

# **LARGE DISPLAY**

**PANEL METER  
MODEL L2CX SERIES**

U0208ML-01

**WARNING : ELECTRIC SHOCK HAZARD**

THE HIGH VOLTAGE DC WITHIN THE SWITCHING MODE PSU OF THE LXCX HAS A SLOW DISCHARGE TIME CONSTANT.

IT IS ADVISED THAT THE METER SHOULD BE LEFT FOR AT LEAST 60 SECS. AFTER THE MAINS SUPPLY HAS BEEN REMOVED; BEFORE ANY ATTEMPT IS MADE TO REMOVE THE REAR PANEL.

THE METER SHOULD NOT BE OPERATED WITH THE REAR PANEL REMOVED OTHER THAN BY QUALIFIED SERVICE PERSONNEL.

Although it is believed that the information contained in this manual is correct, we reserve the right to make any changes or additions that we may consider necessary.

REV	ECO.NO	DATE	BY	CHK
B	U0120	21 JUN 90	<i>JL</i>	<i>RS</i>

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## 1.0 GENERAL INFORMATION

The LXXX series of multipurpose large displays are self contained within extruded aluminium cases suitable for panel mounting, hanging from an upright or free standing.

The cases are of rugged construction and appearance. The product has been designed to fulfil a need for use in process control environments and the characters are easily readable at large distances.

### 1.1 MODELS L2C4 AND L2C6

The L2C4 is a four digit and L2C6 a six digit 57mm character real time clock and run up or run down clock display module.

The clock accepts inputs from contact closure and other sensor inputs to start, stop, and reset the run time clock.

Transducer excitation of 16 volts nominal is available. The units feature a run time alarm with optically isolated transistor switch output, and RS422/485 level two wire transmission of the displayed time.

## 2.0 SPECIFICATIONS

### 2.1 DISPLAY

Type RED light emitting diode. (Green L.E.D. optional)  
Height 57mm ( 2 1/4 inches )  
Display 9 9 : 5 9 ( optionally 9 9 : 5 9 : 5 9 )  
Brightness Set by switch for 25%, 50% (normal) or 100%.

### 2.2 POWER SUPPLY

AC 95 to 265 VAC 40 to 440Hz  
Power consumption 10 watts Max.

### 2.3 ENVIRONMENTAL

Operating temp. 0 - 50 C at normal brightness 0-35 C at full brightness  
Storage temp. -20 to + 85 C  
Relative humidity 85% to 40 C (non condensing) case as standard  
suitable for IP43, optional IP65 enclosure.

### 2.4 MECHANICAL

Case size 264 ( 384 opt ) x 120 x 112mm  
Panel cut-out 258 ( 378 opt ) x 114mm  
Case depth 107mm behind bezel  
Case material Aluminium extrusion  
Weight 2.5 ( 3 opt ) Kg

### 2.5 CONNECTORS

Mains IEC connector  
Signal Plug in screw connectors

### 2.6 REAL TIME CLOCK

Type 24 hour clock ( 12/24 hour clock on the 6 decade version )  
Time setting by volt free contact closure inputs seconds reset, minutes advance, hours advance  
Time accuracy  $\pm 1$  minute per month  
Power down maintains time for minimum 2 weeks without mains power

2.7	RUN TIME CLOCK	
	Type	99 hours 59 minutes or 99 minute 59 seconds, controlled by rear panel switch 99 hours 59 minutes 59 seconds on 6 decade version. Run up or run down controlled by rear panel switch
	Timer resolution	1 second
	Timer uncertainty	1 second max per start / stop sequence
	Timer memory	run time maintained for 2 weeks minimum but not updated with mains removed
	Alarm	one minute or one second resolution ( one minute only on 6 decade version ) set by external contact closure inputs.
	Alarm value	maintained for 2 weeks minimum with mains removed.
	Alarm enable	controlled by rear panel switch
	Alarm output	optically isolated transistor switch 30V / 30mA capacity
	Alarm indication	clock and serial output stop, display flashes and alarm output activates.
	Initialization	by operation of one or more of the control inputs
2.8	CONTROL LINES	
	Threshold	three inputs, sharing one common return rising: +2.2V min, +3.5V max falling: +1V min, +2.42V max
	Signal hysteresis	0.4V minimum
	Maximum signal	$\pm 30V$
	Loading	100kilohms loading to common for +5V signal 18 kilohms loading beyond +5/-0.6V
	Load	1 kilohm $\pm 5\%$ load may be internally jumpered to common or to the excitation supply for each control line.
	Response time	200mS maximum: internally debounced for contact closure inputs.
	Active level	internally jumpered to be active either with low level/ falling edge or high level/rising edge inputs independently for each control line.
2.9	CONTROL MODES	
	operating mode depends on interlinking of the three control lines	
	one control :	to reset and run when active and stop when inactive
	two controls:	one to run when active and stop when inactive and the other to reset
	two controls:	one to alternately start and stop and the other to reset
	three controls:	one to start, one to stop and one to reset
	Input connections	on plug-in screw terminal modules

2.10 SERIAL OUTPUT	Output intended for transmission to the LXSX remote display fitted with a clock display as a slave clock display
Signal	RS422/485 level 1200 baud fixed rate. One transmission each second while showing real time or run time.
String	Transmits - - NUL - - (CR) or - - NUL - - NUL - - (CR) when setting time or entering alarm state
Data string	6 or 9 ASCII characters representing HHHM.M(CR) or MMS.S(CR) or HHM.MS.S(CR) for 6 decade version.
Character length	one start bit, 8 data bits no parity and one stop bit
Handshake	no handshake: one data string transmitted each second.

2.11 EXCITATION SUPPLY

Output	16V $\pm$ 20% 100mA max load
Ripple	250mV ac 100KHz bandwidth



## 3.0 MECHANICAL ASSEMBLY AND INSTALLATION

### 3.1 SAFETY CONSIDERATIONS

As delivered from the factory/distributor, this instrument complies with required safety regulations. To prevent electrical or fire hazard and ensure safe operation, please follow the guidelines below.

**POWER VOLTAGE** - Verify that the instrument is connected for the power voltage i.e. 95V to 265V AC that it will be used.

**POWER WIRING** - This instrument has no power on switch ; it will be in operation as soon as the power is connected.

Verify that the power cable has the proper ground (earth) wire and that this wire is properly connected to a ground (earth) point. If the panel cutout is a metal enclosure, it must be grounded (earthed).

This instrument is protected according to the class I of the IEC 348 and VDE 0411 regulations.

**RAIN OR MOISTURE** - Do not expose the instrument to condensing moisture.

**FUMES AND GASES** - Do not operate the instrument in the presence of flammable gases or fumes ; such an environment constitutes a safety hazard.

**EXERCISE CAUTION** - As with any electronic instrument, high voltage may exist when attempting to install, calibrate, or remove parts of the instrument.

### 3.2 UNPACKING AND INSPECTION

Your L2C4/L2C6 remote display was systematically inspected and tested, then carefully packed before shipment. Unpack the instrument and inspect for shipping damage. If damage exists, do not attempt to operate the unit. Notify the freight carrier immediately.

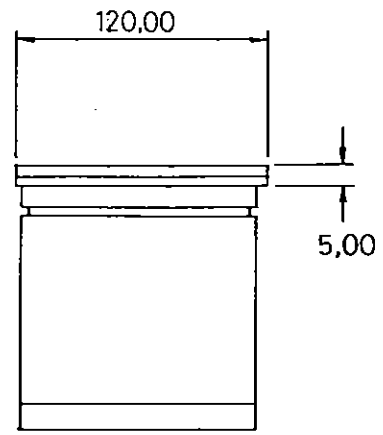
Check the packaging contains a mains IEC connector or combined moulded lead and connector, and two 8 pin screw barrier connectors.

### 3.3 REMOVE THE L2CX FROM ITS CASE

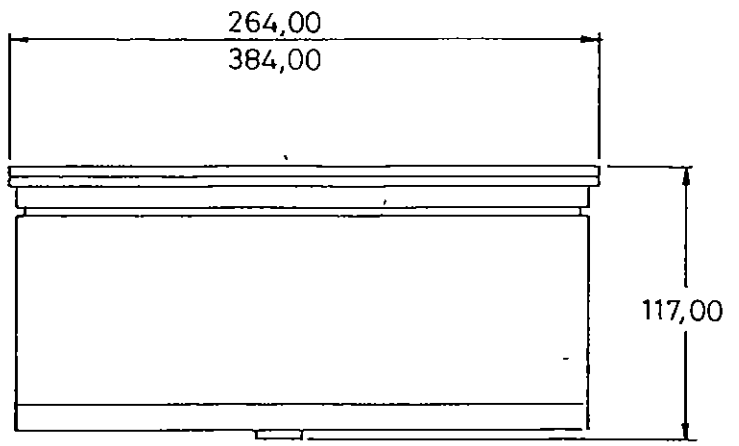
1. Remove the rear panel (ten retaining screws).
2. Remove the right hand side plate (four retaining screws).
3. The L2CX can now slide out from its case.
4. To assemble reverse the procedure.

