A	ECN 208191	6-85	HLY	

A1...23

J5 INTERBOARD CONNECTOR

38 23
47 22
36 17,18
48 16
37 15
7 14
6 13
5 12

U10 74HC244

31 3 6 14 3
33 2 4 16 2
35 1 2 18 1
34 8 17 3 8
32 7 15 5 7
30 6 13 7 6
28 5 11 9 5
29 4 8 12 4
1 E
19 E

U1 74HC244

3 11 11 9 11
1 10 6 14 10
2 9 8 12 9
10 RESET*13 7 RESET
4 E*15 5
8 W*4 16 W
39 R*2 18 R
17
1 E
19 E

+5V
R6 1K
E
R7 1K

50 LDS LDS
49 UDS UDS
45 AS AS
9 VMA
11

41 22K +5V
40 XTL1
42 ACIA 3 IRQ
46 ACIA 4 IRQ
44 ACIA 5 IRQ
43 ACIA 6 IRQ

U23 74HC245

12 15 18 2 15
13 14 17 B A 3 14
14 13 15 5 13
15 12 13 7 12
16 11 11 9 11
17 10 12 8 10
18 9 14 6 9
19 8 16 4 8
W* 1 DIR
BUS OE 19 OE

J5

U11 74HC245

20 7 18 2 7
21 6 17 B A 3 6
22 5 15 5 5
23 4 13 7 4
24 3 11 9 3
25 2 12 8 2
26 1 14 6 1
27 0 16 4 0
W* 1 DIR
BUS OE 19 OE

D0..15 → SHT. 2,3

A16 U33 74HC02 4
A15 2,3 1 2 U34 74HC20 6
A18 5
A23 12,13 74HC10 12 1 U37

S48 10
S50 13 74HC20 U34 8
S58 12
ACIA3CS 9
ACIA4CS 9 74HC10 U37 8 9 74HC02 U33 10
ACIA5CS 10
ACIA6CS 11

11 74HC02
AS 12 U33 13
5,6 U33 74HC02 4 BUS OE

SHT. 2,3 →

U36 74HC138

3 1
4 2
5 3
VMA 4
22 5
23 6
12 ACIA 3 CS 800019
11 ACIA 4 CS 800021
10 ACIA 5 CS 800029
9 ACIA 6 CS 800031

U25 74HC138

12 1
13 2
14 3
LDS 4
5
S48 18 6
15 LOWER EEPROM 8 CS 48001
14 LOWER EEPROM 9 CS 49001
13 LOWER EEPROM 10 CS 4A001
12 LOWER EEPROM 11 CS 4B001
11 LOWER EEPROM 12 CS 4C001
10 LOWER EEPROM 13 CS 4D001
9 LOWER EEPROM 14 CS 4E001
7 LOWER EEPROM 15 CS 4F001

U24 74HC138

12 1
13 2
14 3
UDS 4
5
18 6
15 UPPER EEPROM 8 CS 48000
14 UPPER EEPROM 9 CS 49000
13 UPPER EEPROM 10 CS 4A000
12 UPPER EEPROM 11 CS 4B000
11 UPPER EEPROM 12 CS 4C000
10 UPPER EEPROM 13 CS 4D000
9 UPPER EEPROM 14 CS 4E000
7 UPPER EEPROM 15 CS 4F000

DASH NO & QUANTITY	ITEM	SIZE	PART NUMBER	DESCRIPTION
				LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DECIMAL XX ± .02 XXX ± .010
FRACTIONAL 1/64 ANGULAR 2°
CONCENTRICITY MACHINED DIAMETERS .004 TIR
SURFACE ROUGHNESS IN 400 MICROINCHES
ALL DIMENSIONS IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
ALL DIMENSIONS TO BE MET BEFORE PLATING
DO NOT SCALE THIS DRAWING
( ) DIMENSION IN MILLIMETERS

DRILLED HOLE TOLERANCES
.018 TO .116 ± .002 .234 TO .750 ± .005
.120 TO .234 ± .003 .750 TO 2.000 ± .010

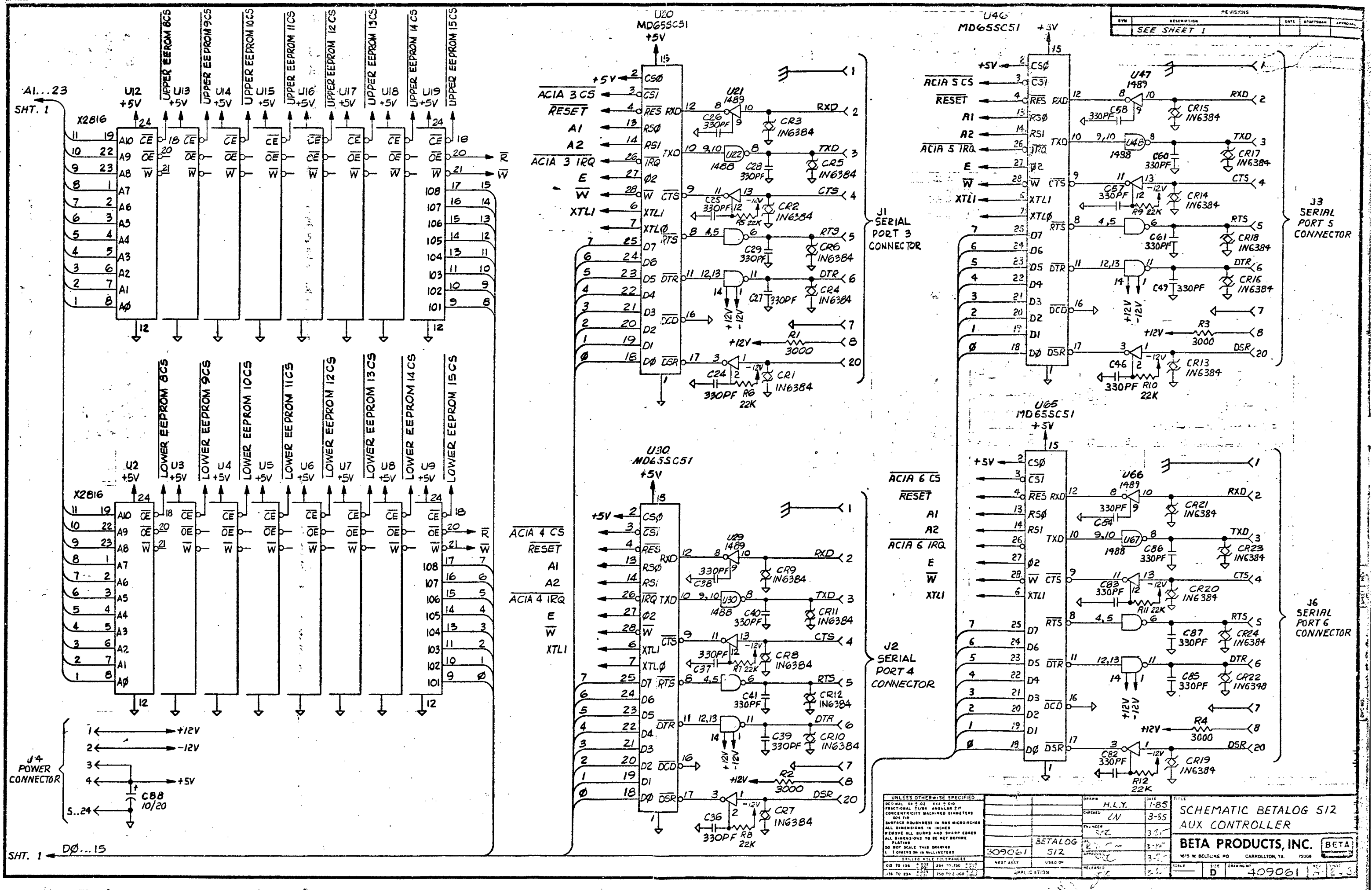
DRAWN	H.L.Y.	DATE	1-85
CHECKED	LN		3-85
ENGINEER	[illegible]		3-85
MFG	[illegible]		3-85
APPROVED	[illegible]		5-6
RELEASED	[illegible]		3-85

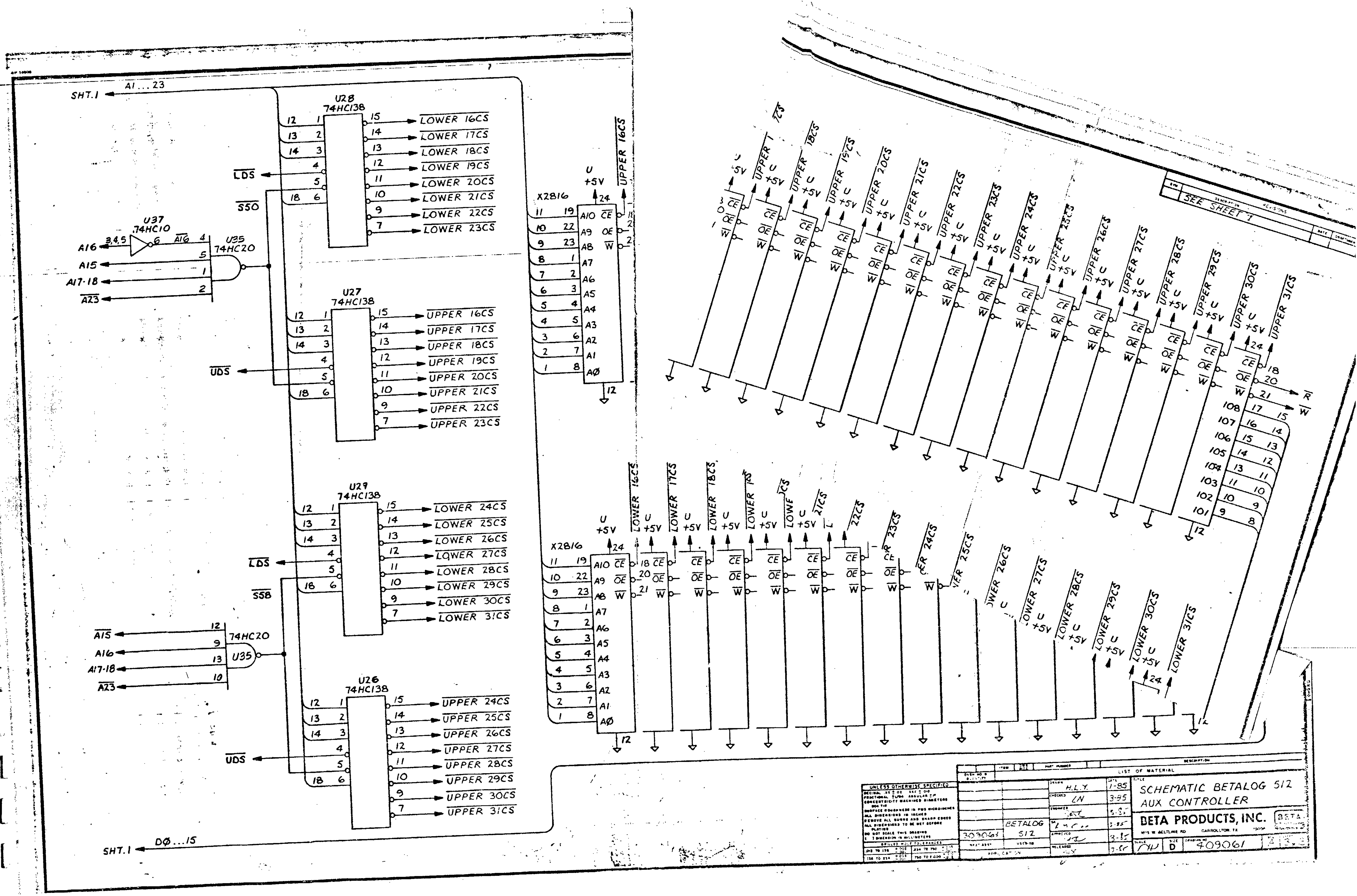
309061 BETALOG 512
NEXT ASSY USED ON
APPLICATION

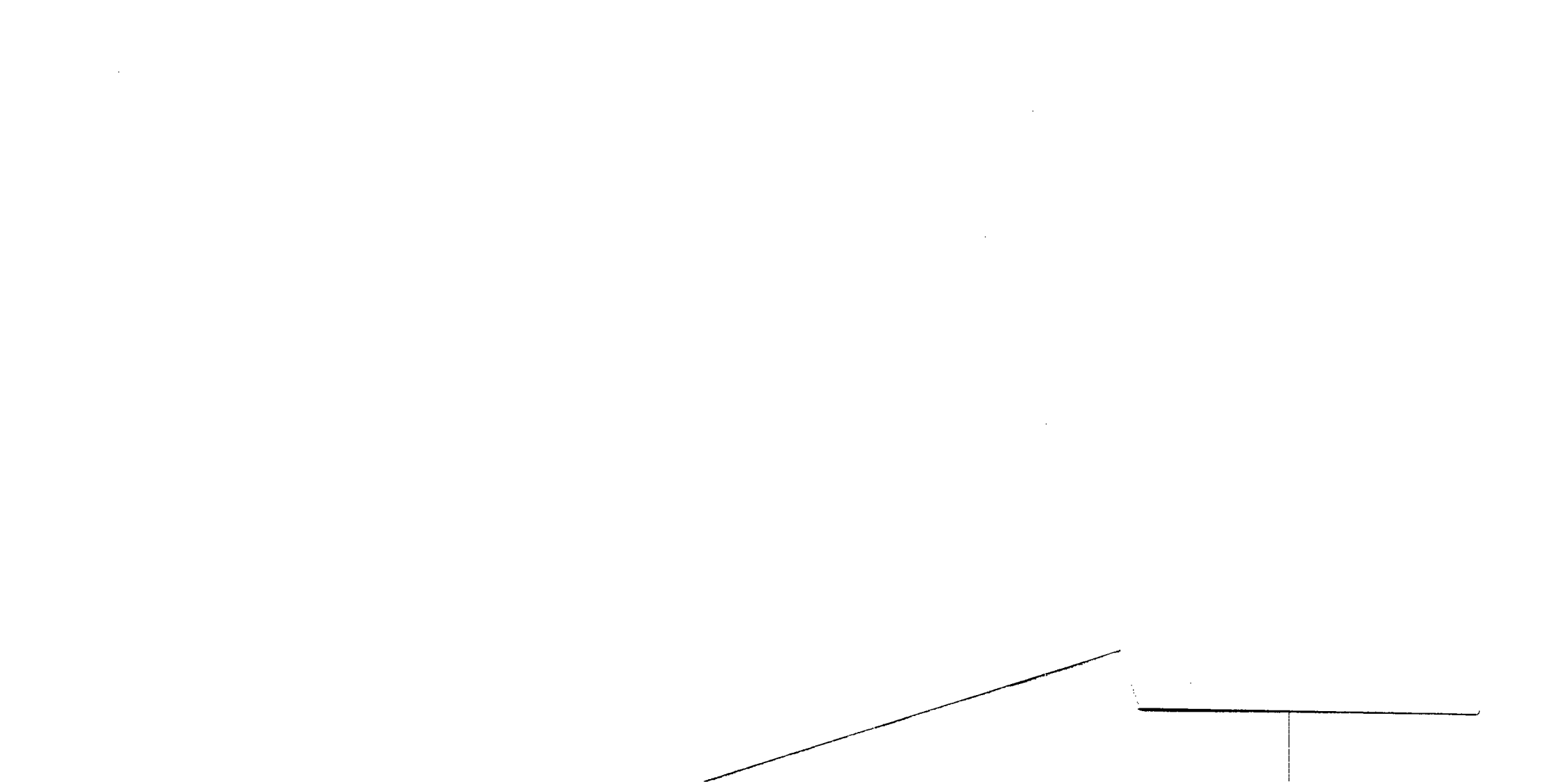
TITLE: SCHEMATIC BETALOG 512 AUX CONTROLLER

BETA PRODUCTS, INC. BETA
1615 W BELTLINE RD. CARROLLTON, TX. 75006

SCALE — SIZE D DRAWING NO 409061 REV A SHEET 1 OF 3


A1...23
SHT. 1
X2816
U12 +5V
U13 +5V
U14 +5V
U15 +5V
U16 +5V
U17 +5V
U18 +5V
U19 +5V
UPPER EEPROM 8CS
UPPER EEPROM 9CS
UPPER EEPROM 10CS
UPPER EEPROM 11CS
UPPER EEPROM 12CS
UPPER EEPROM 13CS
UPPER EEPROM 14CS
UPPER EEPROM 15CS
U2 +5V
U3 +5V
U4 +5V
U5 +5V
U6 +5V
U7 +5V
U8 +5V
U9 +5V
LOWER EEPROM 8CS
LOWER EEPROM 9CS
LOWER EEPROM 10CS
LOWER EEPROM 11CS
LOWER EEPROM 12CS
LOWER EEPROM 13CS
LOWER EEPROM 14CS
LOWER EEPROM 15CS
J4 POWER CONNECTOR
+12V
-12V
+5V
C88 10/20
5..24
SHT. 1 DØ...15
U10 MD65SC51 +5V
U30 MD65SC51 +5V
ACIA 3 CS
ACIA 4 CS
RESET
A1
A2
ACIA 3 IRQ
ACIA 4 IRQ
E
W
XTLI
U21 1489
U22 1488
U29 1489
U30 1488
C26 330PF
C28 330PF
C25 330PF
C29 330PF
C27 330PF
C24 330PF
C38 330PF
C40 330PF
C37 330PF
C41 330PF
C39 330PF
C36 330PF
R5 22K
R6 22K
R1 3000
R7 22K
R9 22K
R11 22K
R2 3000
R8 22K
CR3 IN6384
CR5 IN6384
CR2 IN6384
CR6 IN6384
CR4 IN6384
CR1 IN6384
CR9 IN6384
CR11 IN6384
CR8 IN6384
CR12 IN6384
CR10 IN6384
CR7 IN6384
RXD
TXD
CTS
RTS
DTR
DCD
DSR
J1 SERIAL PORT 3 CONNECTOR
J2 SERIAL PORT 4 CONNECTOR
U46 MD65SC51 +5V
U65 MD65SC51 +5V
U47 1489
U48 1488
U66 1489
U67 1488
C58 330PF
C60 330PF
C57 330PF
C61 330PF
C49 330PF
C62 330PF
C84 330PF
C86 330PF
C83 330PF
C87 330PF
C85 330PF
C82 330PF
C46 330PF
R10 22K
R3 3000
R4 3000
CR15 IN6384
CR17 IN6384
CR14 IN6384
CR18 IN6384
CR16 IN6384
CR13 IN6384
CR21 IN6384
CR23 IN6384
CR20 IN6384
CR24 IN6384
CR22 IN6398
CR19 IN6384
J3 SERIAL PORT 5 CONNECTOR
J6 SERIAL PORT 6 CONNECTOR
REVISIONS
SEE SHEET 1
UNLESS OTHERWISE SPECIFIED
DRILLED HOLE TOLERANCES
BETALOG 512
409061
NEXT ASSY
USED ON
APPLICATION
DRAWN H.L.Y. 1-85
CHECKED LN 3-85
ENGINEER SAZ 3-85
QA 3-85
APPROVED 3-85
RELEASED 3-85
SCHEMATIC BETALOG 512
AUX CONTROLLER
BETA PRODUCTS, INC.
1615 W. BELTLINE RD CARROLLTON, TX. 75006
SIZE D
DRAWING NO 409061
REV A
SHEET 2 OF 3


SHT.1
A1 ... 23
U28
74HC138
LOWER 16CS
LOWER 17CS
LOWER 18CS
LOWER 19CS
LOWER 20CS
LOWER 21CS
LOWER 22CS
LOWER 23CS
LDS
S50
U37
74HC10
A16
A15
A17-18
A23
U35
74HC20
U27
74HC138
UPPER 16CS
UPPER 17CS
UPPER 18CS
UPPER 19CS
UPPER 20CS
UPPER 21CS
UPPER 22CS
UPPER 23CS
UDS
U29
74HC138
LOWER 24CS
LOWER 25CS
LOWER 26CS
LOWER 27CS
LOWER 28CS
LOWER 29CS
LOWER 30CS
LOWER 31CS
S58
U26
74HC138
UPPER 24CS
UPPER 25CS
UPPER 26CS
UPPER 27CS
UPPER 28CS
UPPER 29CS
UPPER 30CS
UPPER 31CS
D0...15
X2816
+5V
SEE SHEET 1
LIST OF MATERIAL
SCHEMATIC BETALOG 512
AUX CONTROLLER
BETA PRODUCTS, INC.
BETALOG 512
303061
H.L.Y.
D
409061



REV	DESCRIPTION	DATE	BY	CHK
A	ECN 208045	3/85	LN	
B	ECN 208301	7/85		
C	ECN 208896	1/86		
D	ECN 209371	1/87		

P1 FIELD CONTACT SUPPLY CONNECTOR

P3 POWER CONNECTOR

J2 SYNC CONNECT

VR2 IN5297 · VR1 IN5297 · R4 4700 · R6 62K 1/2W · R8 12K · R5 62K 1/2W · C5 1000PF · CR4 IN4007 · CR5 · CR6 · CR7 · R7 27K · U4 4N35 · R2 3600 · CR2 IN4007 · C4 1000PF · U2 4N35 · R10 10K · R3 360 · U3 4N35 · CR3 IN4007 · U5 74HC02 · R9 10K · U1 555 · CR1 IN4148 · K1 · R1 1MEG · Q1 2N3702 · Q2 · C3 .01 · C2 15/20 · R11 10 · R12 10 · C7 · E5 · C8 · R13 100

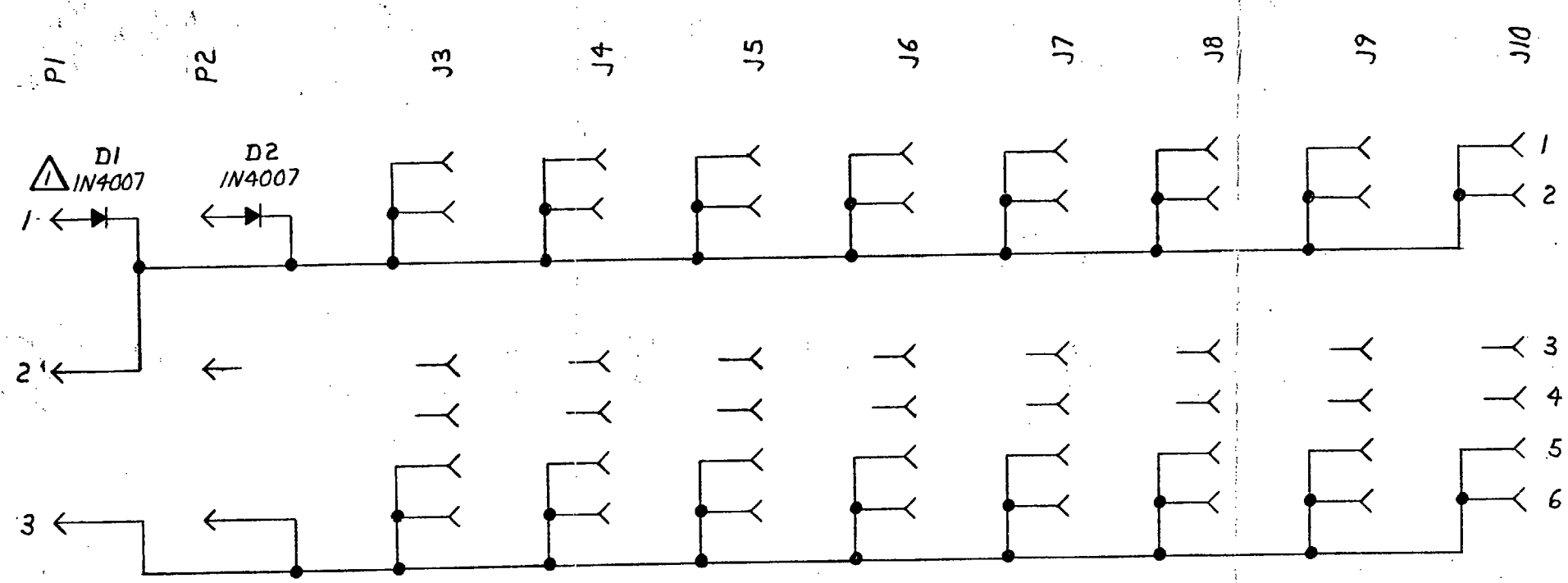
J4 AUX CONTROLLER · J5 MAIN CONTROLLER · J6 SCANNER 7 · J7 SCANNER 6 · J8 SCANNER 5 · J9 SCANNER 4 · J10 SCANNER 3 · J11 SCANNER 2 · J12 SCANNER 1 · J13 SCANNER 0 · J14 · P15

+12V · -12V · +5V · TRIG · TRIG TYPE · TIME SYNC OUT · SR DATA · SW DATA · BD7 · BD6 · BD5 · BD4 · BD3 · BD2 · BD1 · BD0 · ONE MILLISECOND · CLK · RESET

DRAWN	Tallant	4-1-86	SCHEMATIC, BETALOG 512 LOGIC BACKPLANE
CHECKED			BETA PRODUCTS, INC.
APPROVED			409062 D

DRAWING 409062 · SHEET 1 · REV D

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL
A	ECN 208065	3/85	[illegible]	[illegible]
B	ECN 208506	10-85	LN	[illegible]



NOTES:

1. REVERSE D1 ORIENTATION FOR -002 ASSY

DASH NO. & QUANTITY	ITEM	DWG SIZE	PART NUMBER	DESCRIPTION
			LIST OF MATERIAL	
1		BETALOG	512	
309063				
NEXT ASSY		USED ON		
APPLICATION				

UNLESS OTHERWISE SPECIFIED
DECIMAL .XX ±.02 .XXX ±.010
FRACTIONAL ±1/64 ANGULAR ±1°
CONCENTRICITY MACHINED DIAMETERS .004 TIR
SURFACE ROUGHNESS IN RMS MICROINCHES
ALL DIMENSIONS IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
ALL DIMENSIONS TO BE MET BEFORE PLATING
DO NOT SCALE THIS DRAWING
( ) DIMENSION IN MILLIMETERS

DRILLED HOLE TOLERANCES

.013 TO .136	+.002 −.001	.234 TO .750	+.005 −.001
.136 TO .234	+.003 −.001	.750 TO 2.000	+.010 −.002

DRAWN	LN	12-84
CHECKED	LN	12-84
ENGINEER	[illegible]	12-84
QA	[illegible]	12-84
APPROVED	[illegible]	12-84
RELEASED	[illegible]	12-84

TITLE: SCHEMATIC, FIELD CONTACT BACKPLANE

BETA PRODUCTS, INC. BETA PRODUCTS, INC.
1615 W. BELTLINE RD. CARROLLTON, TX. 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
—	C	409063	B	1 of 1

REV B
SHEET 1
DWG NO. 409063

ITEM	DESCRIPTION	DATE	APPROVED	
A	ECN 209520	9/87		

BETALOG 512 ← → BETALOG 512 EXPANSION

LOGIC DC SUPPLY
+5 +12 -12

CUSTOMER I/O'S

AUXILIARY CONTROLLER
- J1 - PORT 3
- J2 - PORT 4
- IRIG-B J3 - PORT 5
- J6 - PORT 6
- RS232C SERIAL PORTS
- J4 - PWR
- J5 INTERBOARD CONNECTOR

RS232C PERIPHERAL DEVICES

50 PIN RIBBON CABLE

MAIN CONTROLLER
- J5 INTERBOARD CONNECTOR
- J7 - PORT 0
- J1 - PORT 1
- J2 - PORT 2
- RS232C SERIAL PORTS
- 8 FORM "C" RELAY CONTACT SETS
- J3 - RELAY OUTPUTS
- J4 - PWR, SYNC & SCANNER DATA

TIME SYNC I/O'S

SCANNER #8
- J2 PT1 - PT32
- J3 PT33 - PT64
- FIELD INPUTS
- J4 - PWR, SYNC & SCANNER DATA
- J1 - FC VOLTAGE

512 FIELD INPUTS

F.C. SUPPLY

F.C. BACKPLANE

SCANNER #1
- J1 - FC VOLTAGE
- J2 PT1 - PT32
- J3 PT33 - PT64
- FIELD INPUTS
- J4 - PWR, SYNC & SCANNER DATA

LOGIC BACKPLANE
- J3
- J4
- J5
- J2
- J6
- EXP. CONNS. J15, J14

15 PIN RIBBON CABLE (J15)
15 PIN RIBBON CABLE (J14)

LOGIC DC SUPPLY
+5 +12 -12

LOGIC BACKPLANE
- J3
- J13
- J15
- J14
- EXP. CONNS.
- J6

CUSTOMER INPUTS

SCANNER #1
- J4 - PWR, SYNC & SCANNER DATA
- FIELD INPUTS
- J2 PT1 - PT32
- J3 PT33 - PT64
- J1 - F.C. VOLTAGE

F.C. BACKPLANE

F.C. SUPPLY

SCANNER #8
- J1 - F.C. VOLTAGE
- FIELD INPUTS
- J2 PT1 - PT32
- J3 PT33 - PT64
- J4 - PWR, SYNC & SCANNER DATA

512 FIELD INPUTS

ITEM	QTY	PART NUMBER	DESCRIPTION
		DASH NO.	QTY PER MATERIAL

UNLESS OTHERWISE SPECIFIED

DRAWN	H.L.Y.	2-85
CHECKED	LN	2-85
ENG APPR.	[signature]	2-85
MFG APPR.	R. McDade	2-85
Q.A.	[signature]	2-85
COMMENTS		

890083 840922

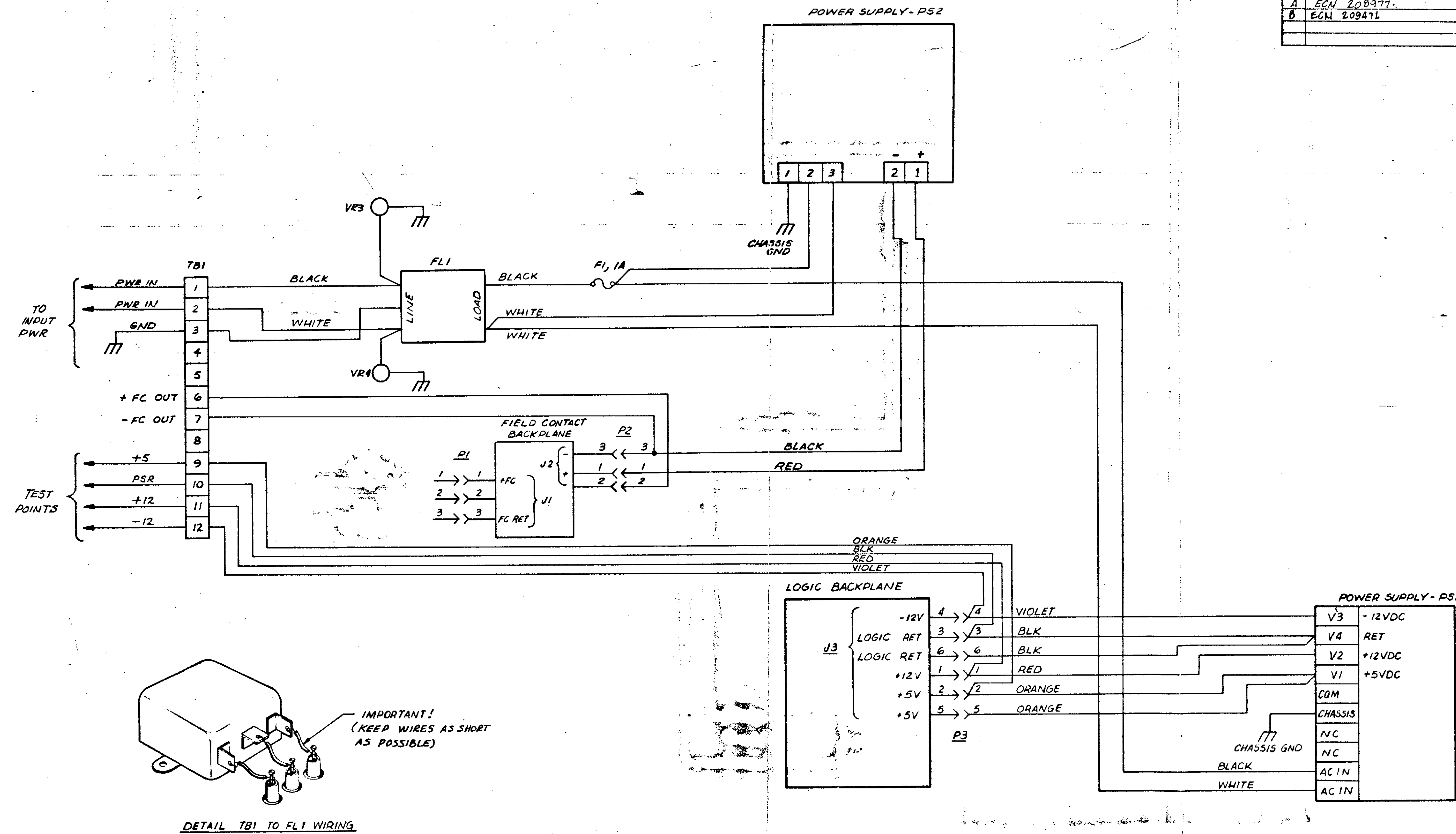
BLOCK DIAGRAM, BETALOG 512/1024

BETA PRODUCTS, INC.

SIZE	DWG NO	REV
D	806580	A

SHEET 1 / 1

SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL
A	ECN 208977	[illegible]	[illegible]	[illegible]
B	ECN 209471	[illegible]	[illegible]	MJH



DETAIL TB1 TO FL1 WIRING

NOTES:

1. ALL WIRE IS 18 AWG TEFZEL UNLESS OTHERWISE NOTED.

UNLESS OTHERWISE SPECIFIED

LIST OF MATERIAL

DRAWN	H.L.Y.	9-85
CHECKED	LN	10-85
ENGINEER	[illegible]	10-75
	R. McQuaid	10-85
APPROVED	[illegible]	10-85