CASE CUTOUT & DIMENSIONS

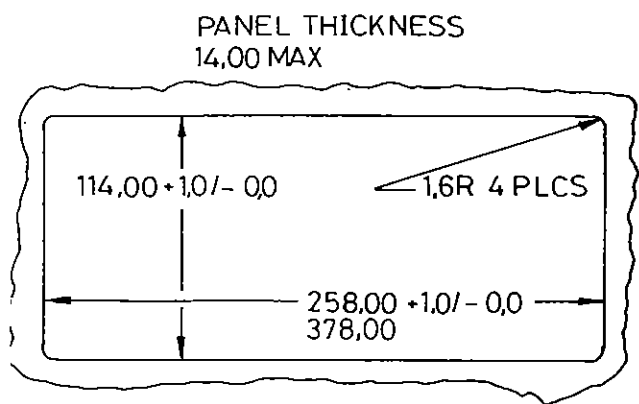
Note.  
Dimensions are  
in millimeters



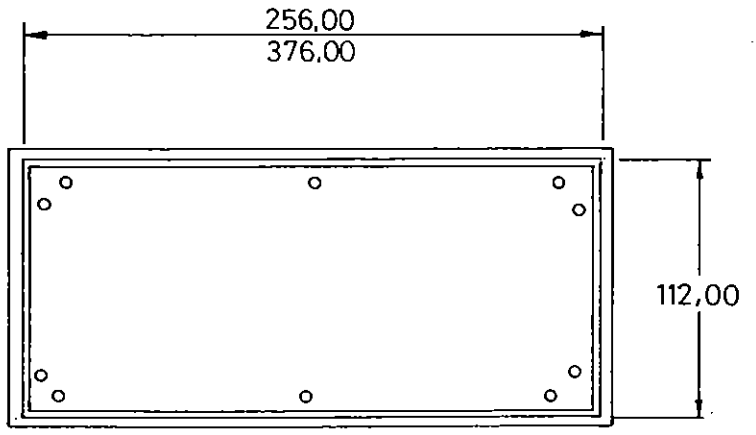
SIDE VIEW



TOP VIEW



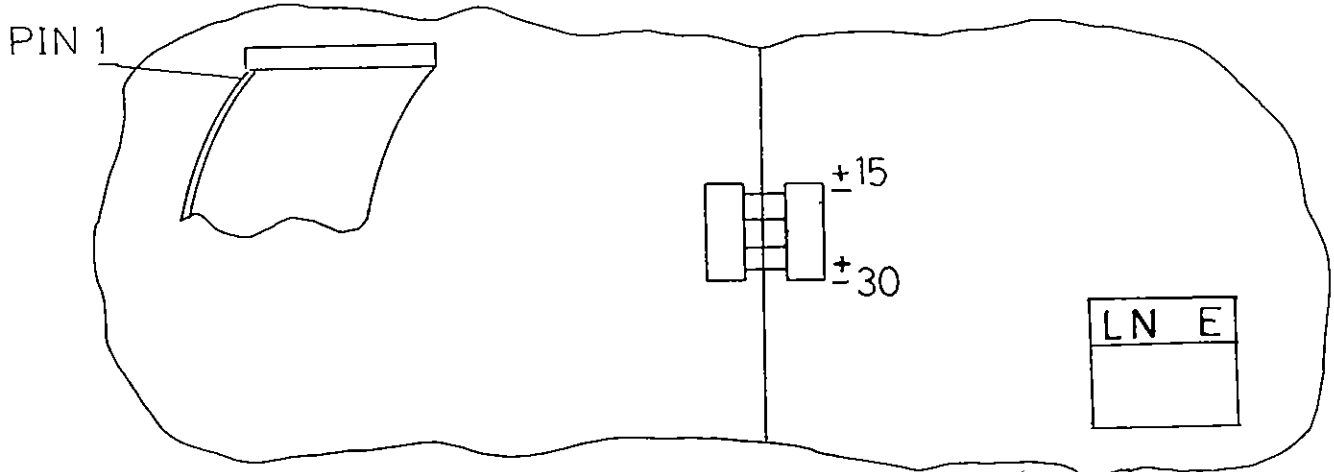
PANEL CUTOUT



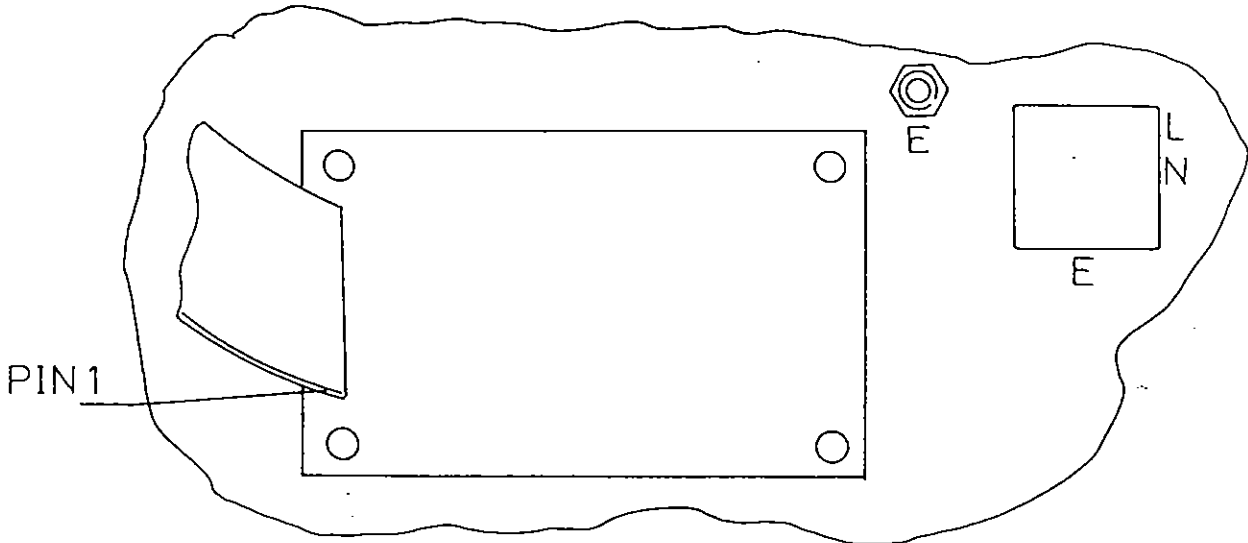
REAR VIEW

FIGURE 3-1 CASE CUT OUT & DIMENSIONS

CASE REAR VIEW



BACK PANEL INSIDE VIEW



BACK PANEL OUTSIDE VIEW

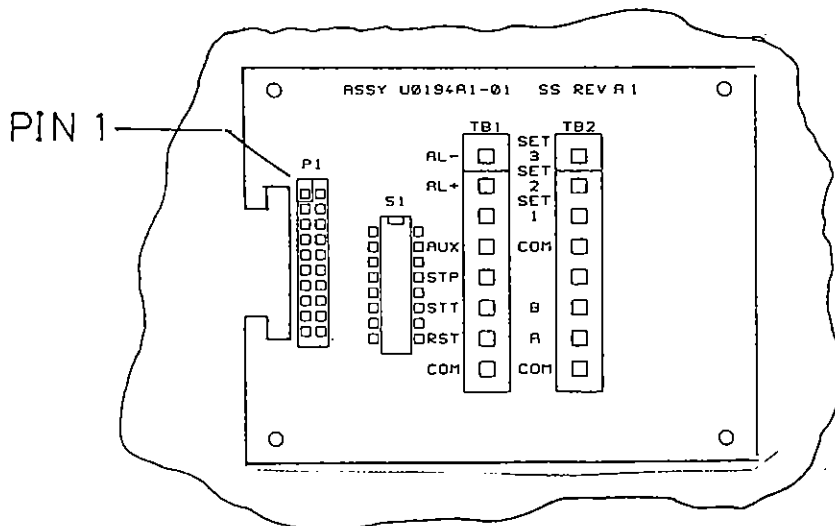


FIGURE 3-2 REAR VIEW & ACCESS

## 4.0 CONNECTIONS

### 4.1 POWER CONNECTIONS

The display operates over a mains supply of 95V to 265V, so there is no mains change required. Currently there is no DC power option for the large display series.

AC POWER CONNECTIONS		
AC POWER	WIRE COLOUR	
	EUROPE	USA
AC POWER HI	BROWN	BLACK
AC POWER LO	BLUE	WHITE
AC POWER GND	GREEN/YELLOW	GREEN

The re-wirable mains connector should have the mains cable attached according to the markings inside the free socket.

### 4.2 FUSING

The mains inlet has an integral fuse holder with spare fuse, rated at 315 milliamperes. If during the life of the instrument the fuse fails, a fuse with the same characteristics as the fuse supplied must be used. This is a Wickman 19195 315 mA fuse. Fuses with other ratings or other fusing characteristics may result in nuisance fusing, or fire risk. If replacement with the correct fuse type results in further fuse failure, the unit should be checked for a fault; a higher fuse rating should not be attempted.

### 4.3 SIGNAL INPUT CONNECTIONS

Connections are via two 8 pin plug in screw terminal strips  
Pin designations are as follows:

PIN	TB1	TB2
1	ALARM -	SET 3
2	ALARM +	SET 2
3	NO CONNECTION	SET 1
4	AUX +	SET COMMON
5	STOP	NO CONNECTION
6	START	SERIAL B
7	RESET	SERIAL A
8	COMMON	SERIAL COMMON

## 4.4 NOTES

The connections to SERIAL A, SERIAL B and SERIAL COMMON are for the RS422/RS485 data output

The SET inputs are for contact closure to SET COMMON, and are pulled up to the auxiliary 16 volt rail through 4.7Kilohms.

The STOP, START AND RESET inputs are normally configured to be pulled up to the auxiliary 16 volt rail through 1 Kilohms, but may be internally jumpered to be pulled to common through 1 Kilohms, or pulled to common through a high resistance of 100 Kilohms.

Debouncing for 200 milliseconds time constant is normally incorporated on the three control inputs, but may be disabled by removing internal jumpers.

### Run time clock uncertainty

The control inputs are sensed eight times per second, but the actual run time clock is incremented or decremented in synchronism with the built in real time clock once per second.

This means that each start / stop condition may be inaccurate by up to one second

## 5.0 POWER-UP AND OPERATION

### 5.1 REAL TIME CLOCK

At power-up, the unit displays the real time with steady colon provided the standby battery is sufficiently charged. Charging of the standby battery takes place while the unit is under normal operating conditions.

A low battery condition results in a display of --:-- ( or --:--:-- ) This display indicates that the stored parameters may be incorrect and will remain so until they are reset. Setting of the real time is by means of contact closure between common and the following terminals on TB2:

TERMINAL	FUNCTION
SET 1	INCREMENT HOURS
SET 2	INCREMENT MINUTES
SET 3	RESET SECONDS

Reaction to the three inputs is once per second.

## 5.2 RUN TIME CLOCK

The display is switched into run time clock mode by inputting an active signal on to any of the three control lines START, STOP or RESET found on TB1.

An active signal can be either active high or active low depending upon the internal configuration of the unit as shown in section 6.

The factory default settings are for contact closures to common for all three inputs.

Once the unit is displaying the run time clock the 3 control lines operate as follows:-

AN ACTIVE SIGNAL APPLIED TO	FUNCTION
RESET	resets/ presets the timer
START	starts the timer
STOP	stops the timer if running starts the timer if not running

Note on the 4 decade clock the run time clock may be either for hours and minutes or for minutes and seconds. During run time hours and minutes, the colon will flash on and off every second while the clock is running to indicate the clock is running.

## 5.3 UP / DOWN TIMING

The run time clock has two basic modes of operation; a run up clock or a run down clock. These modes are controlled by a rear panel switch, shown in section 6.2.

Run up clock.

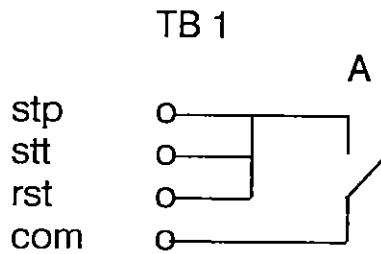
Reset will clear the clock to zero. When the alarm point is reached, if the alarm is enabled, the clock will stop and the whole display will flash and the alarm output will be activated, until the clock is reset. If the alarm is disabled, the clock will run up to 99 minutes 59 seconds ( or 99 hours 59 minutes ) and then roll over to zero.

Run down clock

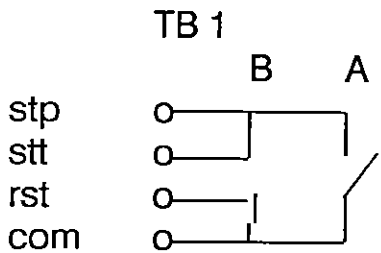
Reset will preset the clock to the alarm point. When zero is reached, if the alarm is enabled, the clock will stop and the whole display will flash and the alarm output will be activated, until the clock is reset. If the alarm is disabled, the clock will run down to zero and then underflow to 99:59.

## 5.4 CONNECTION EXAMPLES

Different interlinking of the three control lines will produce different operating modes:-

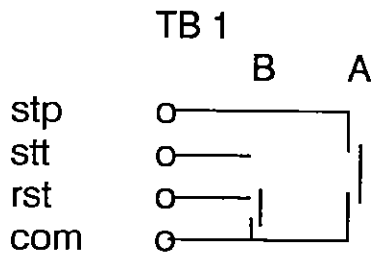


close contact A = reset and run  
open contact A = stop

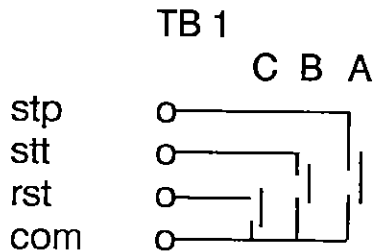


with contact B open  
close contact A = run  
open contact A = stop

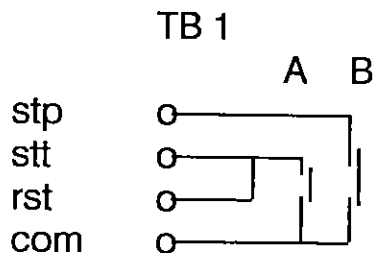
push contact B = reset



push A = start  
push A = stop  
push B = reset



push B = start  
push A = stop  
push C = reset  
note A may close while B is shut  
B may open while A is shut



push A = reset and start  
push B = stop  
( push B again = start )

## 5.5 RUN TIME ALARM SETTING

The alarm is a 4 decade alarm only. On the 6 decade clock, the alarm setting is for hours and minutes only and on the 4 decade clock the alarm point can be for either hours and minutes or minutes and seconds.

Displaying or setting of the alarm point can only be done when the unit is displaying the run time and is not running.

The same three contact inputs are used for setting the alarm point and for adjusting the real time clock, but their functions are different.

To display the alarm set point, hold the SET 3 input to common. Once the alarm point is displayed, the value can be changed by contact closure between common and the following terminals:-

- SET 3. view/adjust alarm point ( hold to common )
- SET 1. increment seconds ( or minutes )
- SET 2. increment minutes ( or hours )
- SET 1. and SET 2 together reset alarm to zero

## 5.6 SERIAL DATA OUTPUT

The unit incorporates an RS422/485 level serial ASCII output to allow master/slave clock setups in conjunction with serial ASCII remote displays.

Details of the serial output are to be found in section 2.10.

Note the line should be terminated to prevent noise pickup if the clock is not transmitting data. This condition occurs during an alarm state, or a low battery condition.



## 6.0 CONFIGURATION

### 6.1 POWER SELECTION.

For 230V A.C operation and for 115V AC operation no changes are required as the internal power supply will work from 95V to 265V.

### 6.2 REAR PANEL CONFIGURATION SWITCH

The 8 position DIP switch on the rear panel is for setting the operating modes of the clock. Five of the eight positions are used. The switch designations are as follows:

SWITCH	FUNCTION	ON	OFF
1	DISABLE	ENABLE	ALARM
2	UP	DOWN	TIMER
3	50%	25%	DISPLAY BRIGHTNESS
4	50%	100%	DISPLAY BRIGHTNESS
5	MM:SS	HH:MM	CLOCK RANGE (4 DECADE)
5	24 HOUR	12 HOUR	CLOCK TYPE (6 DECADE)
6	NOT USED		
7	NOT USED		
8	NOT USED		

Note some switch settings are sensed only at power up, so any change to them should be followed by removing and re-applying the mains power.

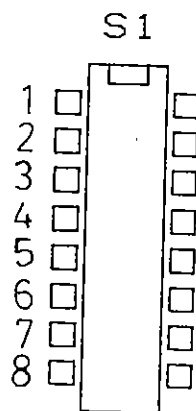


FIGURE 6.1 REAR PANEL SWITCH

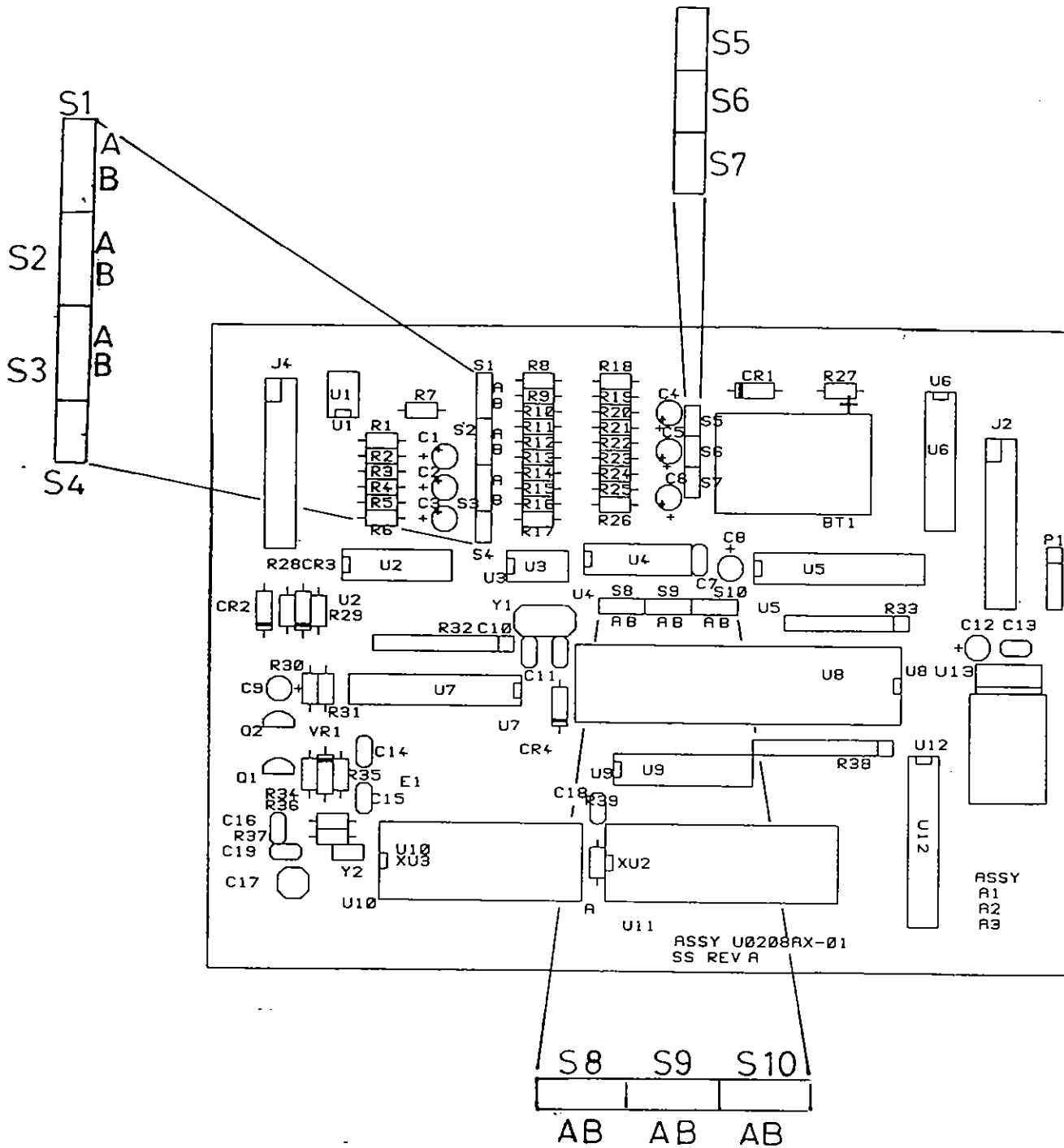


FIGURE 6.2 INTERNAL JUMPER POSITIONS

### 6.3 INTERNAL JUMPER SWITCHES

**DISCONNECT THE UNIT FROM THE MAINS BEFORE OPENING THE CASE.**

To gain access to the internal jumper switches the rear panel must first be removed (ten retaining screws).