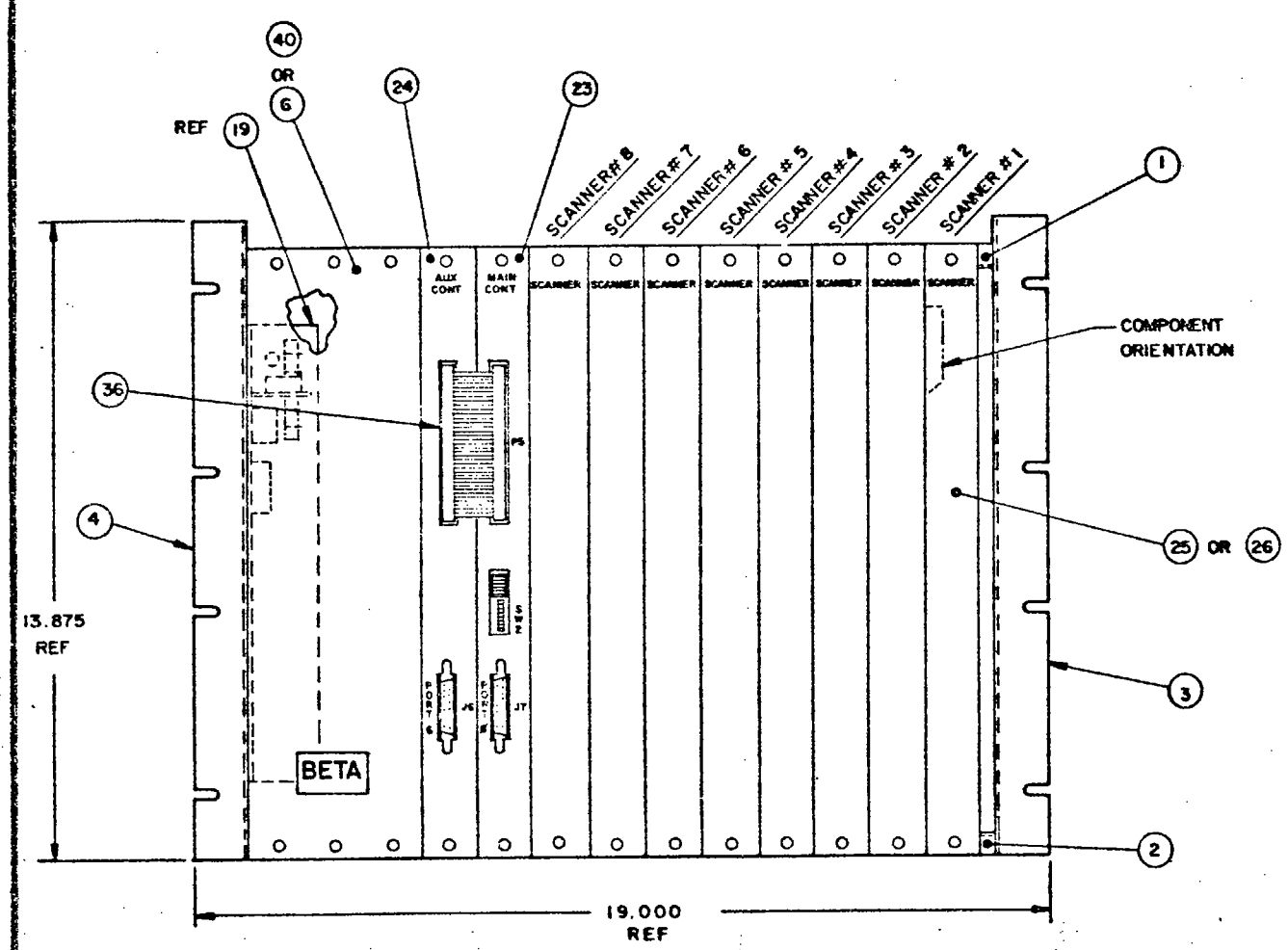
UNIV BL-512

WIRING DIAGRAM,
BETALOG 512 125 F.C. P/S

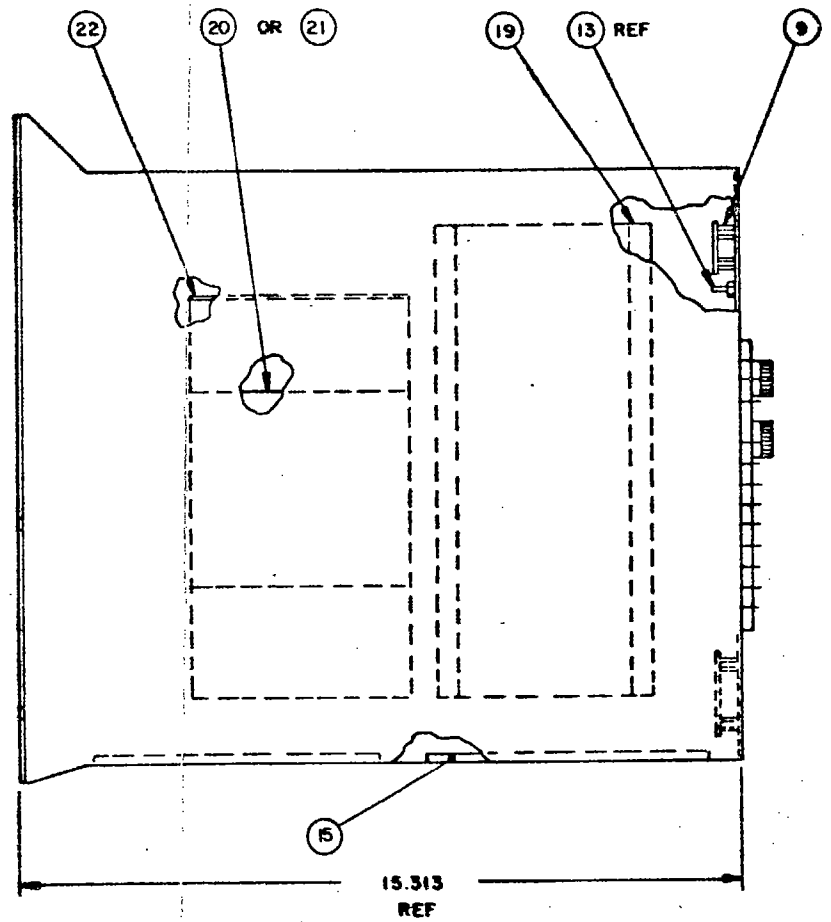
BETA PRODUCTS, INC.
2029 McKENZIE DR.

D 806862 B 1 1

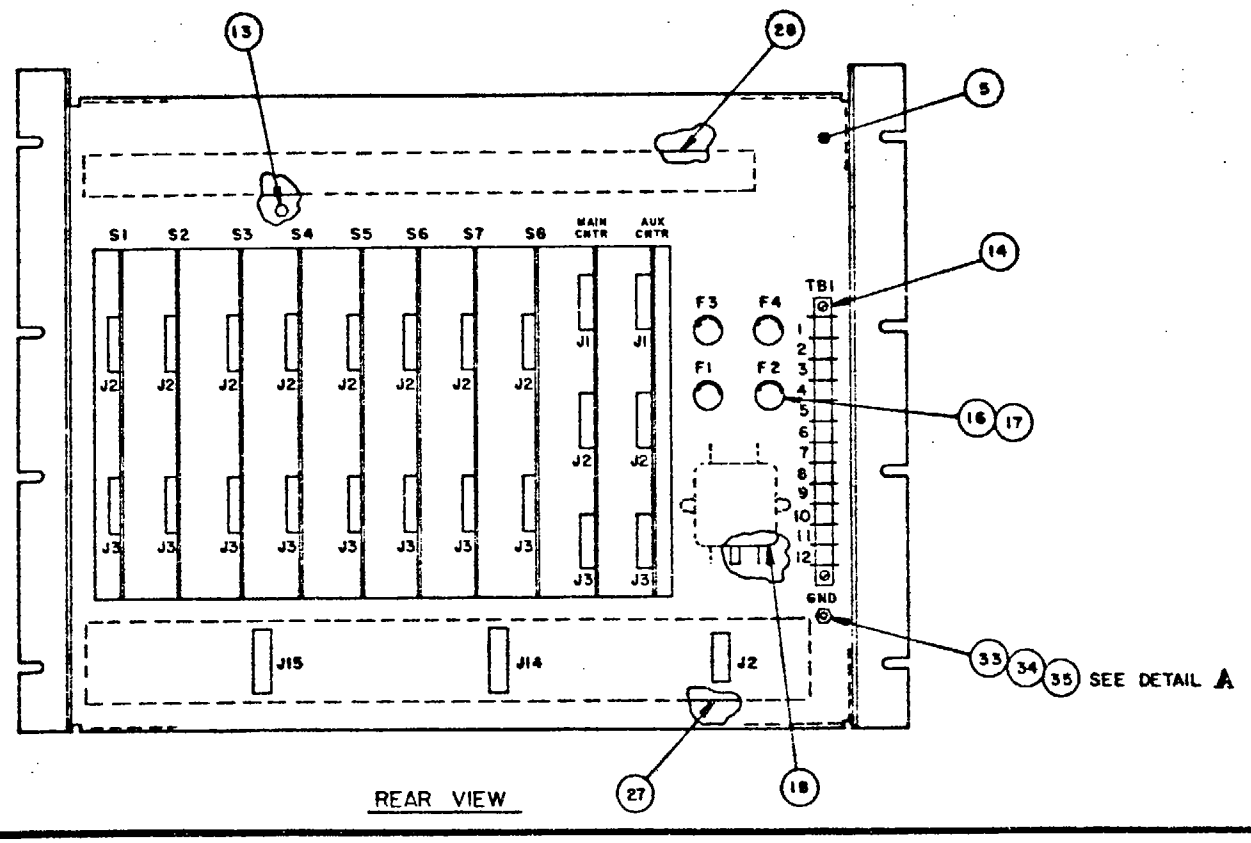
DWG NO. 806862 SHEET 1 REV B



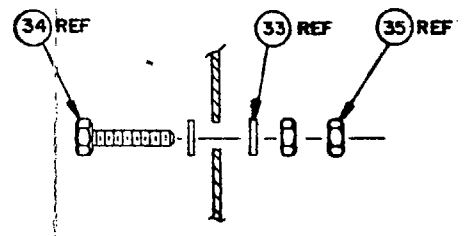
FRONT VIEW



SIDE VIEW



REAR VIEW



DETAIL A

NOTES:

1. ITEM 38 TO BE ISSUED AS A SUPPLEMENT TO ITEMS 23 & 24, REF. DWG. A806760
2. REF. ITEM 29 FOR THE USAGE OF ITEM 38.

	ITEM	SIZE	PART NUMBER	DESCRIPTION
	40	B	806485-002	ASSY, PWR SUPPLY COVER HATHAWAY 7000
	39	D	309075-001	ASSY, AUX CONT. W/FIBER OPT. PCB
2	38		102003-069	VARISTOR (VRI THRU
4	37		100156-005	IC X2864A EEPROM
1	36	B	806526-001	ASSY, CABLE, INTERCONNECTING, AUX/MAIN
2	35		116295-002	NUT, HEX BRASS
1	34		116295-003	BOLT, BRASS 8-32x.75L
2	33		136170-001	WASHER, LOCK NO. 8
	32	A	807320-001	PORT Ø TERMINAL SIMULATOR
4	31	B	806434-002	PANEL, BLANK
	30	B	806434-001	PANEL, FRONT-SCANNER
REF	29		807513	WIRING DIAGRAM
1	28	C	309063-001	ASSY, FC BACKPLANE PCB
1	27	D	309062-001	ASSY, LOGIC BACKPLANE PCB
	26	D	309059-	ASSY, SCANNER PCB NEGATIVE INPUT
4	25	D	309058-001	ASSY, SCANNER PCB POSITIVE INPUT
1	24	D	309061-001	ASSY, AUX CONTROLLER PCB
1	23	D	309060-004	ASSY, MAIN CONTROLLER PCB
	22		120490-004	POWER SUPPLY 125 VDC
	21		120615-065	POWER SUPPLY 48 VDC WITH OVP
1	20		120615-181	POWER SUPPLY 24 VDC
1	19		120615-342	POWER SUPPLY 5, ±12
1	18		120682-100	FILTER, LINE, 1A
1	17		120087-019	FUSE, 1 AMP SLO BLO
1	16		120082-001	FUSE HOLDER
40	15		112076-005	PC CARD GUIDE
1	14		110035-012	TERMINAL BLOCK
10	13		108232-003	CONNECTOR, BANANA MALE
28	12		116181-001	WASHER, FLAT NO.6
28	11		133159-001	WASHER, LOCK NO.6
28	10		130030-021	NUT, HEX 6-32
28	9		116018-014	STANDOFF, 6-32x1/4L
28	8		130000-033	SCREW, 6-32 x 5/8L
42	7		130015-003	SCREW, 8-32 x 3/8L
	6	B	806485-001	ASSY, POWER SUPPLY COVER, BL512
1	5	D	806626-001	CHASSIS, REAR PANEL
1	4	C	806348-002	SIDE PLATE, LEFT
1	3	C	806348-001	SIDE PLATE, RIGHT
1	2	D	806346-002	PLATE, BOTTOM
1	1	D	806346-001	PLATE, TOP

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL

		DRAWN	5/87
		CHECKED	
		ENGINEER	
		QA	
	51756	APPROVED	
NEXT ASSY	USED ON	RELEASED	7/87
APPLICATION			

TITLE: ASSY, SER BETALOG 512
MAIN CHASSIS

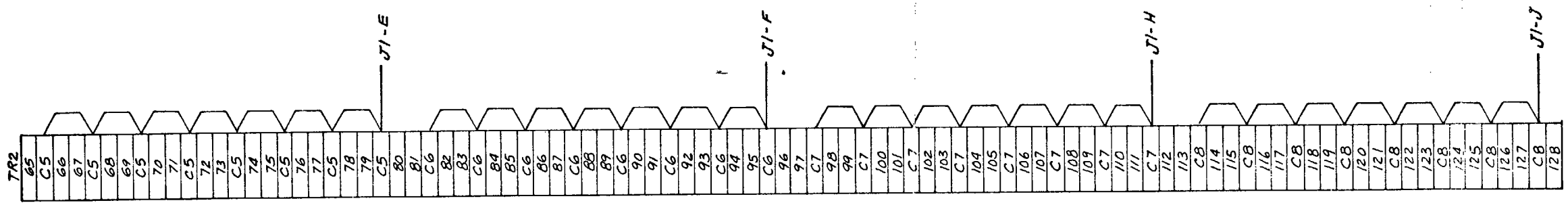
BETA PRODUCTS, INC. (BETA LOGIC)
2929 McKENZIE DR. CARROLLTON, TX. 75006

SCALE — | SIZE D | DRAWING NO 807512 | REV — | SHEET 1 OF 1

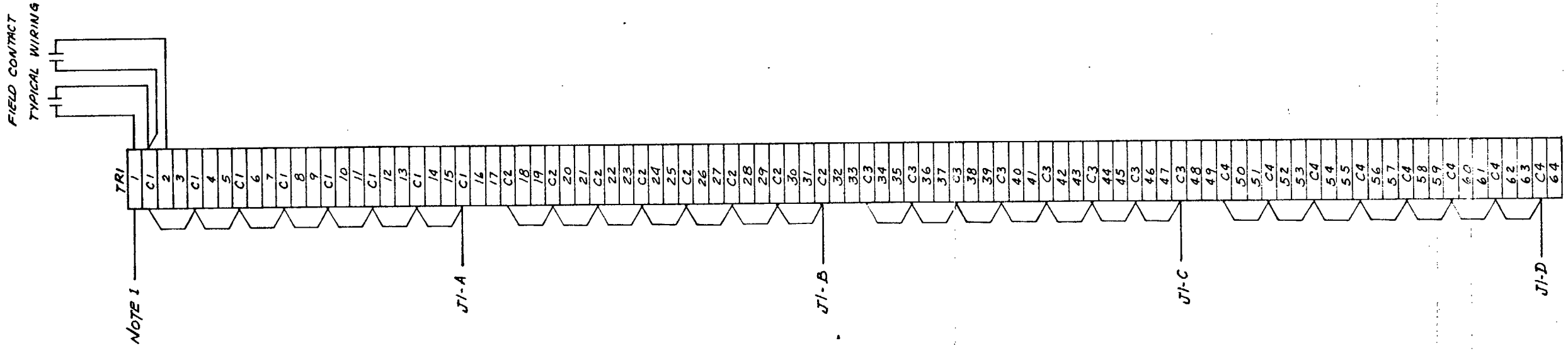
807512

220057

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVED	
A	ECN 209579	7/87	[illegible]	



FIELD CONTACT
TYPICAL WIRING



NOTES:

1. REF DWG 807536 FOR INPUT CONN WIRING.
2. J1 IS LOCATED ON GROUND DET. PANEL 807304.
3. TERMINALS ARE WEIDMULLER SAKTI-2061.2

ITEM	QTY PER	PART NUMBER	DESCRIPTION
ASSY NO. & QUANTITY			LIST OF MATERIAL
		51756	

UNLESS OTHERWISE SPECIFIED
DECIMAL XX ± .02 XXX ± .010
FRACTIONAL ± 1/64 ANGULAR ± 1°
CONCENTRICITY MACHINED DIAMETERS .004 TIR
SURFACE ROUGHNESS 16 RMS MICROINCHES
ALL DIMENSIONS IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
ALL DIMENSIONS TO BE MET BEFORE PLATING
DO NOT SCALE THIS DRAWING
[illegible] DIMENSION IN [illegible] METERS

DRILLED HOLE TOLERANCES

.0 TO .124	± .002	.250 TO .500	± .005
.125 TO .249	± .003	.501 TO 2.500	± .010

	NAME	DATE
DRAWN	[signature]	6/18/87
CHECKED	JP	6/87
ENGINEER	JP	6/87
QA		
APPROVED		
RELEASED	[signature]	6/87

TITLE: TERMINAL ARRANGEMENT

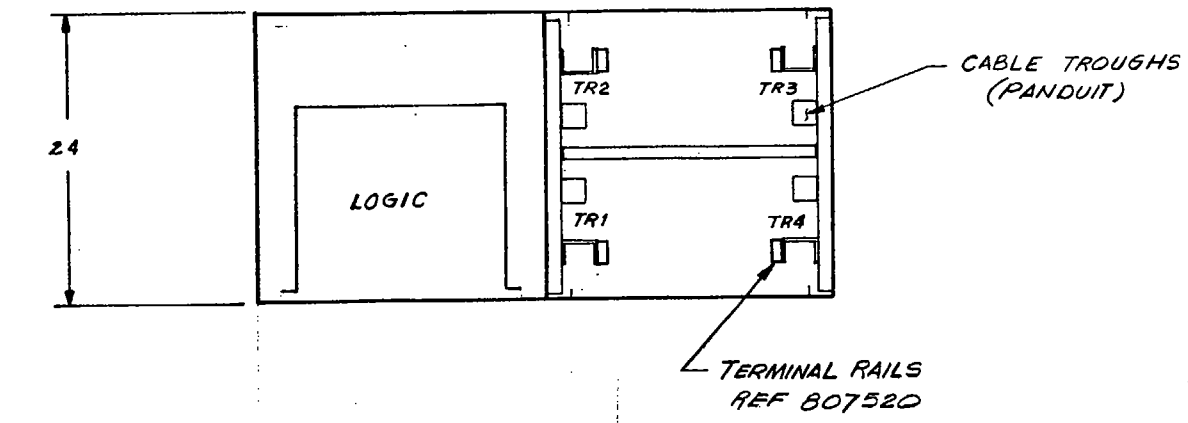
BETA PRODUCTS, INC. BETA
11171 W BELTLINE RD CARROLLTON TX