The internal jumper switches are:

Switch				
S1	A	1K pull-up	B	1K pull-down for STOP line
S2	A	1K pull-up	B	1K pull-down for START line
S3	A	1K pull-up	B	1K pull-down for RESET line

all three are factory set to be pull-up ( to +16 volts nominal )

S4	ON	220 ohm terminating resistor for the RS422/485 output not factory installed
S5	ON	switch debounce for the STOP line
S6	ON	switch debounce for the START line
S7	ON	switch debounce for the RESET line

all three are installed at the factory

S8	A	rising edge/ high level active RESET line
	B	falling edge / low level active RESET line
S9	A	rising edge /high level active START line
	B	falling edge/low level active START line
S10	A	rising edge/ high level active STOP line
	B	falling edge/low level active STOP line

all three are factory set to position B

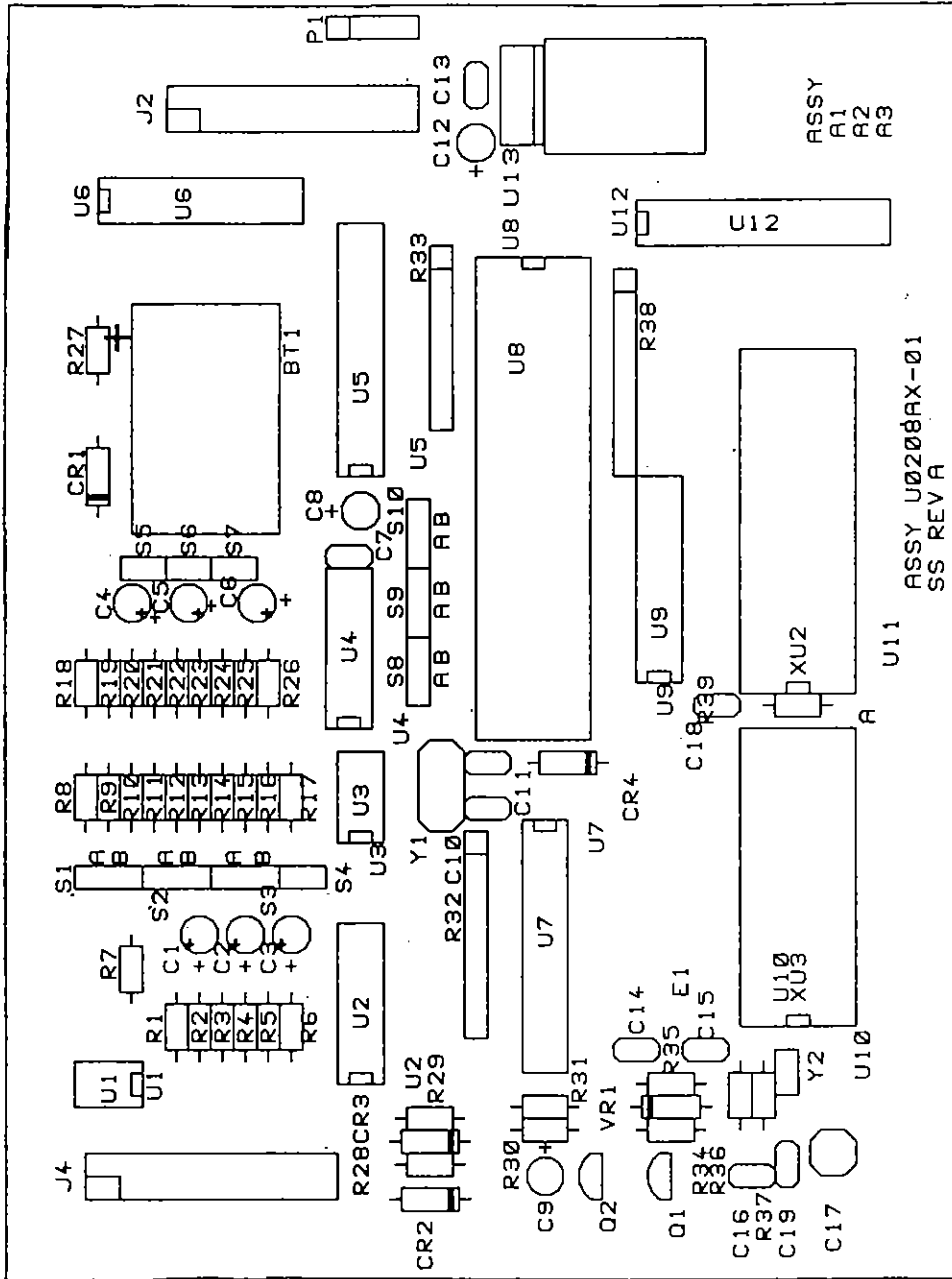
The factory default is intended for contact closure input controls of the run time clock.

## 6.4 CLOCK ADJUSTMENT

The advance/retard control for the clock is a small screwdriver adjustable control at the bottom left hand corner of the control card, C17 on assembly U0208A1-01.

To speed up the clock, adjust the trimmer to expose more of the brass coloured portion of the trimmer and to slow the clock, adjust to expose less of the brass coloured portion of the trimmer.

If an accurate timer is available, the frequency at the test point E1 near the top left corner of U10 should be set to 8Hz (128mS) exactly.



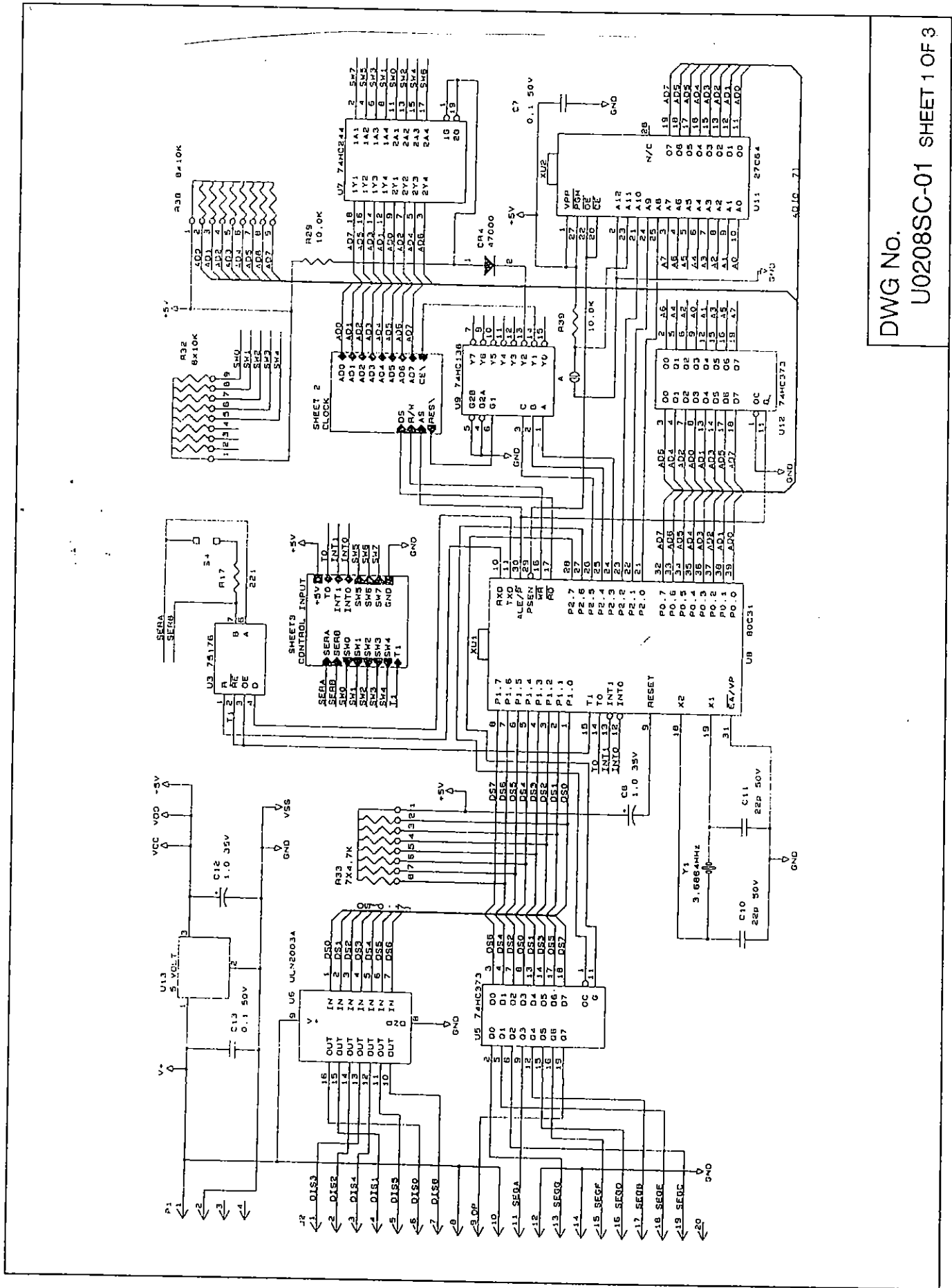
ASSY  
R1  
R2  
R3

ASSY U0208AX-01  
SS REV A

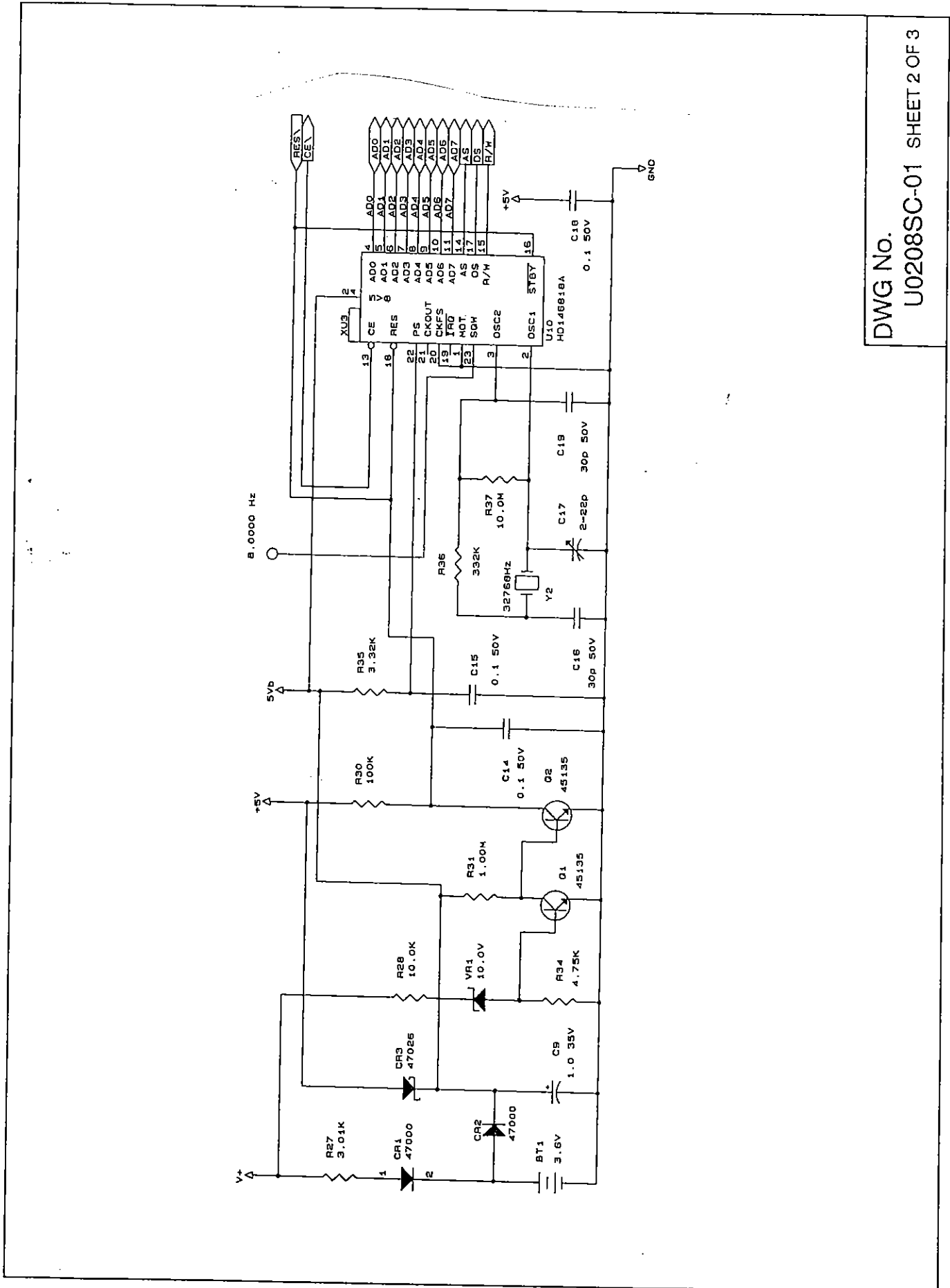
DWG No.  
U0208AY-01

FIGURE 7-1 The LXCX Card Assembly

FIGURE 7-2 The LXCX Card Schematic Sheet 1 of 3



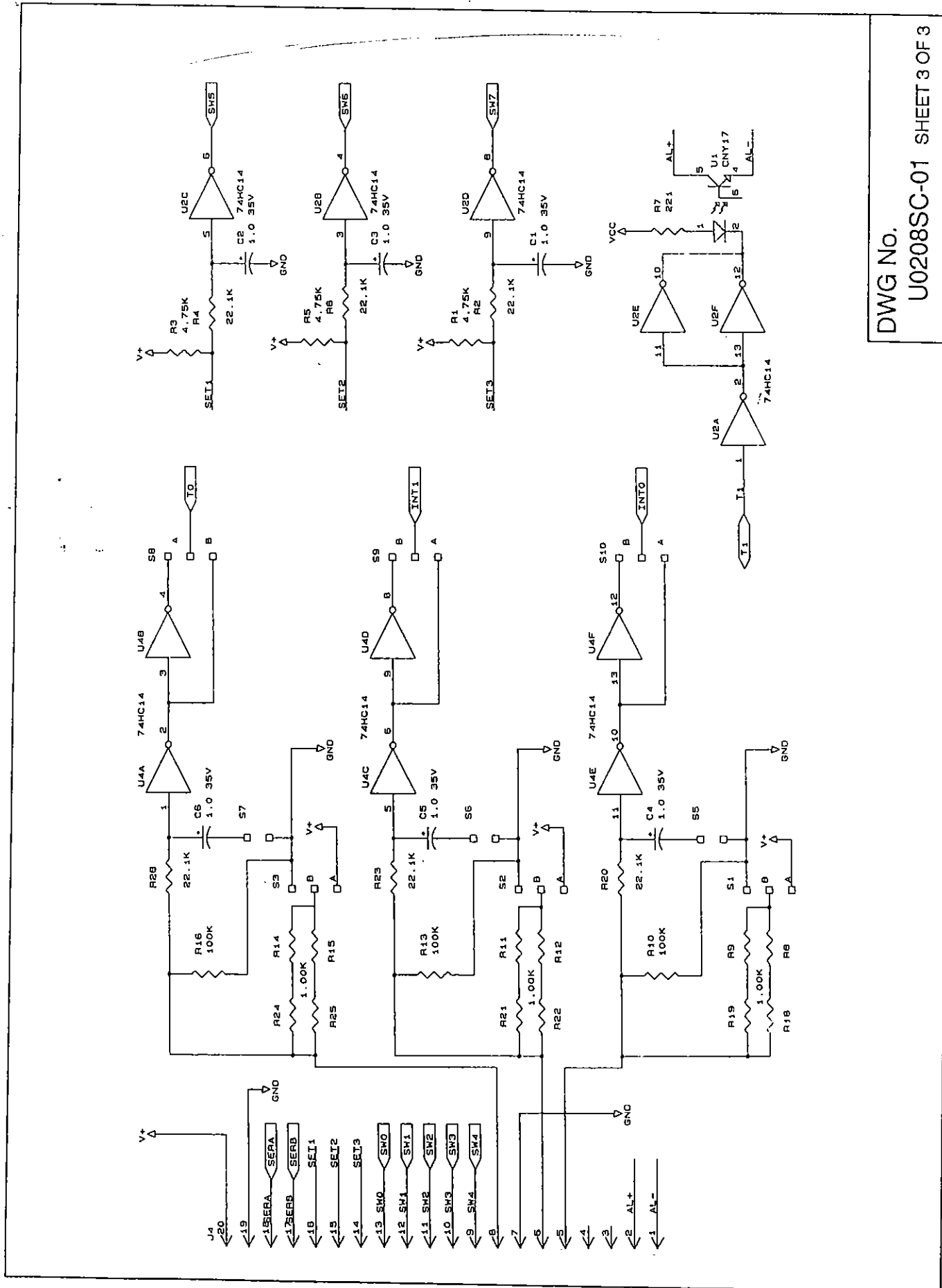
DWG No. U0208SC-01 SHEET 1 OF 3



DWG No.  
U0208SC-01 SHEET 2 OF 3

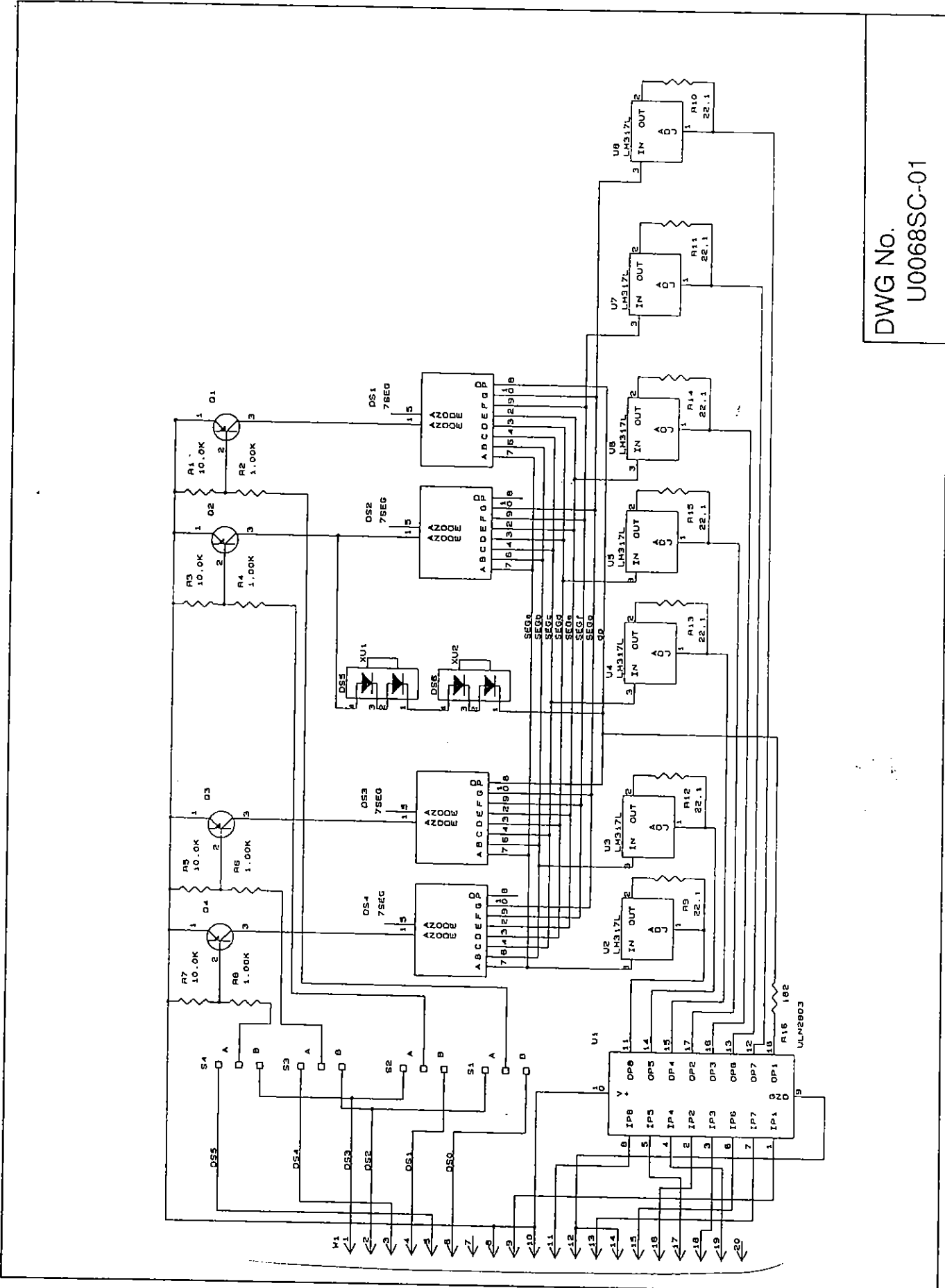
FIGURE 7-2 The LXCX Card Schematic Sheet 2 of 3