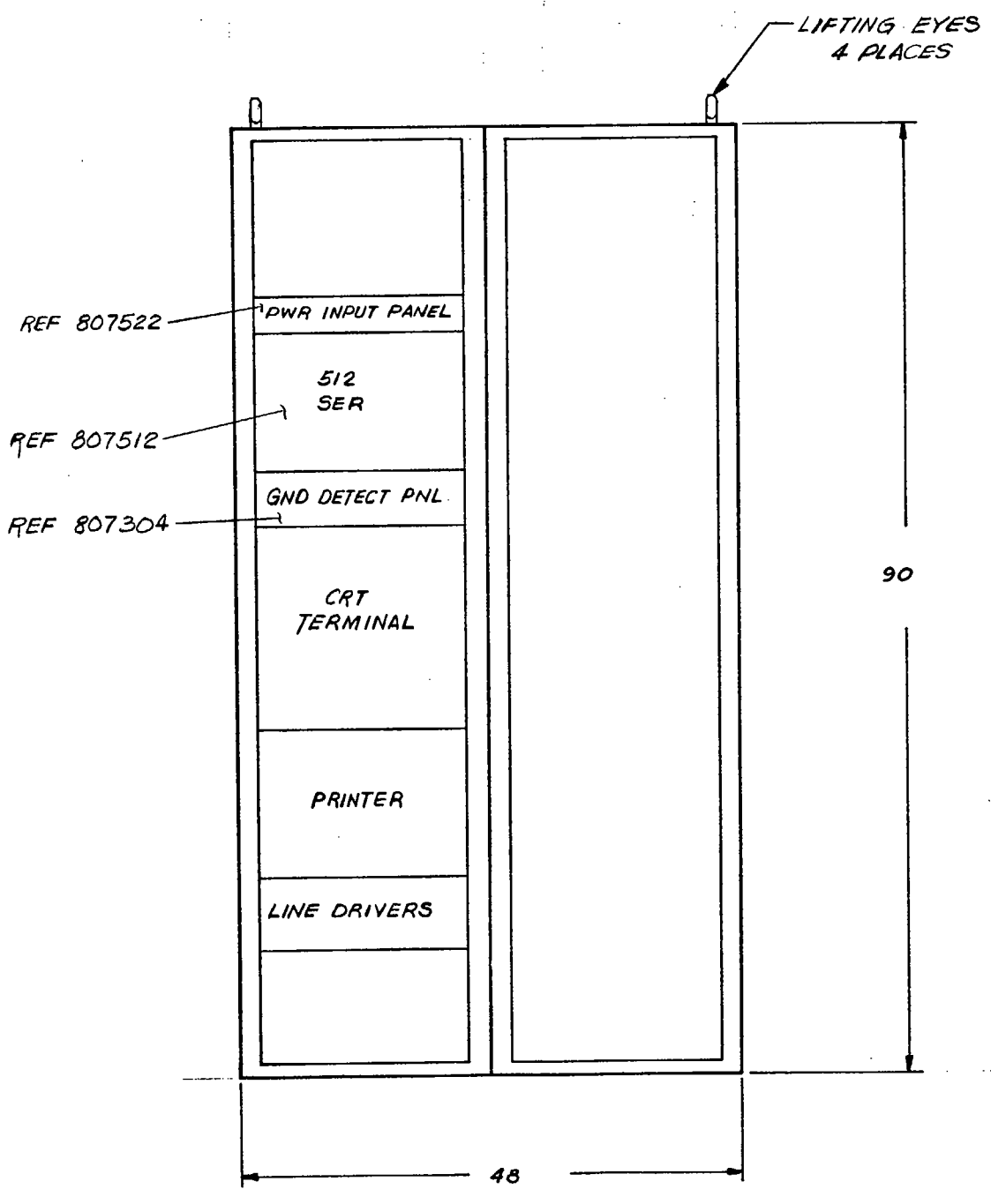
SCALE	SIZE	DRAWING NO	REV
~	D	807520	A

SHEET 1.2

DWG NO 807520 REV A

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL
A	ECN 209580	5/14	[illegible]	[illegible]





CABINET SHOWN WITHOUT DOORS

REF CABINET WIRING DWG 807564
TERMINATION OF LINE DRIVERS (MODEM)
TO REMOTE CRT & PRINTER.

DASH NO. & QUANTITY	ITEM	DWG SIZE	PART NUMBER	DESCRIPTION
				LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DECIMAL .XX ±.02 .XXX ±.010
FRACTIONAL ±1/64 ANGULAR ±1°
CONCENTRICITY MACHINED DIAMETERS .004 TIR
SURFACE ROUGHNESS IN RMS MICROINCHES
ALL DIMENSIONS IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
ALL DIMENSIONS TO BE MET BEFORE PLATING
DO NOT SCALE THIS DRAWING
( ) DIMENSION IN MILLIMETERS

DRILLED HOLE TOLERANCES

.013 TO .138	+.002 −.001	.234 TO .750	+.005 −.001
.138 TO .234	+.003 −.001	.750 TO 2.000	+.005 −.002

		DRAWN	6/9/87
		CHECKED	6/87
		ENGINEER	6/87
		QA	
	51756	APPROVED	
NEXT ASSY	USED ON	RELEASED	6/87
APPLICATION			

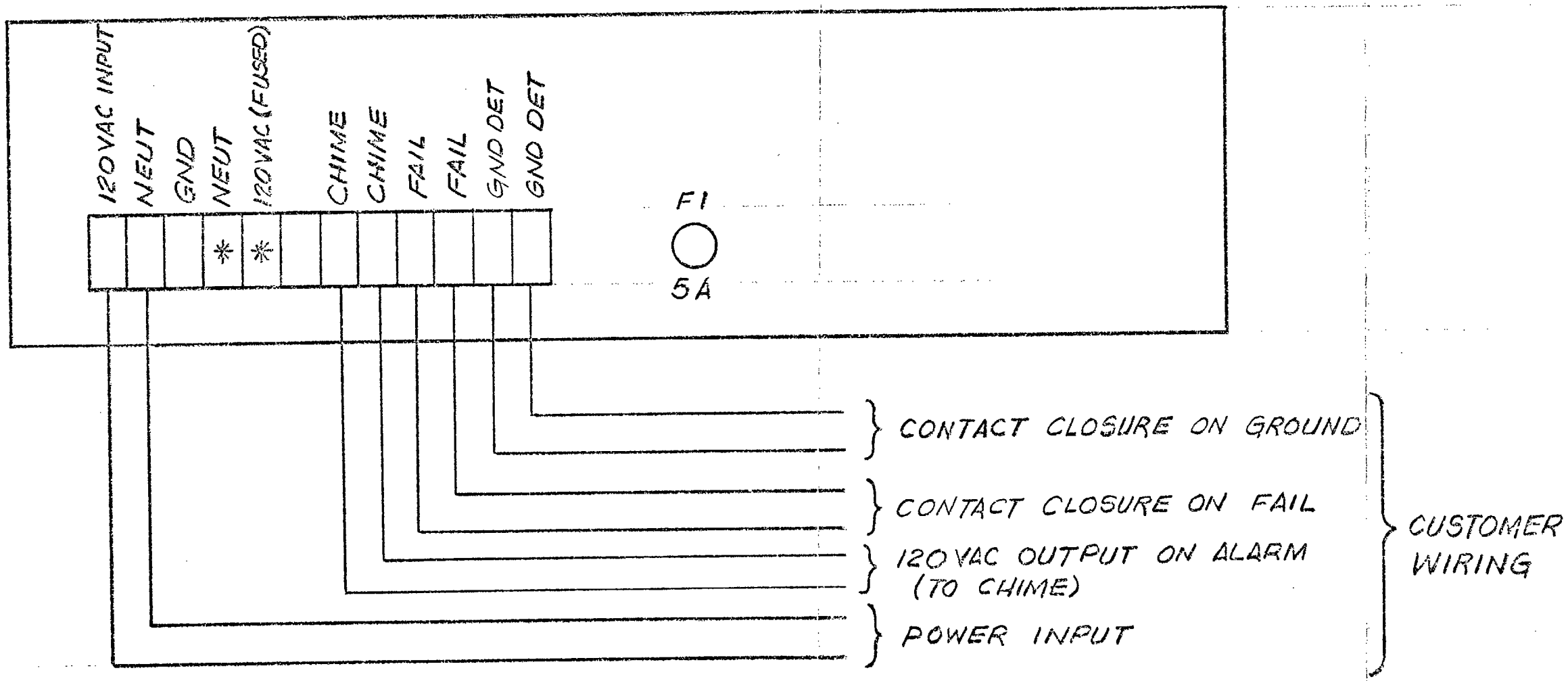
TITLE: CABINET ARRANGEMENT

BETA PRODUCTS, INC. BETA PRODUCTS INC
1615 W. BELTLINE RD CARROLLTON, TX. 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
~	D	807521	A	1 of 1

DWG NO. 807521 REV A SHEET 1

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL
A	ECN 209610	4/87	[illegible]	[illegible]



* CABINET WIRING

DASH NO. & QUANTITY	ITEM	DWG SIZE	PART NUMBER	DESCRIPTION
				LIST OF MATERIAL
			51756	
NEXT ASSY			USED ON	
APPLICATION				

UNLESS OTHERWISE SPECIFIED			
DECIMAL .XX ± .02 .XXX ± .010			
FRACTIONAL ±1/64 ANGULAR ±1°			
CONCENTRICITY MACHINED DIAMETERS .004 TIR			
SURFACE ROUGHNESS IN RMS MICROINCHES			
ALL DIMENSIONS IN INCHES			
REMOVE ALL BURRS AND SHARP EDGES			
ALL DIMENSIONS TO BE MET BEFORE PLATING			
DO NOT SCALE THIS DRAWING			
( ) DIMENSION IN MILLIMETERS			
DRILLED HOLE TOLERANCES			
.013 TO .136	+.002 -.001	.234 TO .750	+.005 -.001
.136 TO .234	+.003 -.001	.750 TO 2.000	+.010 -.002

DRAWN	[illegible]	6/87
CHECKED	[illegible]	6/87
ENGINEER	[illegible]	6/87
QA		
APPROVED		
RELEASED	[illegible]	6/87

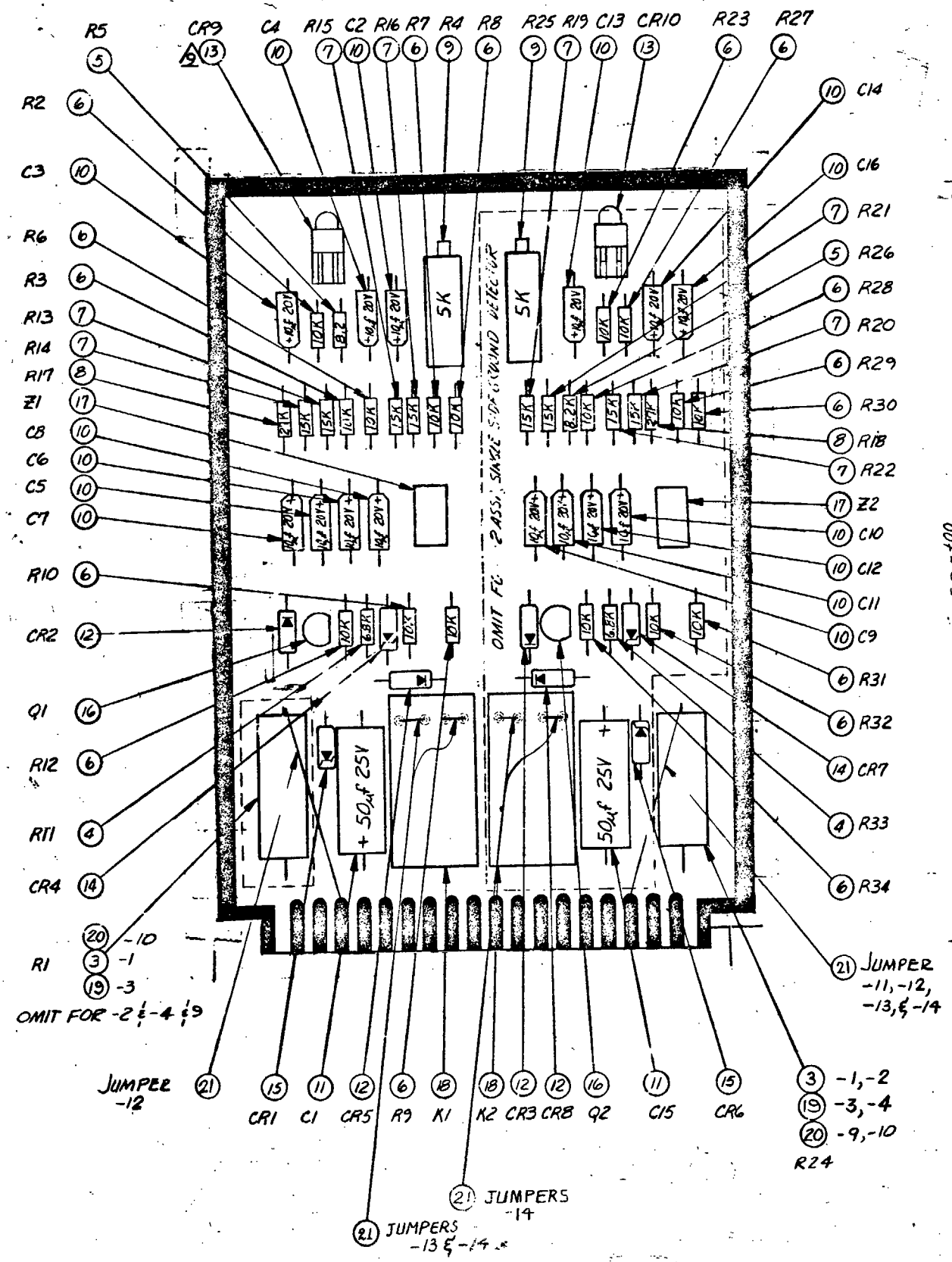
TITLE
POWER INPUT PANEL

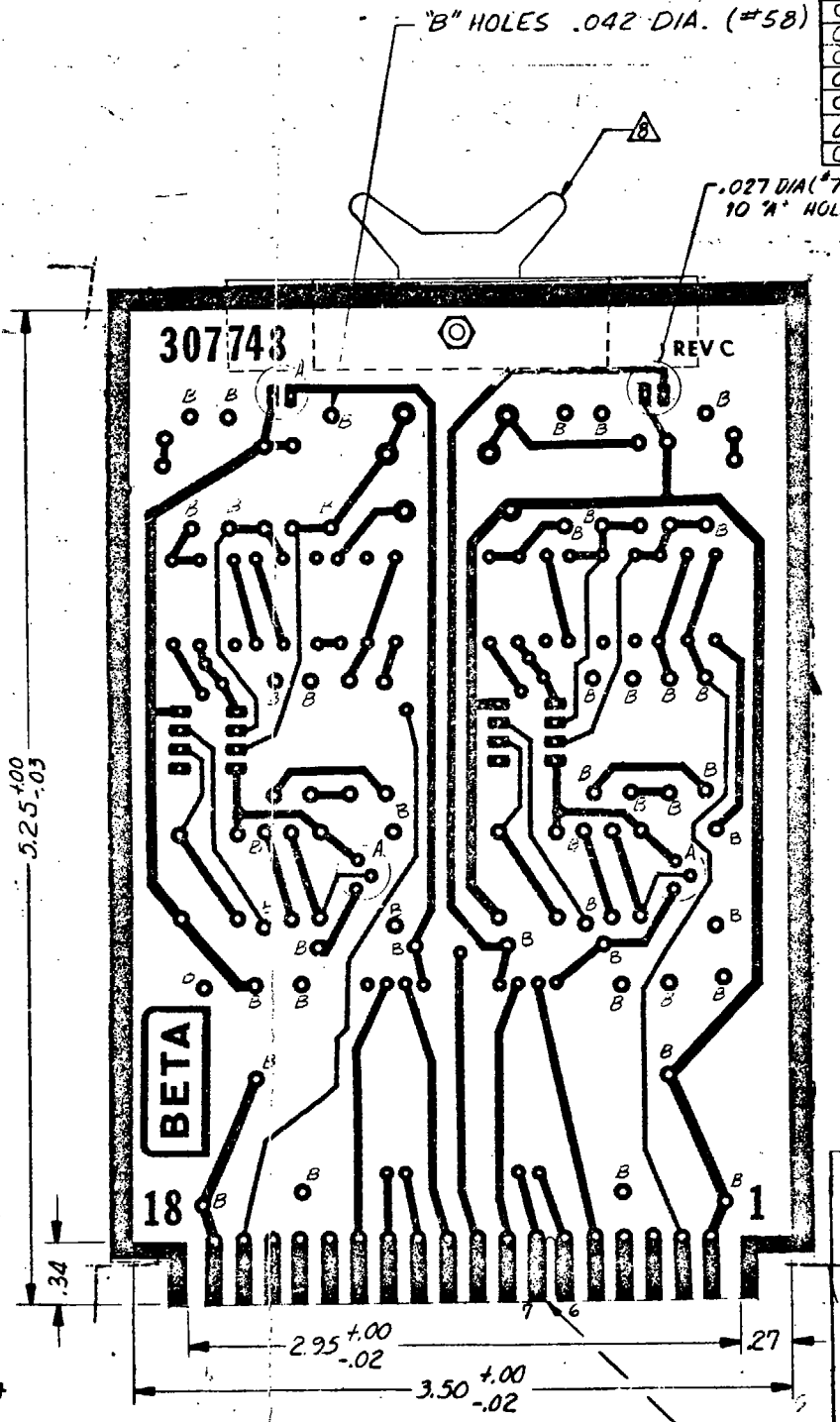
BETA PRODUCTS, INC.
2029 McKENZIE DR. CARROLLTON, TX. 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
~	B	807522	A	1 of 1

DWG NO. 807522 REV A SHEET 1

TELEDYNE POST N89505





REVISIONS				
SYM	DESCRIPTION		DATE	APPVL
C_2	ECN 201691	JW	7/5/79	
C_3	ECN 202460			
C_4	ECN 203600	SK	11/29/80	
C_5	ECN#203754	DEB	4/14/80	
C_6	ECN 206449		7/25/83	DEB
C_7	ECN 206817	LN	10-29-83	
C_8	ECN 208207		6-11-85	
C_9	ECN 209400	LB	2-18-85	

REVISIONS			
SYM	DESCRIPTION	DATE	APPVL
—	ECN # 102849	4.27.76	
A	ECN # 105355	7-14-76	
A_1	ECN # 102847	7/29/76	
A_2	ECN # 105770	9-20-76	
A_3	ECN # 104701	10-28-76	
A_4	ECN # 104739	12.13.76	
A_5	ECN # 104462	5 20 77	
B	ECN # 104940	6-15-77	
B_1	ECN # 106334	10.25.77	
B_2	ECN # 106496	12-1-77	
B_3	ECN # 106694	12.29.77	
C	ECN # 108237	9-78	
C_1	ECN 201265	5-79	

NOTES:
1. MATERIAL: 1/16 THK NEMA G-10 EPOXY GLASS PLASTIC SHEET, LAMINATED COPPER CLAD TWO SIDES, 2 OZ COPPER OR EQUIV.
2. FINISH: TIN LEAD PLATE OR EQUIV.
3. COPPER TO BE CENTERED ±.02 WITHIN CONNECTOR AREA.
4. ALL HOLES .031 DIA. (1/32) UNLESS OTHERWISE SPECIFIED.
5. ALL HOLES PLATED THRU AND DIAMATER OF ALL HOLES SPECIFIED AFTER PLATING ±.003
6. KEY TO BE CUT .06 WIDE AND CENTERED BETWEEN CONTACTS.
7. FOR ASSY'S DASH 5 THRU 8, CONNECTOR TO BE GOLD OVER NICKEL.
8. CARD HANDLE (P/N 112077-001 YELLOW) USED WHEN REQUIRED BY ORDER MODIFY HANDLE BY CUTTING BOTH ENDS TO LEAVE 1.625 WIDE & MATCH DRILL TO PCB.