FIGURE 7-2 The LXCX Card Schematic Sheet 3 of 3



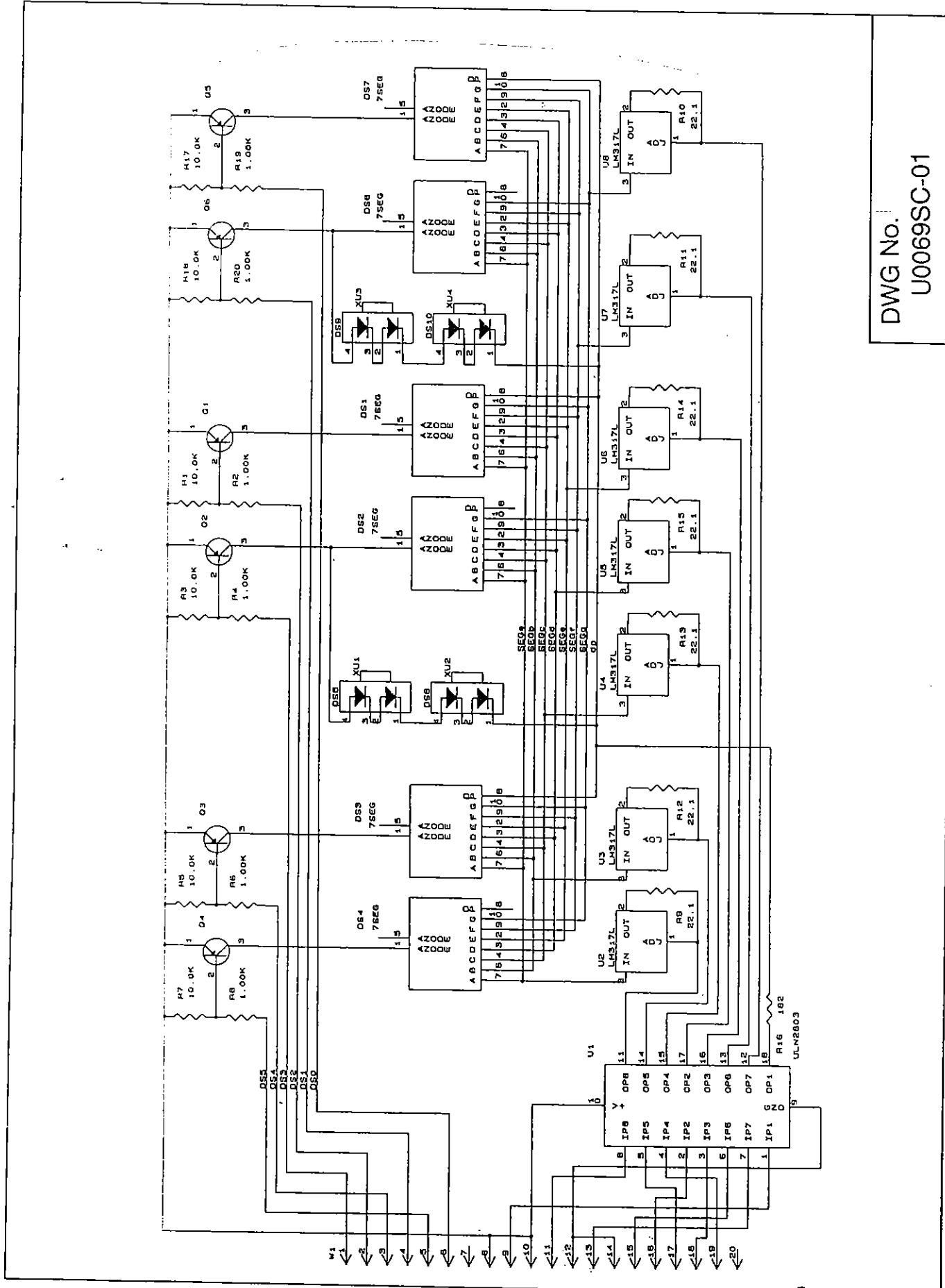
DWG No.  
U0208SC-01 SHEET 3 OF 3





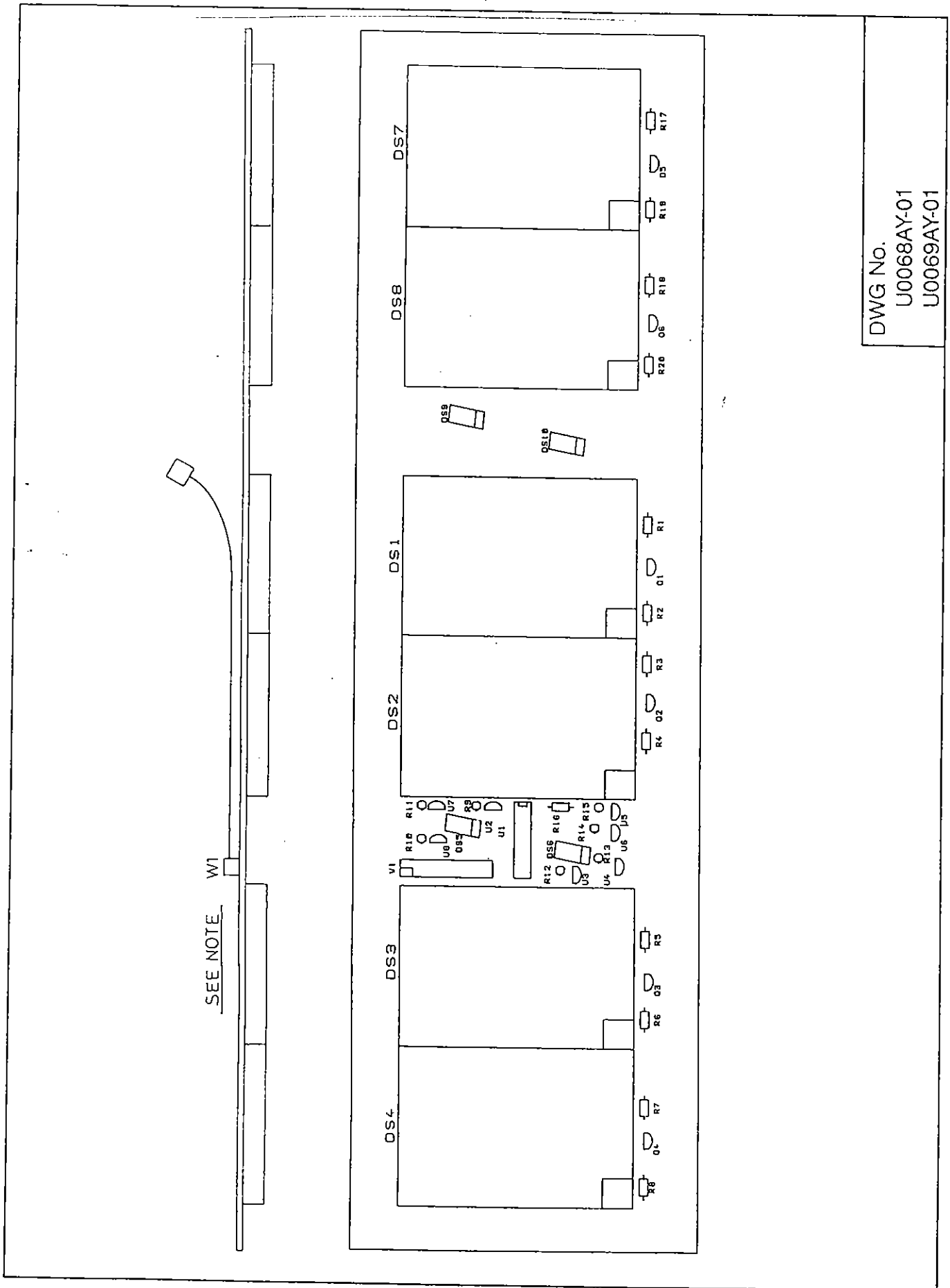
DWG No.  
U0068SC-01

FIGURE 7-3 4 DIGIT Display Card Schematic



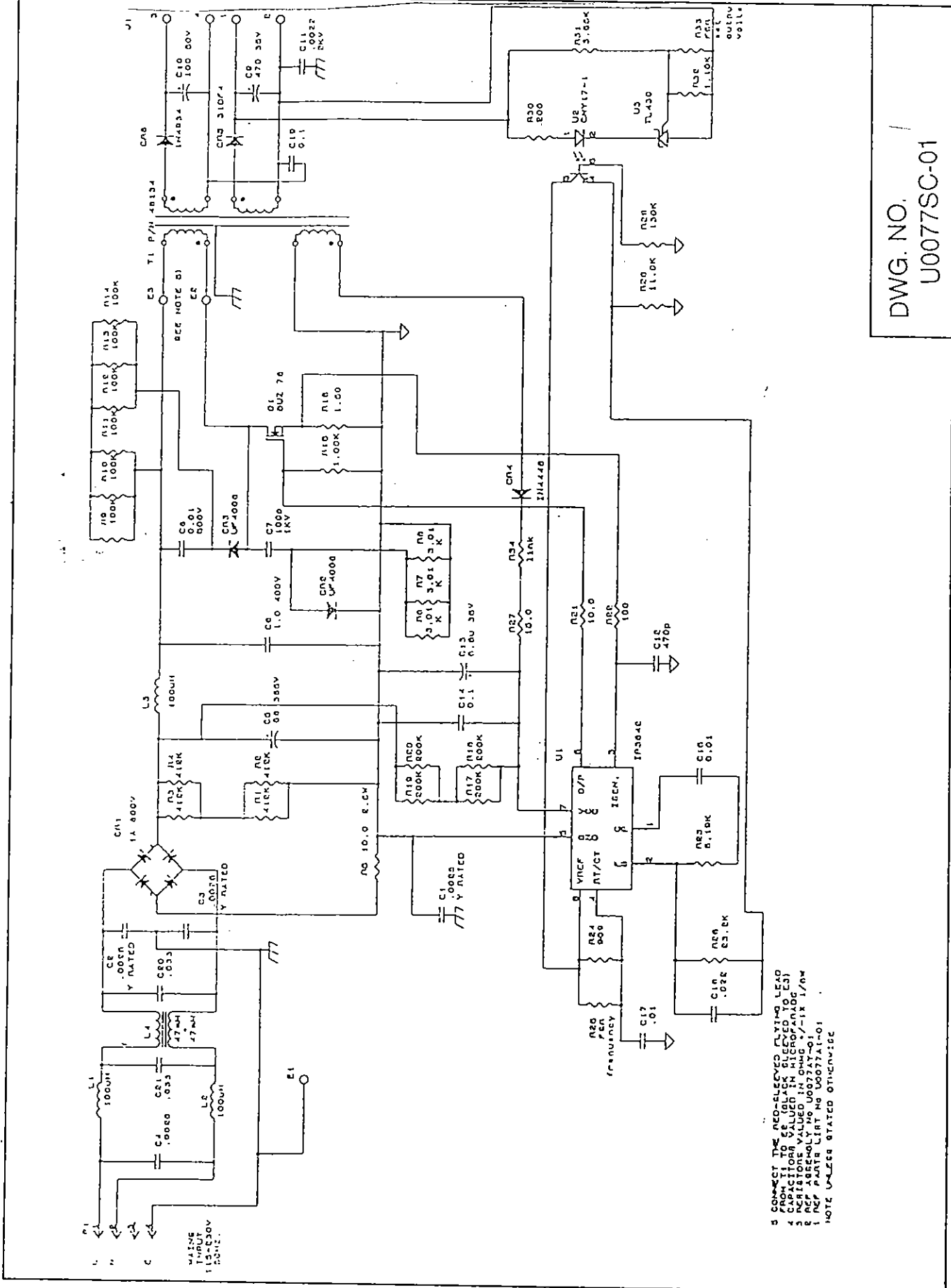
DWG No. U0069SC-01

FIGURE 7-4 6 DIGIT Display Card Schematic



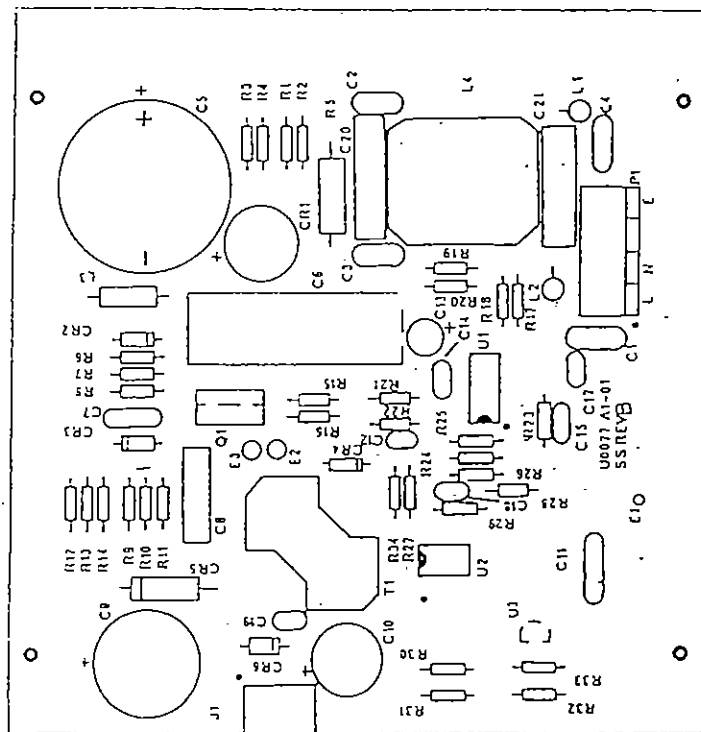
DWG No.  
 U0068AY-01  
 U0069AY-01