FOR DASH 5 THRU 14, SEE SHT 3.

REF -4	REF -3	REF -2	REF -1	ITEM	A/R	PART NUMBER	TEST PROCEDURE / DESCRIPTION
—	—	—	—	21		—	JUMPER - 22G SLEEVED
—	—	—	—	20		104040-331	RESISTOR 330Ω ½ W
1	2	—	—	19		104042-122	RESISTOR 1.2K 2W
1	2	1	2	18		120491-1	RELAY
1	2	1	2	17		100110-00001	INTEGRATED CIRCUIT 1458
1	2	1	2	16		100001-057	TRANSISTOR 2N5449
1	2	1	2	15		100000-057	DIODE, ZENER IN4749A
1	2	1	2	14		100000-036	DIODE, ZENER IN4736A
1	2	1	2	13		100134-1	DIODE, LED DIACO 550-0406 INDICATOR
2	4	2	4	12		100000-024	DIODE IN4007
1	2	1	2	11		102005-3	CAPACITOR 50μf 25V
7	14	7	14	10		102080-1	CAPACITOR 10μf 20V
1	2	1	2	9		104162-00009	RESISTOR 5K BOURNS 3009P
1	2	1	2	8		104148-273	RESISTOR 27K 1/4W 10%
4	8	4	8	7		104148-153	15K
8	16	8	16	6		104148-103	10K
1	2	1	2	5		104148-822	8.2K
1	2	1	2	4		104148-682	6.8K 1/4W 10%
—	—	1	2	3		104070-1	RESISTOR 5K 5W
1	1	1	1	2	D	307748-00001	PCB
				1	D	307748	ASSY PCB GND DET CARD

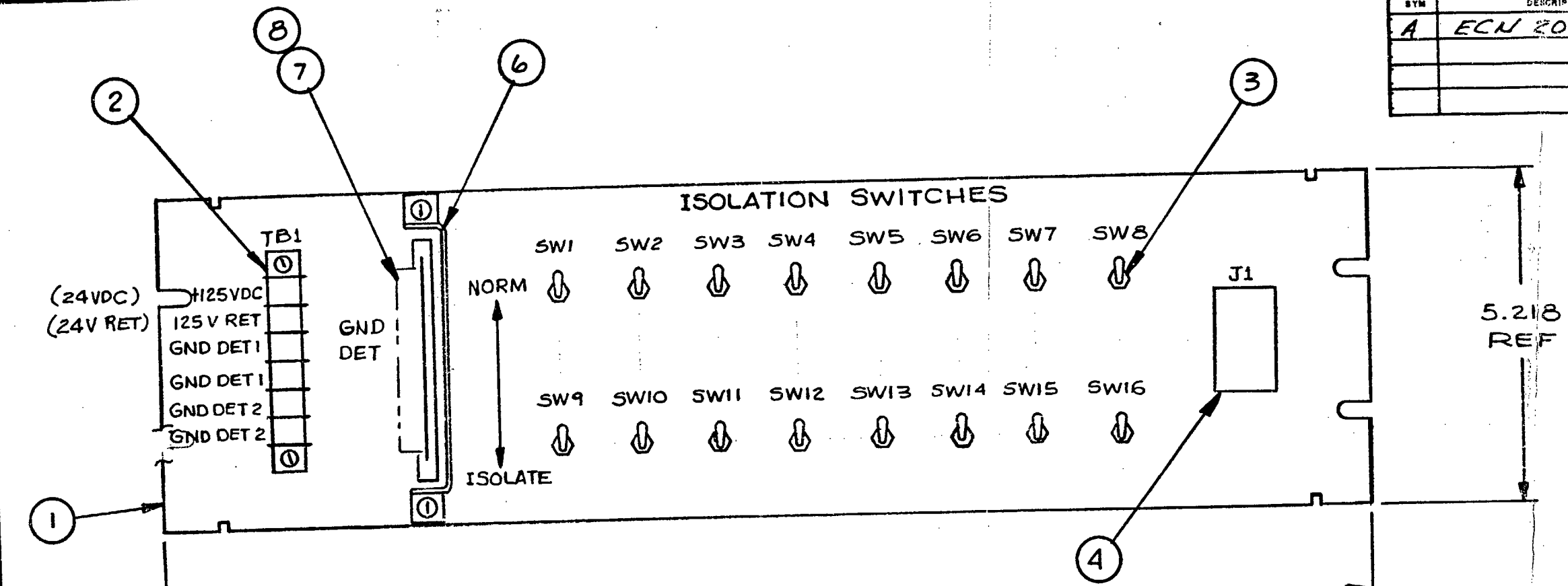
DASH NO. & QTY. — LIST OF MATERIALS

-1,-5 ASSY FOR DOUBLE-SIDED DETECTION, 125 VDC
-2,-6 ASSY FOR SINGLE-SIDED DETECTION, 125 VDC
-3,-7 ASSY FOR DOUBLE-SIDED DETECTION, 48 VDC
-4,-8 ASSY FOR SINGLE-SIDED DETECTION, 48 VDC
-9 ASSY FOR SINGLE-SIDED DETECTION, 24 VDC
-10 ASSY FOR DOUBLE-SIDED DETECTION, 24 VDC
-11 ASSY FOR SINGLE SIDE, EXTERNAL R1, 125 VDC
-12 ASSY FOR DOUBLE SIDE, EXTERNAL R1, R24, 125 VDC
-13 ASSY FOR SINGLE SIDE, EXTERNAL R1, 125VDC, W/O RLY.
-14 ASSY. FOR DOUBLE SIDE G.D. 125VDC FC EXTERNAL RELAYS

DRAWN	T. McCAIN	3-22-76	TITLE: ASSY PCB DOUBLE SIDED GROUND DETECTOR
ENG			
MFG ENGR	M. ALFORD	4-1-76	OPTRON, INC. BETA P.O. Box 428 Carrollton, Texas 75006
APPD			
QUAL	M. ALFORD	4-1-76	SIZE A/1 DWG NO D 307748 REV Co SHEET 1/3

307748 1/3 Co

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL
A	ECN 209497	5/87	[illegible]	TP



DASH NO. & QUANTITY		ITEM	DWG SIZE	PART NUMBER	DESCRIPTION
-002	-001			LIST OF MATERIAL	
1	-	11		104040-331	RESISTOR 330Ω 1/2W
-	1	10		104070-001	RESISTOR 5K 5W
1	1	9		102097-001	CAPACITOR 1uf, 400V
1	1	8		108234-001	PCB CONNECTOR & CARD GUIDE
1	1	7	D	307748-011	ASSY, GND DET PCB
1	1	6	B	807306-001	SHIELD, PCB
REF	REF	5		807307-001	WIRING DIAGRAM
1	1	4		108270-001	CONNECTOR 38 PIN
16	16	3		110163-001	SWITCH, TOGGLE
1	1	2		108129-006	TERMINAL BLOCK
1	1	1	B	807305-001	CHASSIS

UNLESS OTHERWISE SPECIFIED
DECIMAL .XX ±.02 .XXX ±.010
FRACTIONAL ±1/64 ANGULAR ±1°
CONCENTRICITY MACHINED DIAMETERS .004 TIR
SURFACE ROUGHNESS IN RMS MICROINCHES
ALL DIMENSIONS IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
ALL DIMENSIONS TO BE MET BEFORE PLATING
DO NOT SCALE THIS DRAWING
( ) DIMENSION IN MILLIMETERS

DRILLED HOLE TOLERANCES			
.013 TO .136	+.003 −.001	.234 TO .750	+.005 −.001
.136 TO .234	+.003 −.001	.750 TO 2.000	+.010 −.002

NEXT ASSY	USED ON
	50522
	50523
APPLICATION	

		DATE
DRAWN	Tom Tallant	11/86
CHECKED	TP	1-87
ENGINEER	TP	1-87
QA		
APPROVED		
RELEASED		1-87

TITLE: ASSY, ISOL. SWITCH PANEL W/GND DET

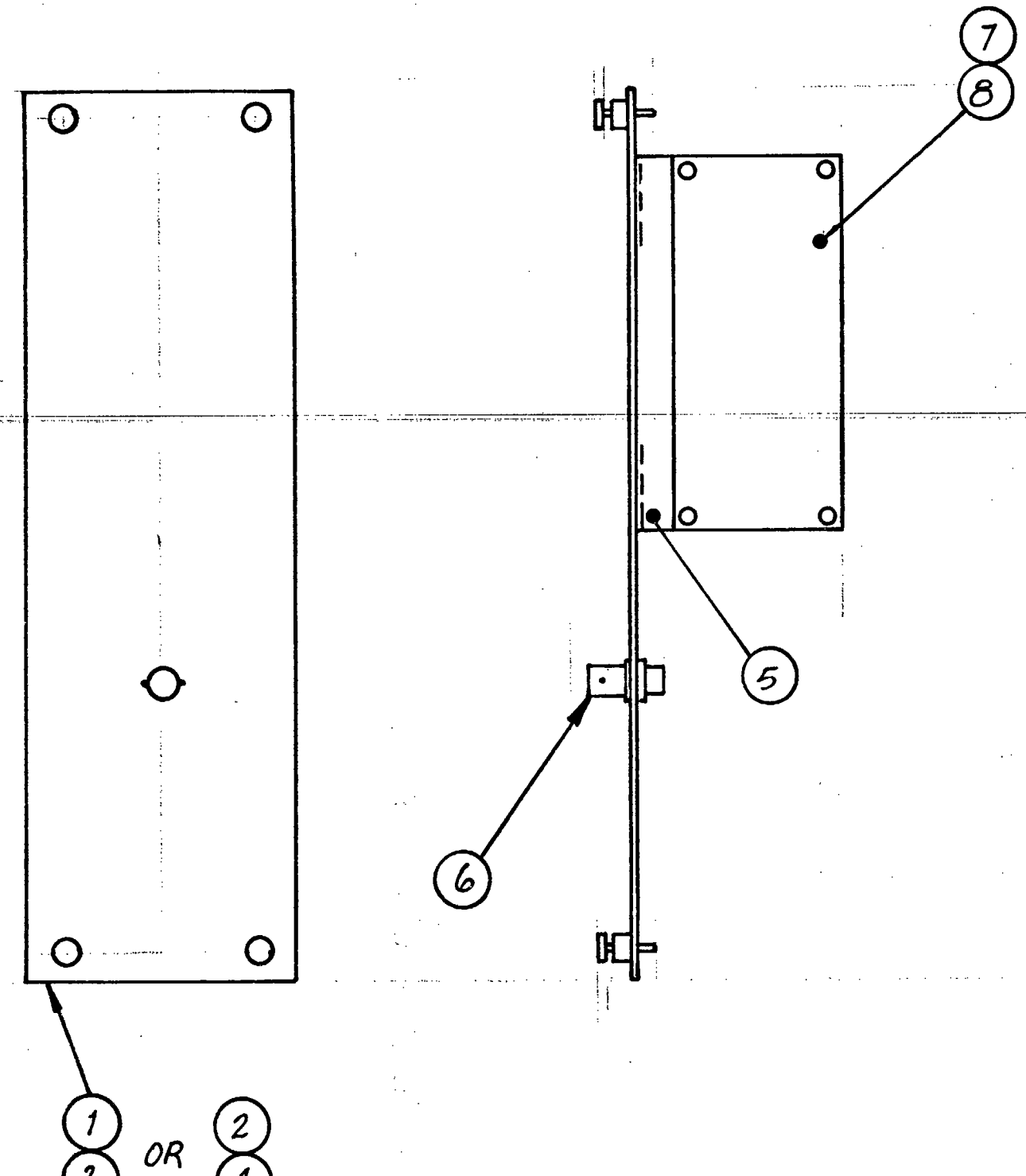
BETA PRODUCTS, INC. BETA
1615 W. BELTLINE RD. CARROLLTON, TEX 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
1/2	B	807304	A	1 OF 1

DWG NO. 807304
REV A
SHEET 1

TELEDYNE POST N81881

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL



DASH NO. B QUANTITY		ITEM	DWG SIZE	PART NUMBER	DESCRIPTION
002	001			LIST OF MATERIAL	
4	4	8		116018-014	STANDOFF, HEX 6-32 x .25 L
1	1	7		309093-001	ASSY, 1 PPM OSC. PCB
1	1	6		112050-001	CONNECTOR, BNC
1	1	5		807608-001	BRKT. PCB MOUNTING
1	–	4		807607-002	COVER, PWR SUPPLY HATH 7000
–	1	3		807607-001	COVER, PWR SUPPLY BL512
X		2		807609-002	ASSY, HATHAWAY 7000
	X	1		807609-001	ASSY, BL512

UNLESS OTHERWISE SPECIFIED
DECIMAL .XX ± .02 .XXX ± 010
FRACTIONAL ±1/64 ANGULAR ±1°
CONCENTRICITY MACHINED DIAMETERS .004 TIR
SURFACE ROUGHNESS IN RMS MICROINCHES
ALL DIMENSIONS IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
ALL DIMENSIONS TO BE MET BEFORE PLATING
DO NOT SCALE THIS DRAWING
( ) DIMENSION IN MILLIMETERS

DRILLED HOLE TOLERANCES			
.013 TO .136	+.003 −.001	.234 TO .750	+.005 −.001
.136 TO .234	+.005 −.001	.750 TO 2.000	+.010 −.002

NEXT ASSY	USED ON
APPLICATION	

		DATE
DRAWN		8/87
CHECKED		8-87
ENGINEER		8-87
QA		
APPROVED		
RELEASED		8-87

TITLE
ASSY, PWR SUPPLY COVER W/1PPM PCB

BETA PRODUCTS, INC.
2029 McKENZIE DR. CARROLLTON, TX. 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
~	B	807609	–	1 OF 1

DWG NO. 807609
REV –
SHEET 1

TELEDYNE POST N89585

CONN. PIN NO	SCANNER 1 CONN. J2 POINT NO	SCANNER 1 CONN. J3 POINT NO	SCANNER 2 CONN. J2 POINT NO	SCANNER 2 CONN. J3 POINT NO	SCANNER 3 CONN. J2 POINT NO	SCANNER 3 CONN, J3 POINT NO
20	1	33	65	97	129	161
21	2	34	66	98	130	162
22	3	35	67	99	131	163
23	4	36	68	100	132	164
24	5	37	69	101	133	165
25	6	38	70	102	134	166
26	7	39	71	103	135	167
27	8	40	72	104	136	168
9	9	41	73	105	137	169
8	10	42	74	106	138	170
7	11	43	75	107	139	171
6	12	44	76	108	140	172
5	13	45	77	109	141	173
3	14	46	78	110	142	174
2	15	47	79	111	143	175
1	16	48	80	112	144	176
17	17	49	81	113	145	177
16	18	50	82	114	146	178
15	19	51	83	115	147	179
14	20	52	84	116	148	180
13	21	53	85	117	149	181
12	22	54	86	118	150	182
11	23	55	87	119	151	183
10	24	56	88	120	152	184
32	25	57	89	121	153	185
33	26	58	90	122.	154	186
34	27	59	91	123	155	187
35	28	60	92	124	156	188
36	29	61	93	125	157	189
37	30	62	94	126	158	190
19	31	63	95	127	159	191
18	32	64	96	128	160	192
29	+FC	+FC	+FC	+FC	+FC	+FC
30	-FC	-FC	-FC	-FC	-FC	-FC

SCANNER INPUT
CONNECTOR TAB.

CONN. PIN NO	SCANNER 4 CONN. J2 POINT NO	SCANNER 4 CONN. J3 POINT NO	SCANNER 5 CONN. J2 POINT NO	SCANNER 5 CONN. J3 POINT NO	SCANNER 6 CONN. J2 POINT NO	SCANNER 6 CONN, J3 POINT NO
20	193	225	257	289	321	353
21	194	226	258	290	322	354
22	195	227	259	291	323	355
23	196	228	260	292	324	356
24	197	229	261	293	325	357
25	198	230	262	294	326	358
26	199	231	263	295	327	359
27	200	232	264	296	328	360
9	201	233	265	297	329	361
8	202	234	266	298	330	362
7	203	235	267	299	331	363
6	204	236	268	300	332	364
5	205	237	269	301	333	365
3	206	238	270	302	334	366
2	207	239	271	303	335	367
1	208	240	272	304	336	368
17	209	241	273	305	337	369
16	210	242	274	306	338	370
15	211	243	275	307	339	371
14	212	244	276	308	340	372
13	213	245	277	309	341	373
12	214	246	278	310	342	374
11	215	247	279	311	343	375
10	216	248	280	312	344	376
32	217	249	281	313	345	377
33	218	250	282	314	346	378
34	219	251	283	315	347	379
35	220	252	284	316	348	380
36	221	253	285	317	349	381
37	222	254	286	318	350	382
19	223	255	287	319	351	383
18	224	256	288	320	352	384
29	+FC	+FC	+FC	+FC	+FC	+FC
30	-FC	-FC	-FC	-FC	-FC	-FC

SCANNER INPUT
CONNECTOR TAB.

CONN. PIN NO	SCANNER 7 CONN. J2 POINT NO	SCANNER 7 CONN. J3 POINT NO	SCANNER 8 CONN. J2 POINT NO	SCANNER 8 CONN. J3 POINT NO	SCANNER 9 CONN. J2 POINT NO	SCANNER 9 CONN, J3 POINT NO
20	385	417	449	481	513	545
21	386	418	450	482	514	546
22	387	419	451	483	515	547
23	388	420	452	484	516	548
24	389	421	453	485	517	549
25	390	422	454	486	518	550
26	391	423	455	487	519	551
27	392	424	456	488	520	552
9	393	425	457	489	521	553
8	394	426	458	490	522	554
7	395	427	459	491	523	555
6	396	428	460	492	524	556
5	397	429	461	493	525	557
3	398	430	462	494	526	558
2	399	431	463	495	527	559
1	400	432	464	496	528	560
17	401	433	465	497	529	561
16	402	434	466	498	530	562
15	403	435	467	499	531	563
14	404	436	468	500	532	564
13	405	437	469	501	533	565
12	406	438	470	502	534	566
11	407	439	471	503	535	567
10	408	440	472	504	536	568
32	409	441	473	505	537	569
33	410	442	474	506	538	570
34	411	443	475	507	539	571
35	412	444	476	508	540	572
36	413	445	477	509	541	573
37	414	446	478	510	542	574
19	415	447	479	511	543	575
18	416	448	480	512	544	576
29	+FC	+FC	+FC	+FC	+FC	+FC
30	-FC	-FC	-FC	-FC	-FC	-FC

SCANNER INPUT
CONNECTOR TAB.