FIGURE 7-5 4/6 DIGIT Display Card Assembly



5 CONNECT THE UNOCCUPIED FLYING LEAD  
 6 CAPACITORS VALUE IN MICROFARADS (µF)  
 7 RESISTORS VALUE IN OHMS (Ω) / 1K 1/10K  
 8 REF ASSEMBLY NO U0077AT-01  
 9 REF PARTS LIST NO U0077AT-01  
 NOTE UNLESS STATED OTHERWISE

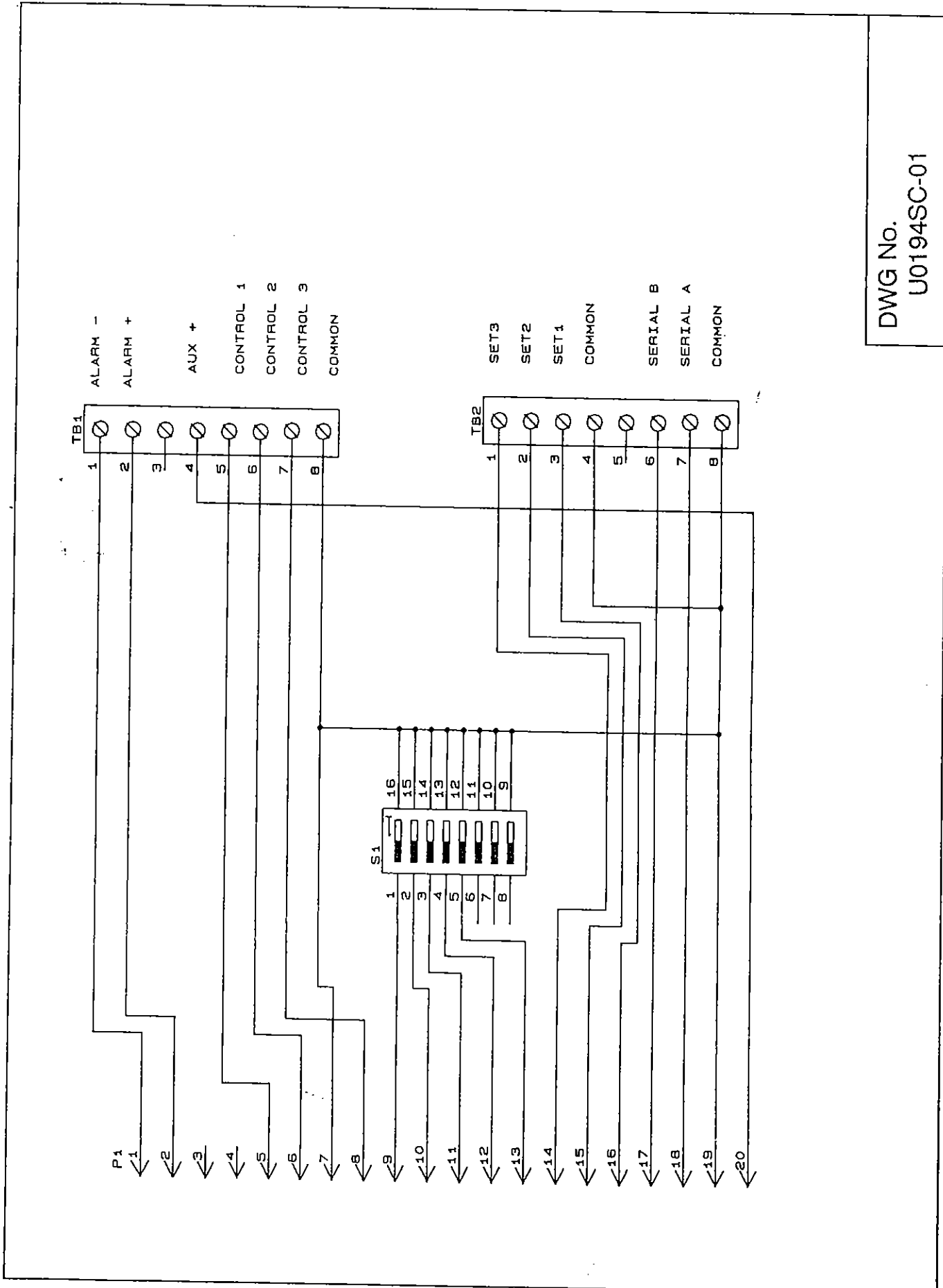
DWG. NO. /  
 U0077SC-01



DWG. NO.  
U0077AY-01

NOTE CONNECT THE RED SLEEVED FLYING  
LEAD FROM T1 TO E2 (BLACK SLEEVED TO E3)