CONN. PIN NO	SCANNER10 CONN. J2 POINT NO	SCANNER10 CONN. J3 POINT NO	SCANNER11 CONN. J2 POINT NO	SCANNER11 CONN. J3 POINT NO	SCANNER12 CONN. J2 POINT NO	SCANNER12 CONN, J3 POINT NO
20	577	609	641	673	705	737
21	578	610	642	674	706	738
22	579	611	643	675	707	739
23	580	612	644	676	708	740
24	581	613	645	677	709	741
25	582	614	646	678	710	742
26	583	615	647	679	711	743
27	584	616	648	680	712	744
9	585	617	649	681	713	745
8	586	618	650	682	714	746
7	587	619	651	683	715	747
6	588	620	652	684	716	748
5	589	621	653	685	717	749
3	590	622	654	686	718	750
2	591	623	655	687	719	751
1	592	624	656	688	720	752
17	593	625	657	689	721	753
16	594	626	658	690	722	754
15	595	627	659	691	723	755
14	596	628	660	692	724	756
13	597	629	661	693	725	757
12	598	630	662	694	726	758
11	599	631	663	695	727	759
10	600	632	664	696	728	760
32	601	633	665	697	729	761
33	602	634	666	698	730	762
34	603	635	667	699	731	763
35	604	636	668	700	732	764
36	605	637	669	701	733	765
37	606	638	670	702	734	766
19	607	639	671	703	735	767
18	608	640	672	704	736	768
29	+FC	+FC	+FC	+FC	+FC	+FC
30	-FC	-FC	-FC	-FC	-FC	-FC

SCANNER INPUT
CONNECTOR TAB.

CONN. PIN NO	SCANNER13 CONN. J2 POINT NO	SCANNER13 CONN. J3 POINT NO	SCANNER14 CONN. J2 POINT NO	SCANNER14 CONN. J3 POINT NO	SCANNER15 CONN. J2 POINT NO	SCANNER15 CONN, J3 POINT NO
20	769	801	833	865	897	929
21	770	802	834	866	898	930
22	771	803	835	867	899	931
23	772	804	836	868	900	932
24	773	805	837	869	901	933
25	774	806	838	870	902	934
26	775	807	839	871	903	935
27	776	808	840	872	904	936
9	777	809	841	873	905	937
8	778	810	842	874	906	938
7	779	811	843	875	907	939
6	780	812	844	876	908	940
5	781	813	845	877	909	941
3	782	814	846	878	910	942
2	783	815	847	879	911	943
1	784	816	848	880	912	944
17	785	817	849	881	913	945
16	786	818	850	882	914	946
15	787	819	851	883	915	947
14	788	820	852	884	916	948
13	789	821	853	885	917	949
12	790	822	854	886	918	950
11	791	823	855	887	919	951
10	792	824	856	888	920	952
32	793	825	857	889	921	953
33	794	826	858	890	922	954
34	795	827	859	891	923	955
35	796	828	860	892	924	956
36	797	829	861	893	925	957
37	798	830	862	894	926	958
19	799	831	863	895	927	959
18	800	832	864	896	928	960
29	+FC	+FC	+FC	+FC	+FC	+FC
30	-FC	-FC	-FC	-FC	-FC	-FC

SCANNER INPUT
CONNECTOR TAB.

CONN. PIN NO	SCANNER16 CONN. J2 POINT NO	SCANNER16 CONN. J3 POINT NO
20	961	993
21	962	994
22	963	995
23	964	996
24	965	997
25	966	998
26	967	999
27	968	1000
9	969	1001
8	970	1002
7	971	1003
6	972	1004
5	973	1005
3	974	1006
2	975	1007
1	976	1008
17	977	1009
16	978	1010
15	979	1011
14	980	1012
13	981	1013
12	982	1014
11	983	1015
10	984	1016
32	985	1017
33	986	1018
34	987	1019
35	988	1020
36	989	1021
37	990	1022
19	991	1023
18	992	1024
29	+FC	+FC
30	-FC	-FC

SCANNER INPUT
CONNECTOR TAB.

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL

REF: DRAWINGS

307748 ASSEMBLY P.C.B. GROUND DETECTOR

SK-501 GROUND DETECTOR FUNCTIONAL DIAGRAM

		ITEM	DWG SIZE	PART NUMBER	DESCRIPTION
DASH NO. & QUANTITY		LIST OF MATERIAL			

		DRAWN		DATE 1-87
		CHECKED		1-87
		ENGINEER		1-87
		QA		
		APPROVED		
NEXT ASSY	USED ON	RELEASED		1-87
APPLICATION				

TITLE: OPERATING DESCRIPTION GROUND DETECTOR

BETA PRODUCTS, INC.

2029 McKENZIE DR. CARROLLTON, TEX 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
~	A	807346	—	1 OF 3

GROUND DETECTOR CARD (307748).

The ground detector circuit provides a means of annunciating the detection of leakage between the field wiring system and chassis (earth) grounds. When the leakage resistance lowers to the detection level, a LED indication will light on the Ground Detector Card and a pair of contacts will close indicating the presence of a ground. The detector may be used on either a positive or negative field contact system.

Drawing SK-501 shows a functional diagram of a ground detector system employing single-side positive detection of a single point (for the sake of simplicity) field wiring system. Double side detection is similar in principle, except that two detectors are employed. One (as shown) to detect grounds to the positive side of the FC supply and another to detect grounds to the negative side of the FC supply. Note, of course, that grounds on either side of FC will be detected by a single side system when FC is closed.

The Ground Detector Card utilizes a Wheatstone bridge connected to a compare circuit to detect the presence of a leakage (R_{GND}) which acts as a shunt on one of the bridge legs and causes an unbalanced condition which trips the compare circuit to activate the relays and lamp. In practice, the bridge arms are made adjustable to set the exact level of R_{GND} that will cause tripping to occur.

The bridge circuit is powered by voltage E which also power the compare, relay and LED circuits. E is generally derived from the FC supply in a practical situation but this fact has no bearing on the operation of the circuit.

With isolation switch SW closed, a ground, designated R_{GND}, appearing on the FC wiring will cause a leakage current to flow in the direction of 1_L as shown. This leakage is due to the path consisting of SW, R_{GND}, R, D and the low-pass filter shunting the bridge. Diode D insures that the bridge can only respond to a current of the polarity shown by 1_L.

The low-pass filter circuit in SK-501 is necessary to minimize the detrimental effects of AC pickup on the field wiring. Without such a circuit the sensitive ground detector could easily overload and become insensitive to the DC leakage current through R_{GND}.

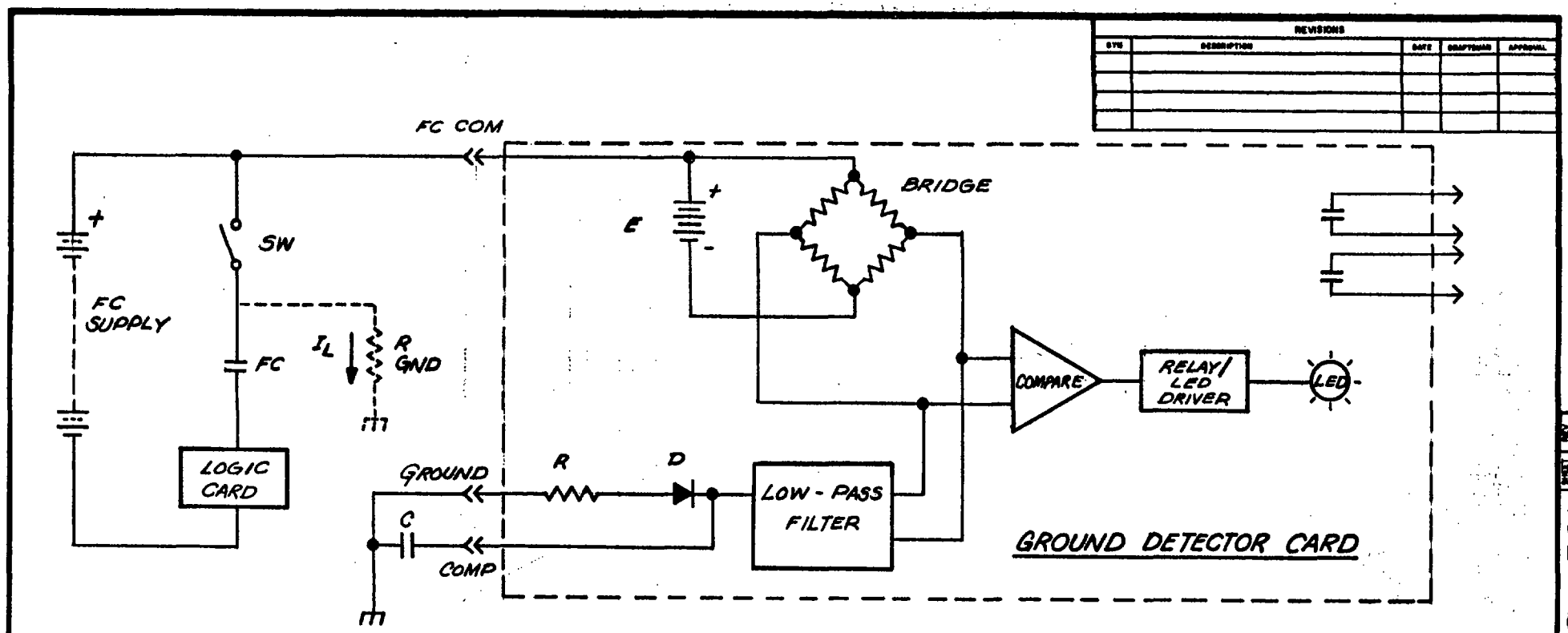
Compensation capacitor C bypasses the DC path through R and D to provide a low impedance common mode AC path for the circuit which prevents AC rectification by diode D that could cause a false ground indication by the circuit. C is chosen such that its reactance is very small compared to R at 60 HZ. C must be a bipolar capacitor utilizing a very low leakage dialetric such as a mylar film type.

The BETA Double Side Ground Detector Card is shown in Dwg. 307748. The components described in block fashion in SK-501 are readily identifiable in the schematic. R4(on the Positive side) and R25 (on the Negative side) provide a means of adjusting the trip point threshold within a range of less than 1K ohms to over 50K ohms.

GROUND DETECTOR CARD (307748) (cont.)

The circuitry shown inside the dashed line of 307748 is the detection circuit for detecting a ground on the negative side of the field contact. This circuit works the same as the positive side detector shown in the other circuit, except that the bridge floats on the negative side of the field contact supply and the leakage current direction, as indicated by CR3, is opposite that of CR2 in the common side ciruit. When single side positive detection is the only requiremnt, the circuitry within the dashed line is deleted.

Two sets of relay contacts are provided on each circuit. This allows several useful combinations to be made for annunciating and indicating the ground condition. A LED (light-emitting diode) located on the circuit board provides a ready means of identifying the trip point for rapid field adjustment.



REVISIONS

SYS	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL

DWG NO. SK-501 REV -

SHEET 1

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
		LIST OF MATERIAL	

UNLESS OTHERWISE SPECIFIED
DECIMAL .XX ± .02 .XXX ± .005
FRACTIONAL ± 1/64 ANGULAR ± 1°
CONCENTRICITY GAUGING DIAMETERS .004 TIR
SURFACE ROUGHNESS IN RMS MICROINCHES
ALL DIMENSIONS IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
ALL DIMENSIONS TO BE SET BEFORE PLATING
DO NOT SCALE THIS DRAWING
( ) DIMENSION IN MILLIMETERS

DRILLED HOLE TOLERANCES			
.013 TO .126	+.002 -.001	.254 TO .750	+.005 -.001
.130 TO .246	+.003 -.001	.750 TO 2.000	+.010 -.002

NEXT ASSY | USED ON | APPLICATION

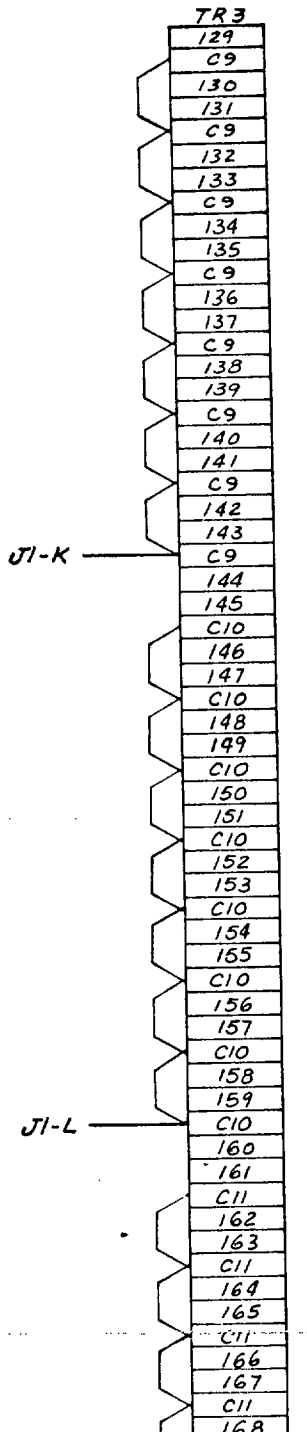
	DATE
DRAWN	1-87
CHECKED	1-87
ENGINEER	1-87
QA	
APPROVED	
RELEASED	1-87

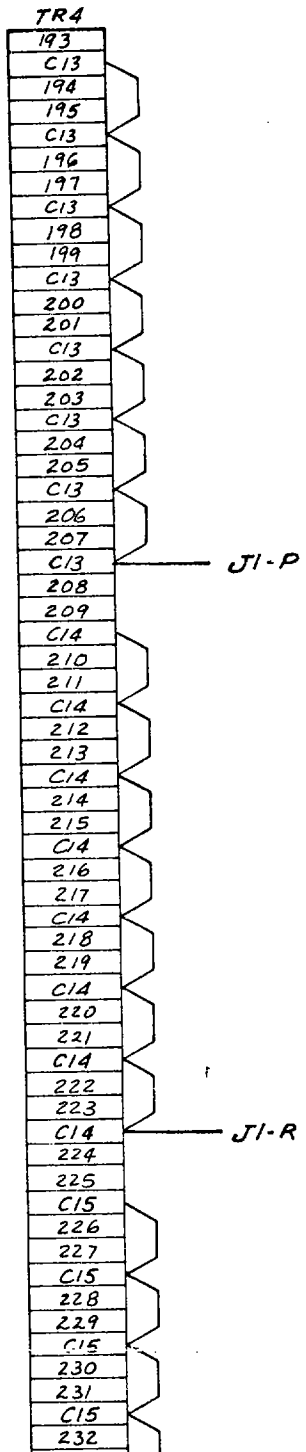
TITLE
GROUND DETECTOR FUNCTIONAL DIAGRAM

BETA PRODUCTS, INC.
2029 McKENZIE DR. CARROLLTON, TX. 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
~	B	SK-501	-	1 of 1

TELETYPE FONT HELVETICA





UNLESS OTHERWISE SPECIFIED
DECIMAL ± .01 ANG ± 0.5°
FRACTIONAL ± 1/64 ANGULAR ± 1°
CONCENTRICITY MACHINED DIAMETERS
SURFACE ROUGHNESS IN RMS MICRO-INCHES
ALL DIMENSIONS IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
ALL DIMENSIONS TO BE MET BEFORE PLATING
DO NOT SCALE THIS DRAWING
DIMENSION IN MILLIMETERS

DIMENSIONS	TOLERANCES
.03 TO .38	± .13
.38 TO 2.54	± .25
2.54 TO 7.62	± .38
7.62 TO 300	± .51

ITEM	QTY	PART NUMBER	DESCRIPTION
			LIST OF MATERIAL

DRAWN		DATE	6/9/87
ENGINEER		DATE	6/87
APPROVED		DATE	6/87
DESIGNED		DATE	6/87

51756

TITLE: TERMINAL ARRANGEMENT

BETA PRODUCTS, INC.
1615 W. BELTLINE RD. CARROLLTON, TX.