FIGURE 7-7 Power Supply Assembly



DWG No.  
U0194SC-01

DWG No.  
U0194AY-01

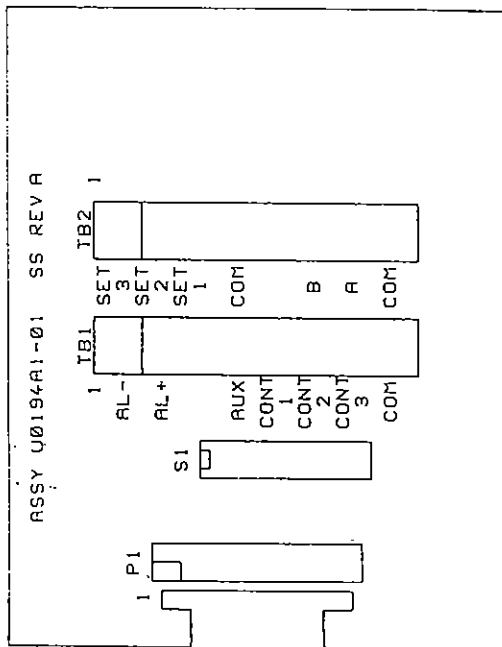
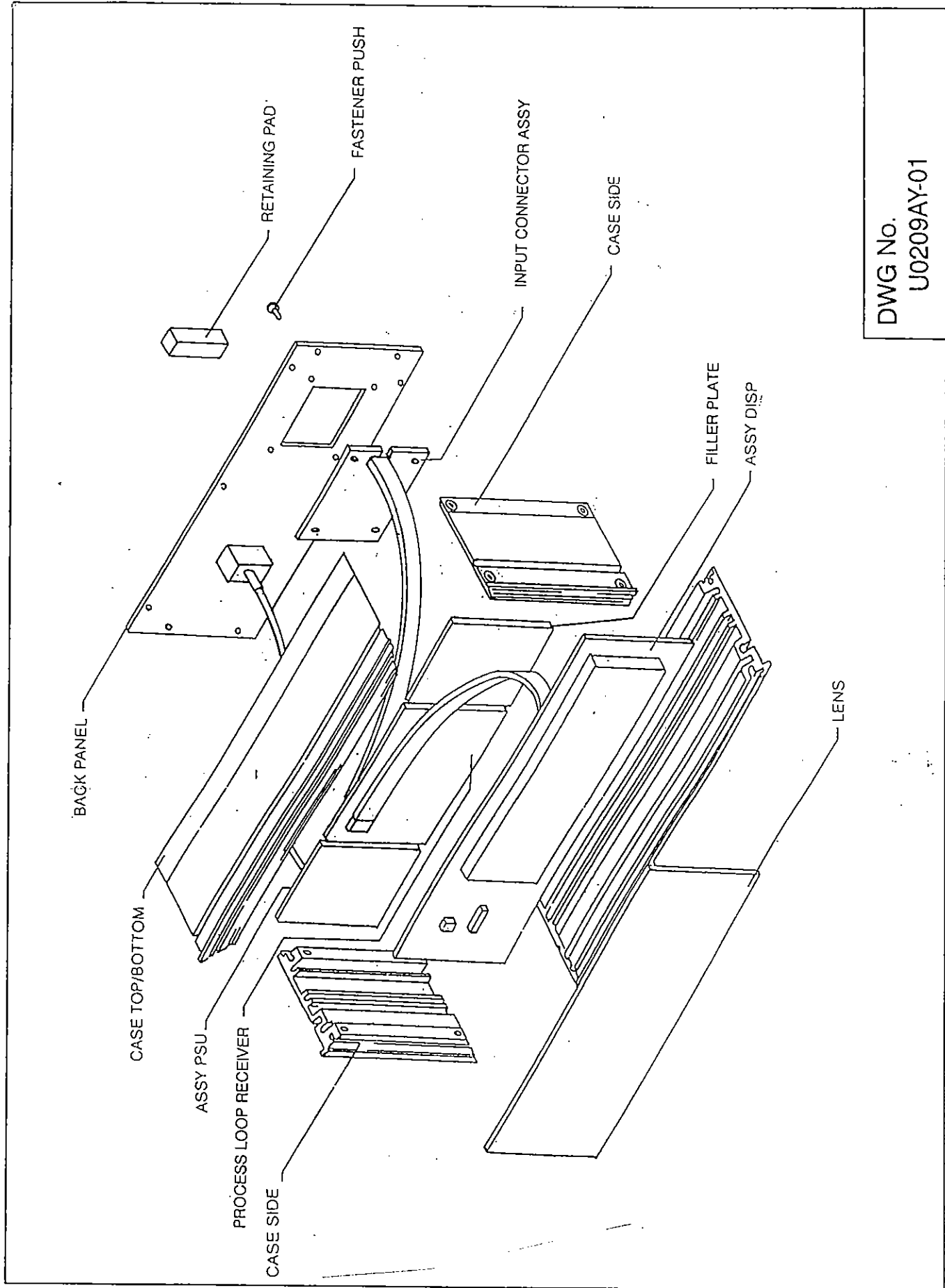


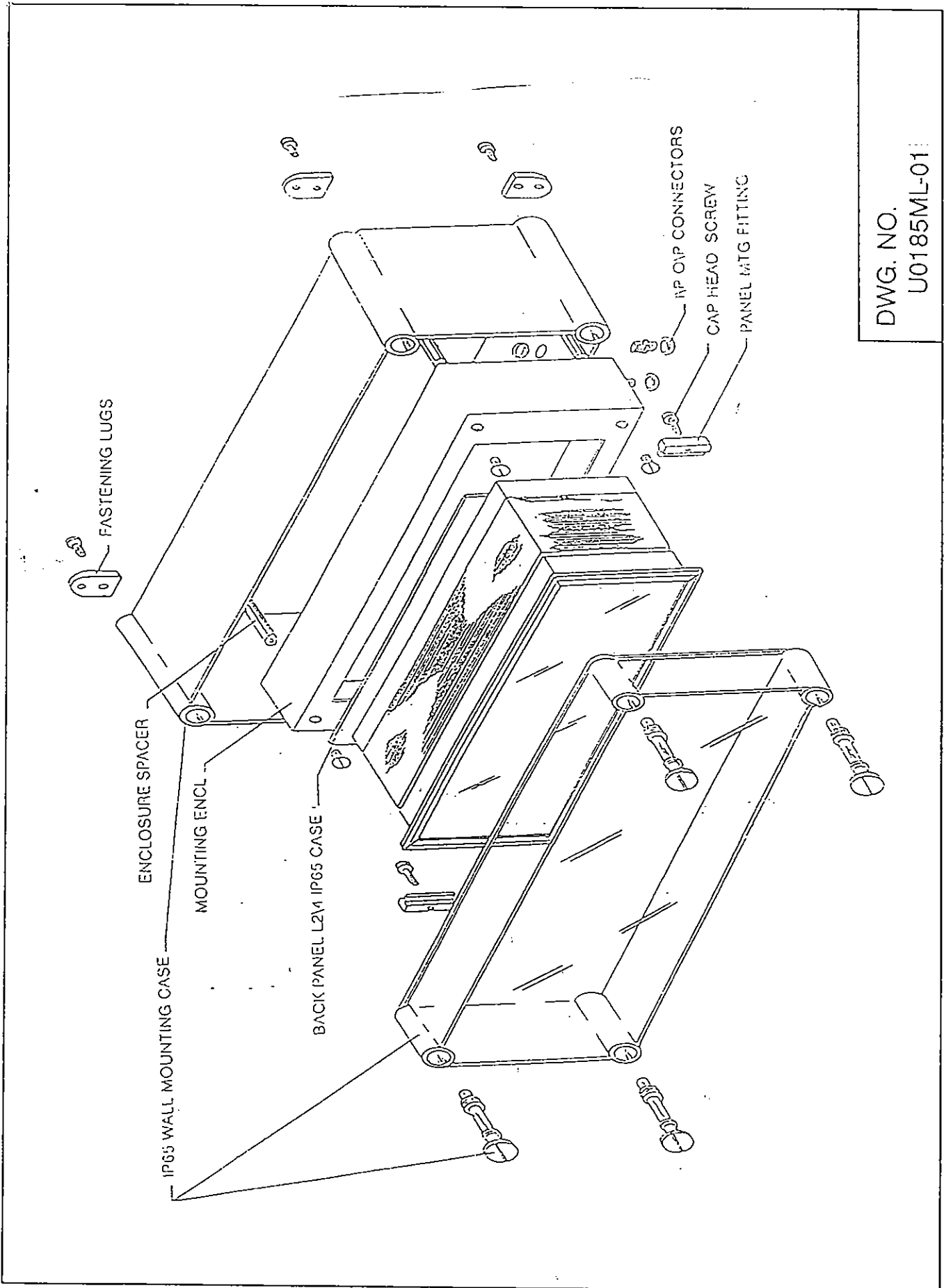
FIGURE 7-9 LXCX Connector Assembly



DWG No.  
 U0209AY-01

FIGURE 7-10 Exploded Veiw of Module





DWG. NO.  
 U0185ML-01

FIGURE 7-11 IP65 Case Assembly

NOTES

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