SIZE	DWG NO.	REV
D	807520	A

SCALE: ~ SHEET 2 OF 2

REV	DESCRIPTION	BY	APPROVED	DATE
A	INITIAL RELEASE			

DWG NO. 807520 SHEET 2 REV A

REVISIONS			
SYM	DESCRIPTION	DATE	APP
A	ECN #105355	7/76	
A-1	ECN #102447	8/80/K	
	SEE SH 1		

-13 & -14 INSTALL JUMPERS AS SHOWN & OMIT K1

FC COM. 1

NEG BRIDGE (-12 ONLY) 3

POS. COMP. 2

GROUND 9

NEG. COMP. 17

POS BRIDGE (-11 & -12 ONLY) 16

FC RET 18

CR1 IN4749 24 V

C1 50μ

R1 *

R2 10K

R3 10K

TP1

TP2

Z1

R4 5K

R5 8.2K

R6 10K

R7 10K

R8 10K

C2 10μ

R9 10K

R10 10K

Z1

CR9 LED

CR4 IN4736 6.8 V

CR5 IN4003

K1

R11 6.8K

R12 10K

Q1 2N5449

-13 & -14

5

6

8

7

R13 15K

C3 10μ

C4 10μ

R15 15K

R14 15K

C5 10μ

C6 10μ

R16 15K

C7 10μ

C8 10μ

CR2 IN4003

R17 27K

CR3 IN4003

R18 27K

R19 15K

C9 10μ

C10 10μ

R20 15K

R21 15K

C11 10μ

C12 10μ

R22 15K

C13 10μ

C14 10μ

R23 10K

TP3

Z2

R24 *

CR6 IN4749 24 V

C15 50μ

R25 5K

R26 8.2K

TP4

R27 10K

R28 10K

R29 10K

R30 10K

C16 10μ

R31 10K

R32 10K

Z2

CR10 LED

CR7 IN4736 6.8 V

CR8 IN4003

K2

R33 6.8K

R34 10K

Q2 2N5449

-14 ONLY INSTALL JUMPERS AS SHOWN & OMIT K2

-14 ONLY

10

11

13

12

OMIT FOR -2, -4, & -9 ASSY, SINGLE SIDE GROUND DETECTOR

* USE 5K, 5W FOR 125 VDC
USE 1.2K, 2W FOR 48 VDC
USE 330Ω, 1/2 W FOR 24 VDC
DELETED ON -11, -12

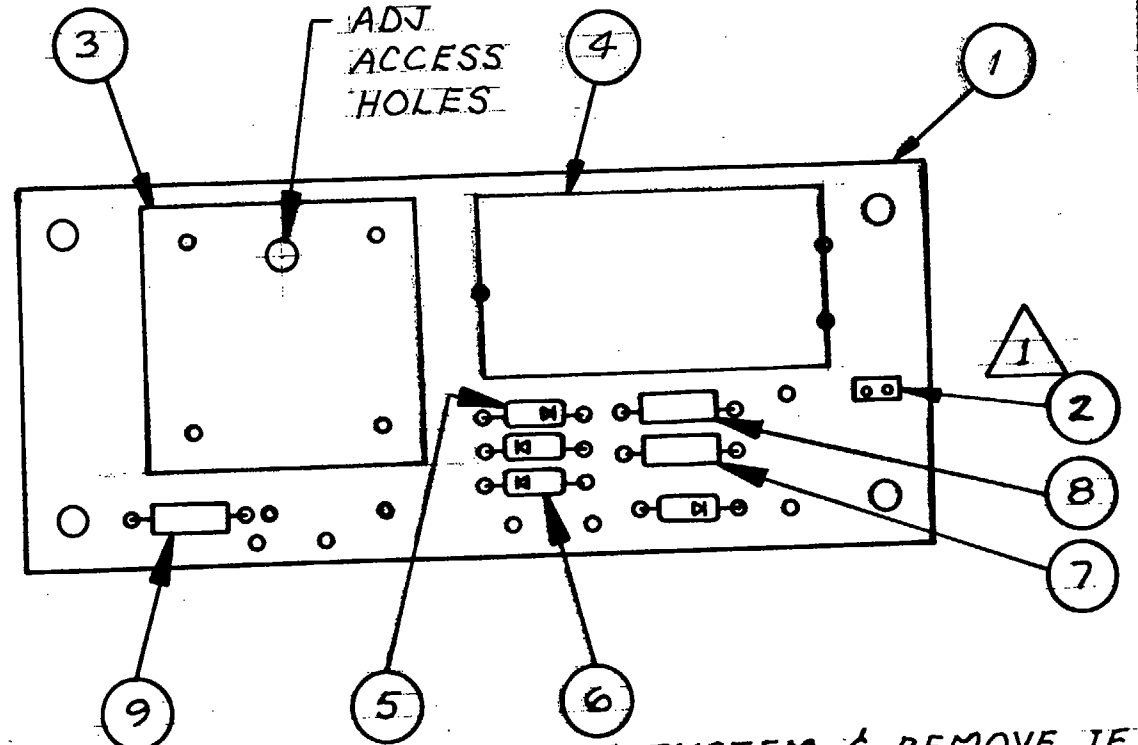
DRAWN	D. BARON	DATE 7-8-76
CKD		
ENGR		
MFG ENGR		
APPD		
RELEASED		

TITLE: DOUBLE SIDE GROUND DETECTOR

OPTRON, INC.

SCALE | SIZE C | DRAWING NO 3077213 | C9

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL



NOTE:

1 INSTALL JUMPER ON START UP OF SYSTEM & REMOVE IF SYSTEM IS TO BE OUT OF SERVICE FOR A PROLONG PERIOD OF TIME.

REF	ITEM	DWG SIZE	PART NUMBER	DESCRIPTION
1	9		104148-101	RESISTOR, 100Ω, 1/4W
1	8		104040-331	RESISTOR, 330Ω, 1/2W
1	7		104040-151	RESISTOR, 150Ω, 1/2W
3	6		100000-024	DIODE, IN4007
1	5		100000-036	ZENER DIODE, 6.8V
1	4		120837-005	BATTERY, 6V
1	3		100137-014	OSC
1	2		108411-024	CONNECTOR 2 PIN M
1	1	A	509093	PC BOARD
001				

DASH NO. & QUANTITY — LIST OF MATERIAL

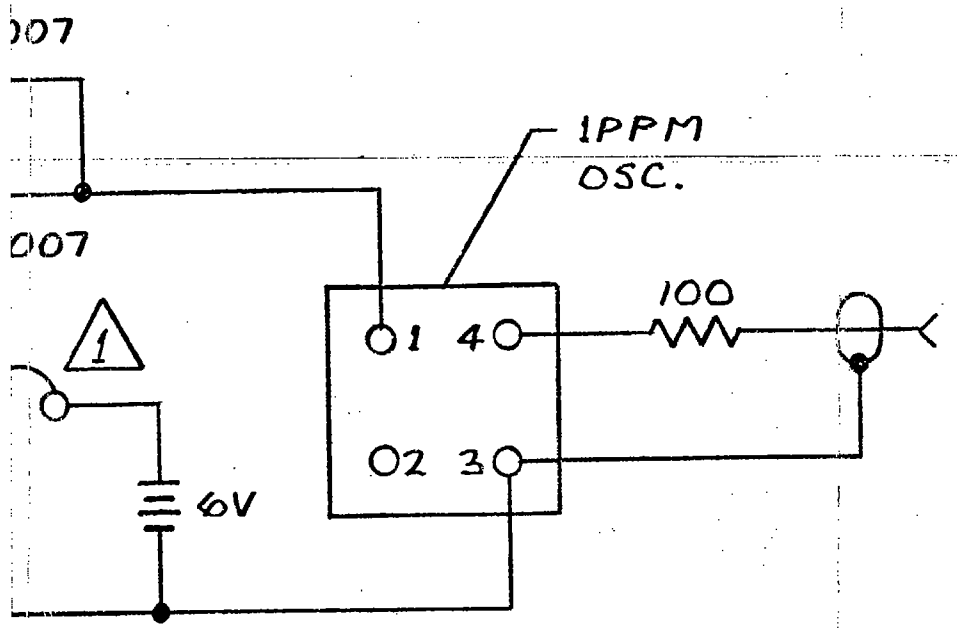
		DRAWN		DATE 6/87
		CHECKED		8-87
		ENGINEER		8-87
		QA		
	UNIV.	APPROVED	-	
NEXT ASSY	USED ON	RELEASED		8-87
APPLICATION				

TITLE: ASSY, 1 PPM OSC. PCB

BETA PRODUCTS, INC. BETA
2029 McKENZIE DR. CARROLLTON, TEX 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
1/1	A	309093	-	1 of 1

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL



REV	SHEET	DWG NO.
—	1	409093

		ITEM	DWG SIZE	PART NUMBER	DESCRIPTION
DASH NO. & QUANTITY				LIST OF MATERIAL	

		DRAWN H.L.Y.		DATE 8-87
		CHECKED		8-87
		ENGINEER		8-87
		QA		
	UNIV.	APPROVED		
NEXT ASSY	USED ON	RELEASED		8-87
APPLICATION				

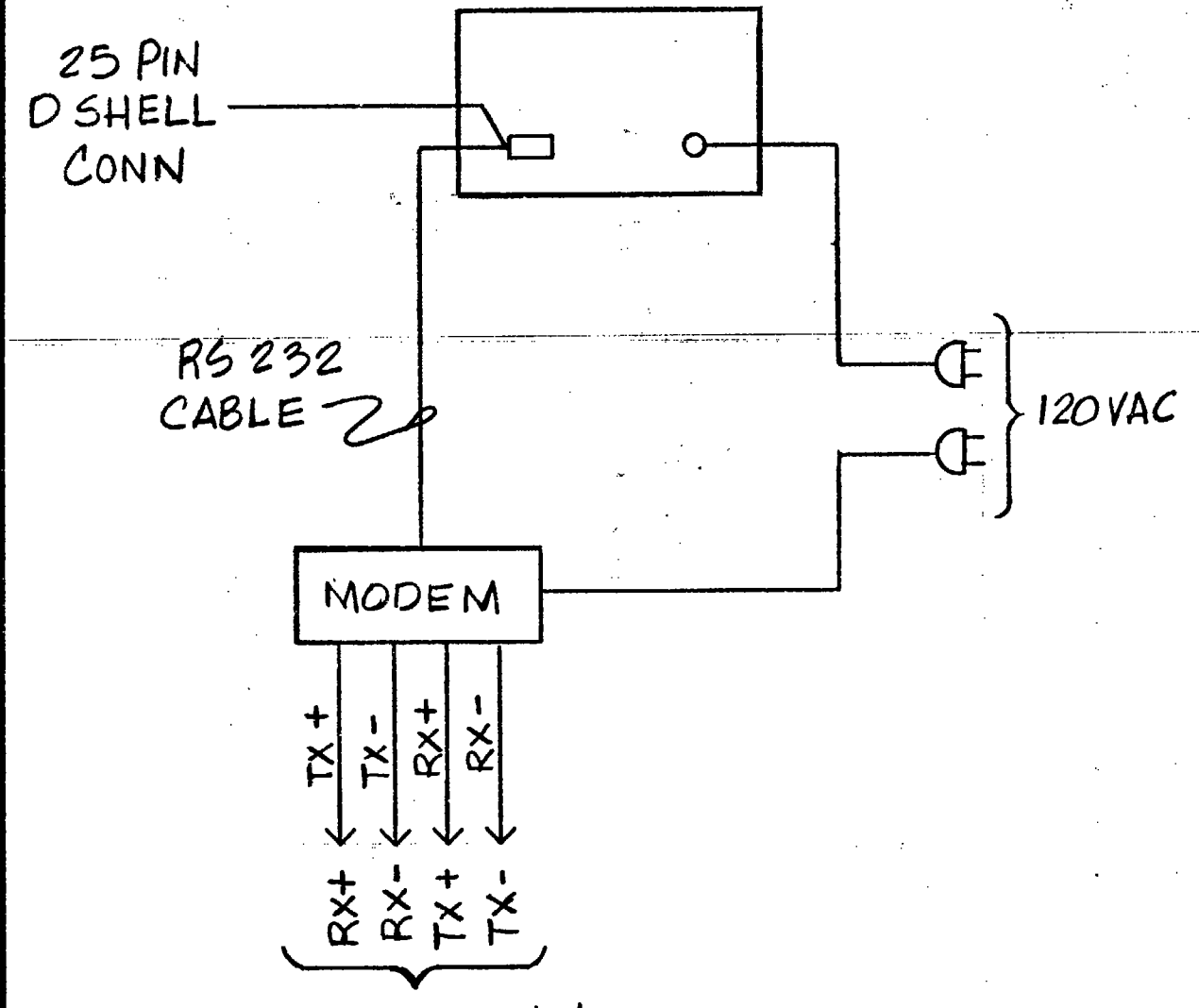
RWISE SPECIFIED
.XXX ± 010
ANGULAR ±1°
RMINED DIAMETERS
S IN RMS MICROINCHES
INCHES
AND SHARP EDGES
BE MET BEFORE
DRAWING
LLIMETERS
E TOLERANCES
.234 TO .750 +.005 −.001
.750 TO 2.000 +.010 −.002

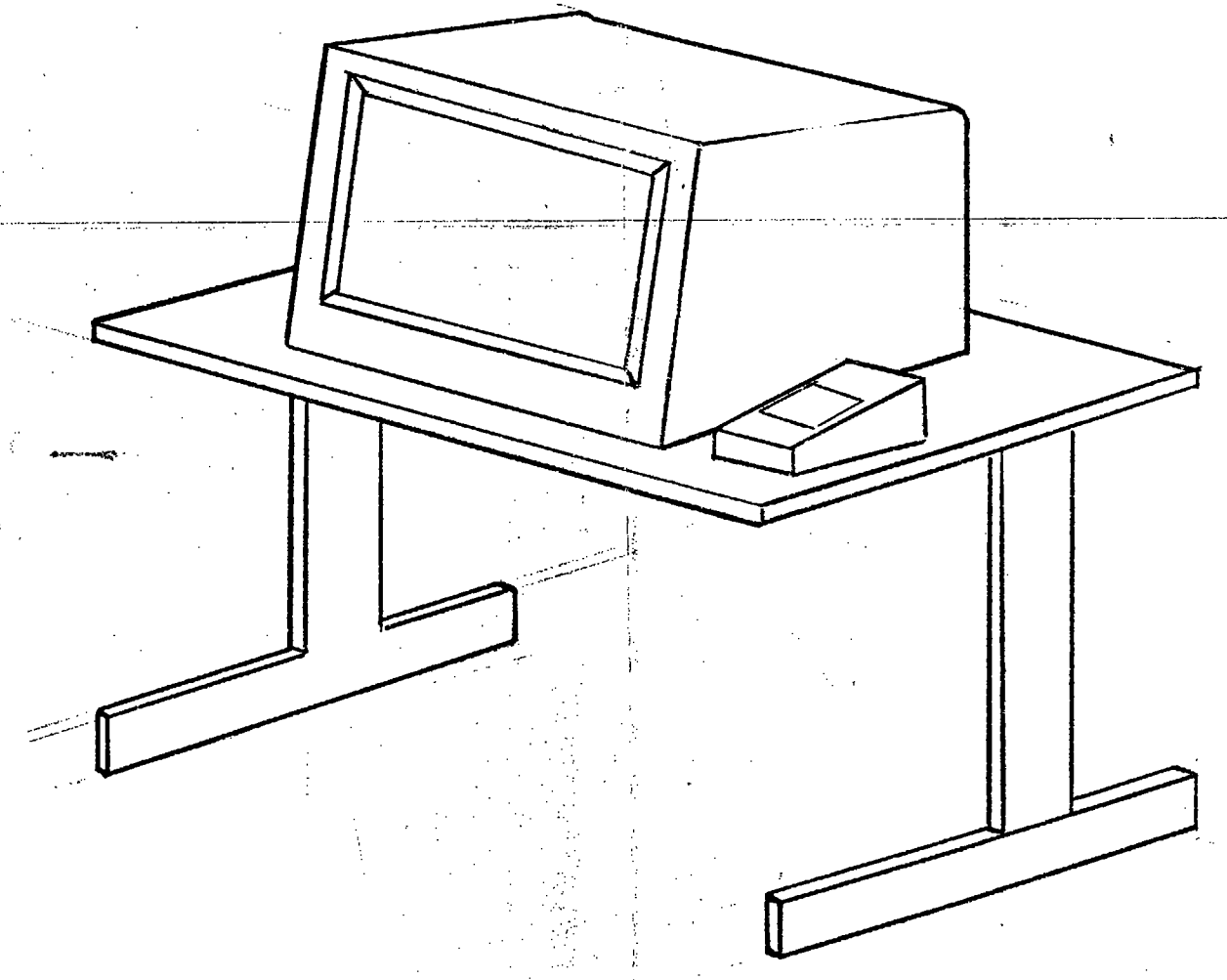
TITLE: SCHEMATIC, 1PPM OSC.

BETA PRODUCTS, INC. BETA
2029 McKENZIE DR. CARROLLTON, TX. 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
NU	B	409093	—	1 of 1

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL





DWG NO. 807628 | SHEET 1 | REV -

DASH NO. & QUANTITY	ITEM	DWG SIZE	PART NUMBER	DESCRIPTION
			LIST OF MATERIAL	

UNLESS OTHERWISE SPECIFIED
DECIMAL .XX ± .02 .XXX ± .010
FRACTIONAL ± 1/64 ANGULAR ± 1°
CONCENTRICITY MACHINED DIAMETERS .004 TIR
SURFACE ROUGHNESS IN RMS MICROINCHES
ALL DIMENSIONS IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
ALL DIMENSIONS TO BE MET BEFORE PLATING
DO NOT SCALE THIS DRAWING
( ) DIMENSION IN MILLIMETERS

DRILLED HOLE TOLERANCES			
.013 TO .136	+.002 −.001	.234 TO .750	+.005 −.001
.136 TO .234	+.003 −.001	.750 TO 2.000	+.010 −.002

NEXT ASSY	USED ON
APPLICATION	51756

	DRAWN	DATE
	CHECKED	6/87
	ENGINEER	6/87
	QA	6/87
	APPROVED	
	RELEASED	6-87

TITLE: CRT OUTLINE & MODEM WIRING

BETA PRODUCTS, INC. BETA
2029 McKENZIE DR. CARROLLTON, TX. 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
~	B	807628	-	1 of 1

TELESYNE POST N89585

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL

DASH NO. & QUANTITY	ITEM	DWG SIZE	PART NUMBER	DESCRIPTION
			LIST OF MATERIAL	

NEXT ASSY	USED ON
APPLICATION	BL512

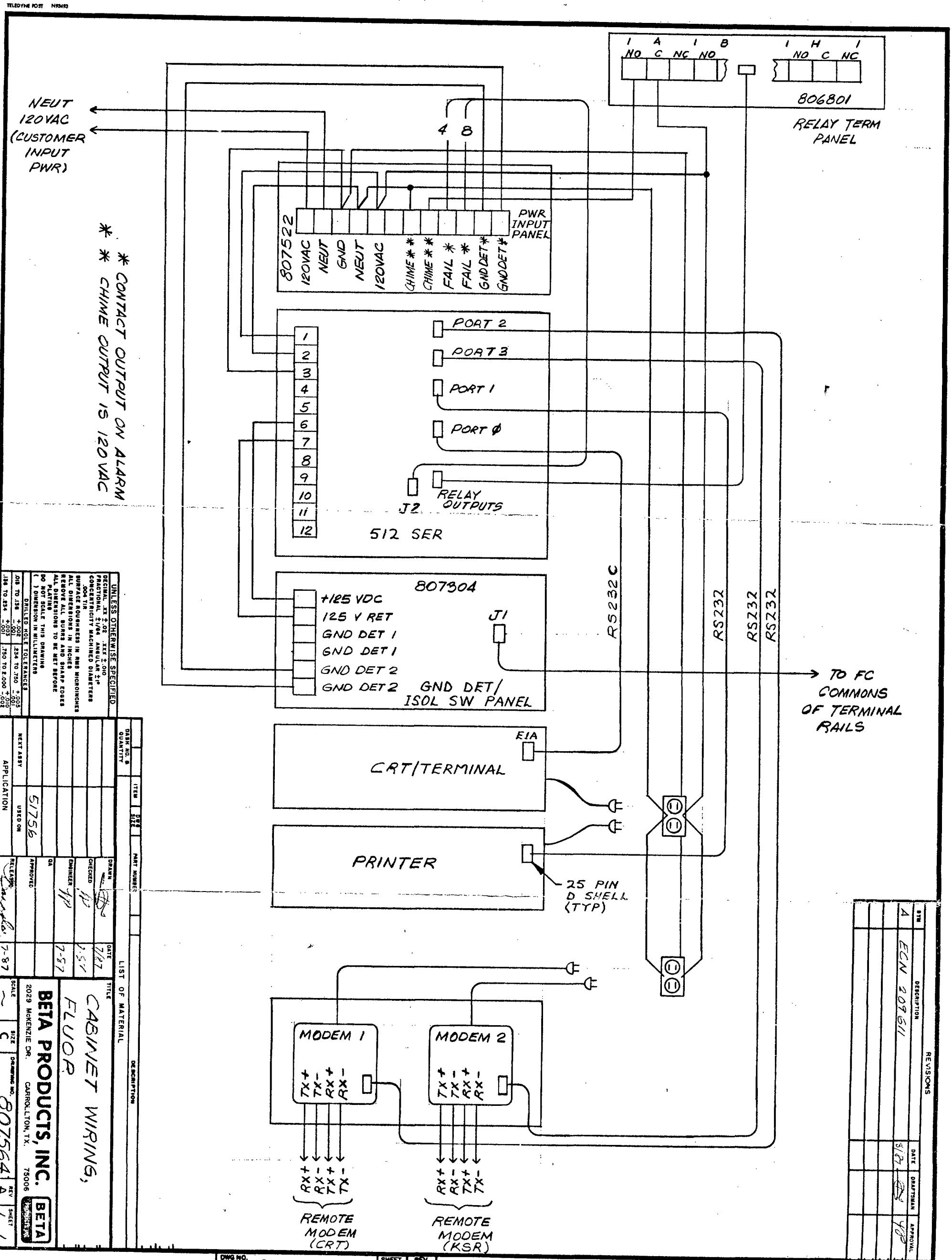
	DRAWN	DATE
	CHECKED	6/87
	ENGINEER	6/87
	QA	6/87
	APPROVED	
	RELEASED	6-87

TITLE: SCANNER INPUT CONNECTOR TABULATION

BETA PRODUCTS, INC. BETA
2029 McKENZIE DR. CARROLLTON, TEX 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
~	A	807536	-	1 of 7

TELEDYNE POST N93493



UNLESS OTHERWISE SPECIFIED
DECIMAL XX ± .02 .XXX ± .010
FRACTIONAL ± 1/64 ANGULAR ± 1°
CONCENTRICITY MACHINED DIAMETERS .004 TIR
SURFACE ROUGHNESS IN RMS MICROINCHES
ALL DIMENSIONS IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
ALL DIMENSIONS TO BE MET BEFORE PLATING
DO NOT SCALE THIS DRAWING
( ) DIMENSION IN MILLIMETERS

DRILLED HOLE TOLERANCES	
.015 TO .136	+.002 −.001
.136 TO .234	+.003 −.001
.234 TO .750	+.005 −.001
.750 TO 5.000	+.010 −.002

ITEM	USED SIZE	PART NUMBER	DESCRIPTION	DASH NO. & QUANTITY

NEXT ASSY APPLICATION
USED ON 51756

DRAWN — DATE 7/87
CHECKED — DATE 7-87
ENGINEER — DATE 7-87
QA
APPROVED
RELEASED — DATE 7-87

LIST OF MATERIAL

SCALE ~ SIZE C DRAWING NO. 807564 REV A SHEET 1 OF 1

TITLE: CABINET WIRING, FLUOR

BETA PRODUCTS, INC.
2029 McKENZIE DR. CARROLLTON, TX. 75006

REVISIONS				
DESCRIPTION	DATE	DRAFTSMAN	APPROVAL	
A ECN 2091611	3/87			

DWG NO. 807564 SHEET 1 REV A

AF 14906

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL
	SEE SHEET 1			

DASH NO.	SINGLE	DOUBLE	GOLD TABS	FCV	EXTERNAL RESISTORS	R1/R24 VALUE	EXTERNAL RELAYS
-001		•		125		5K, 5W	
-002	•			125		5K, 5W	
-003		•		48		1.2K, 2W	
-004	•			48		1.2K, 2W	
-005		•	•	125			
-006	•		•	125			
-007		•	•	48			
-008	•		•	48			
-009	•			24		330, 1/2W	
-010		•		24		330, 1/2W	
-011	•			125	R1		
-012		•		125	R1, R24		
-013	•			125			•
-014		•		125			•

REF	REF	REF	REF	REF	REF	REF	REF	REF	REF	22
4	3	2	1	—	—	—	—	—	—	21
—	—	—	—	2	1	—	—	—	—	20
—	—	—	—	—	—	1	2	—	—	19
—	—	2	1	2	1	1	2	1	2	18
2	1	2	1	2	1	1	2	1	2	17
2	1	2	1	2	1	1	2	1	2	16
2	1	2	1	2	1	1	2	1	2	15
2	1	2	1	2	1	1	2	1	2	14
2	1	2	1	2	1	1	2	1	2	13
4	2	4	2	4	2	2	4	2	4	12
2	1	2	1	2	1	1	2	1	2	11
14	7	14	7	14	7	7	14	7	14	10
2	1	2	1	2	1	1	2	1	2	9
2	1	2	1	2	1	1	2	1	2	8
8	4	8	4	8	4	4	8	4	8	7
16	8	16	8	16	8	8	16	8	16	6
2	1	2	1	2	1	1	2	1	2	5
2	1	2	1	2	1	1	2	1	2	4
—	—	—	—	—	—	—	—	1	2	3
1	1	1	1	1	1	1 △	1 △	1 △	1 △	2
										1
-014	-013	-012	-011	-010	-009	-008	-007	-006	-005	ITEM

DASH NO. & QUANTITY

SEE SHEET 1 FOR DESCRIPTION

DWG SIZE	PART NUMBER	DESCRIPTION

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DECIMAL XX ± .01 XXX ± .010
FRACTIONAL ± 1/64 ANGULAR ± 1°
CONCENTRICITY MACHINED DIAMETERS .004 TIR
SURFACE ROUGHNESS IN RMS MICROINCHES
ALL DIMENSIONS IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
ALL DIMENSIONS TO BE MET BEFORE PLATING
DO NOT SCALE THIS DRAWING
( ) DIMENSION IN MILLIMETERS

DRILLED HOLE TOLERANCES

.015 TO .156	+.002 −.001	.294 TO .750	+.006 −.003
.156 TO .294	+.003 −.001	.750 TO 2.000	+.010 −.002

NEXT ASSY | USED ON
APPLICATION

		DATE
DRAWN	TOLLANT	6-85
CHECKED	LN	6-85
ENGINEER	FJ	6-85
QA	Paul McCord	6-85
APPROVED	FJ	6-85
RELEASED	FJ	6-85

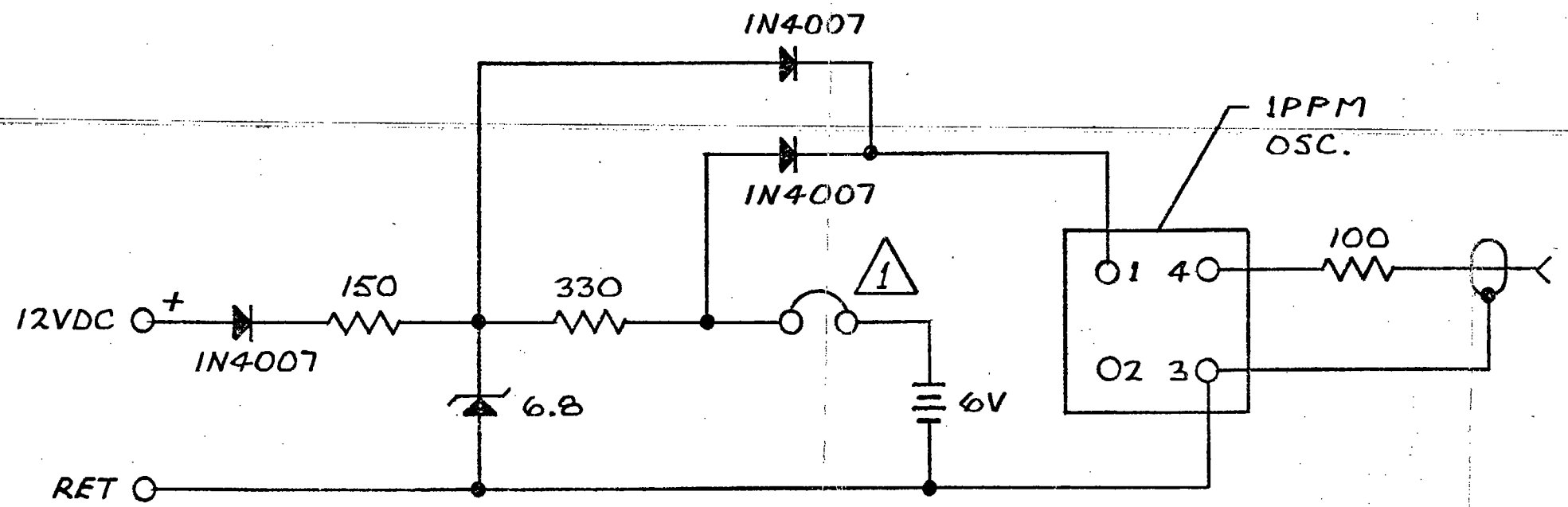
TITLE: ASSY, PCB DOUBLE SIDED GROUND DETECTOR

BETA PRODUCTS, INC. BETA
1615 W. BELTLINE RD. CARROLLTON, TX. 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
NONE	D	307748	C9	3 of 3

REV C9
SHEET 3
DWG NO. 307748

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL



NOTE:

1. INSTALL JUMPER ON START UP OF SYSTEM & REMOVE IF SYSTEM IS TO BE OUT OF SERVICE FOR A PROLONG PERIOD OF TIME.

DASH NO. & QUANTITY		ITEM	DWG SIZE	PART NUMBER	DESCRIPTION
				LIST OF MATERIAL	
			UNIV.		
NEXT ASSY		USED ON			
APPLICATION					

UNLESS OTHERWISE SPECIFIED			
DECIMAL .XX ± .02	.XXX ± .010		
FRACTIONAL ±1/64	ANGULAR ±1°		
CONCENTRICITY MACHINED DIAMETERS .004 TIR			
SURFACE ROUGHNESS IN RMS MICROINCHES			
ALL DIMENSIONS IN INCHES			
REMOVE ALL BURRS AND SHARP EDGES			
ALL DIMENSIONS TO BE MET BEFORE PLATING			
DO NOT SCALE THIS DRAWING			
( ) DIMENSION IN MILLIMETERS			
DRILLED HOLE TOLERANCES			
.013 TO .136	+.002 −.001	.234 TO .750	+.005 −.001
.136 TO .234	+.003 −.001	.750 TO 2.000	+.010 −.002

DRAWN	H.L.Y.	8-87
CHECKED		8-87
ENGINEER		8-87
QA		
APPROVED		
RELEASED		8-87

TITLE: SCHEMATIC, 1PPM OSC.

BETA PRODUCTS, INC.
2029 McKENZIE DR. CARROLLTON, TX. 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
NONE	B	409093	—	1 OF 1

DWG NO. 409093 REV — SHEET 1

TELEDYNE POST N89585

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL

		ITEM	DWG SIZE	PART NUMBER	DESCRIPTION
DASH NO. & QUANTITY		LIST OF MATERIAL			

		DRAWN	DATE 6/87
		CHECKED TP	6/87
		ENGINEER JP	6/87
		QA	
	BL 512	APPROVED	
NEXT ASSY	USED ON	RELEASED	6-27
APPLICATION			

TITLE

SCANNER INPUT CONNECTOR TABULATION

BETA PRODUCTS, INC.

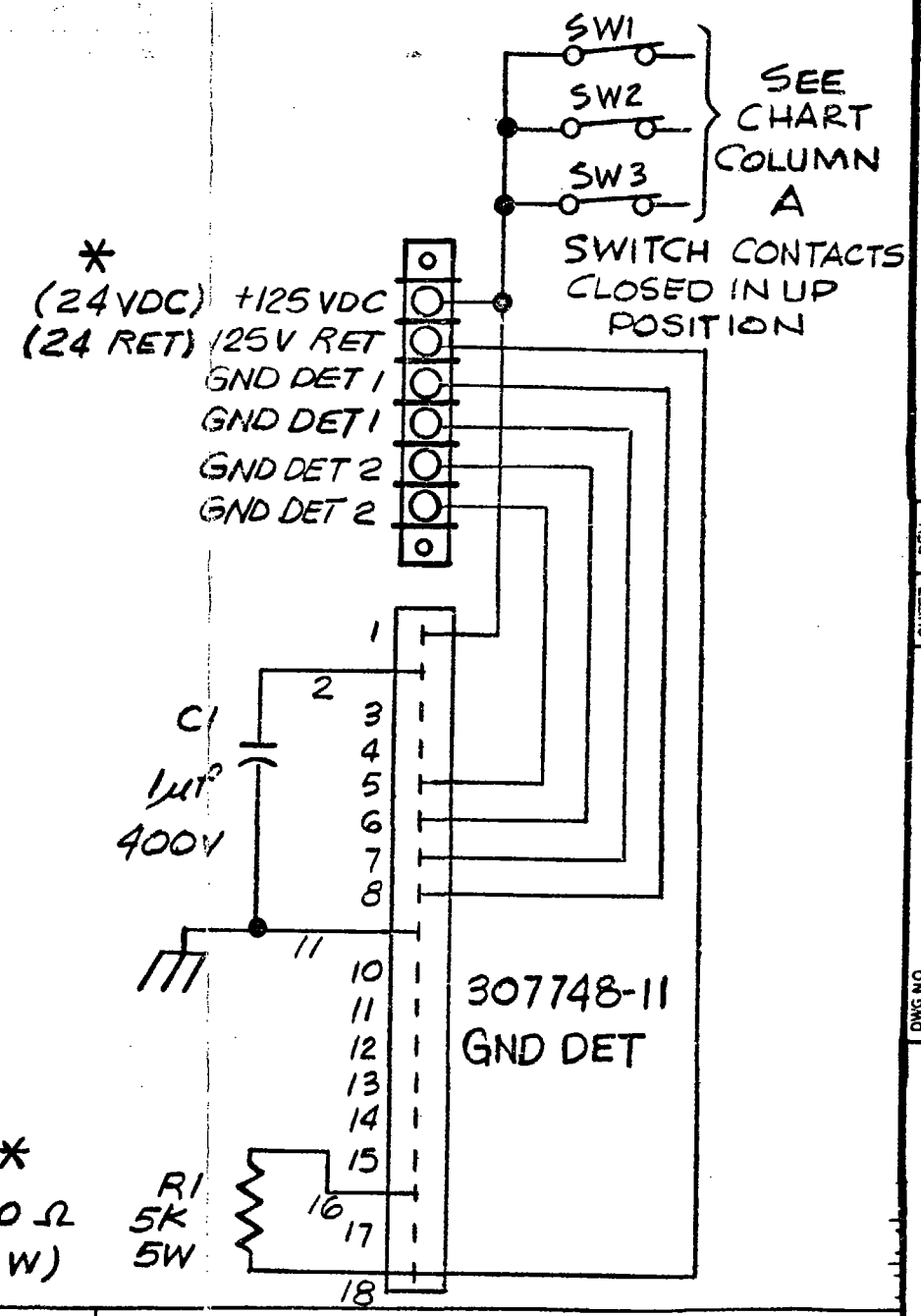
2029 McKENZIE DR. CARROLLTON, TEX 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
~	A	807536	-	1 OF 7

REVISIONS				
SYM	DESCRIPTION	DATE	DRAFTSMAN	APPROVAL
A	ECN 209496	5/87		

PIN #	WIRE#	A	B	FUNCTION
A	1	1		
B	2	2		
C	3	3		
D	4	4		
E	5	5		
F	6	6		
H	7	7		
J	8	8		
K	9	9		
L	10	10		
M	11	11		
N	12	12		
P	13	13		
R	14	14		
S	15	15		
T	16	16		
U	17			
V	18			
W	19			

PIN #	WIRE#	A	B	FUNCTION
X	20			
Y	21			
Z	22			
AA	23			
BB	24			
CC	25			
DD	26			
EE	27			
FF	28			
HH	29			
JJ	30			
KK	31			
LL	32			
MM	33			
NN	34			
PP	35			
RR	36			
SS	37			
TT	38			



C1 102097-001 1µf, 400V CAPACITOR
125VDC R1 104070-001 5K, 5W RESISTOR
24VDC R1 104040-331 330Ω, 1/2W RESISTOR

* 24VDC OPERATION

DASH NO. & QUANTITY		ITEM	DWG SIZE	PART NUMBER	DESCRIPTION
				LIST OF MATERIAL	
	50523				
	50522				
NEXT ASSY	USED ON				
APPLICATION					

UNLESS OTHERWISE SPECIFIED
DECIMAL XX ± .02 .XXX ± .010
FRACTIONAL ±1/64 ANGULAR ±1°
CONCENTRICITY MACHINED DIAMETERS .004 TIR
SURFACE ROUGHNESS IN RMS MICROINCHES
ALL DIMENSIONS IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
ALL DIMENSIONS TO BE MET BEFORE PLATING
DO NOT SCALE THIS DRAWING
( ) DIMENSION IN MILLIMETERS

DRILLED HOLE TOLERANCES

.013 TO .136	+.001 −.001	.234 TO .750	+.005 −.001
.136 TO .234	+.001 −.001	.750 TO 2.000	+.010 −.002

	DATE
DRAWN	11/86
CHECKED	1-87
ENGINEER	1-87
QA	
APPROVED	
RELEASED	1-87

TITLE: WIRING DIAGRAM, ISOLATION SW. PANEL

BETA PRODUCTS, INC. BETA
1615 W. BELTLINE RD. CARROLLTON, TEXAS 75006

SCALE	SIZE	DRAWING NO.	REV	SHEET
~	B	807307	A	1 OF 1

REV A
SHEET 1
DWG NO. 807307

BETA

PRODUCTS, INC.

2029 McKenzie Drive, #150
P.O. Box 115004
Carrollton, TX 75011-5004 • 214/241-2200
Easy Link No. 62943145
Fax No. 214/241-6752 (Auto Answer)