5.3 MICROPROCESSOR A3

5.3.1 Description A3

Introduction
The unit can be seen as the heart of the oscilloscope. It controls all oscilloscope functions and receives input signals from the following sources:
- the rotary and push button knobs present at front unit A4 and CRT controls unit A5.
- commands from an external computer that are applied to the RS232 interface that is part of microprocessor D1001.
- circuits throughout the oscilloscope indicating the state of the circuitry.
- commands from an external computer that are applied via the optional IEEE-488 interface. This interface is also located on unit A3.

Control signals coming from the microprocessor unit can be split up as follows:
- serial data that is applied to numerous digital-to-analog converters that control the continuous oscilloscope functions.
- serial data that is applied to latches that control "on/off" oscilloscope functions.
- 16 analog output voltages that control continuously variable "potentiometer" functions in the oscilloscope.

Diagram 1 and 2

The microprocessor system is formed by microprocessor D1001, FlashROMs D1021 ... D1024 and RAM D1012. Amongst other features the processor incorporates 8 analog "ADC" inputs (ACH0 ... ACH7), a RS232 interface (CPTXD, CPRXD, CPDTR, CPRTS, CPCTS, CPDSR) and a I2C bus (SDAUP/SDA, SCLUP/SCL). Via the I2C bus structure many control buffers and digital-to-analog converters are loaded with data. D1001 has a 12 MHz clock with crystal G1001 that is connected between pin 8 and 9. Half the clock frequency is available as CPCLOCK at output pin 7. The 8 analog ADC inputs ACH0 ... ACH7 are used for the autocal function (YCAL and XCAL) and probe identification (PROBE1 ... PROBE4). These inputs are also used for temperature measurement (R1009) and time base status indication (signal TBSMART).

D1011 demultiplexes the combined address and databits CPAD00 through CPAD07. The output consists of address-information only. Address information is present on the address/data bus if input ALE-HT is high.

The output latch D1017 creates the enable signals for the I2C bus latches and digital-to-analog converters that control the circuits throughout the oscilloscope.

Signal POWER-HT is low the first 250 ms after switching-on. This results via the gates D1007 in a low signal CPRESET-LT that initializes the microprocessor D1001. RESET-LT resets a number of chips at the unit A3 and also front unit A4. Signal EA is made high; this has the result that the microprocessor can only reach its internal ROM. This ROM incorporates the start-up routine. The routine ends by applying signal CPRSTCSLT to pin 11 of flipflop D1014. This makes signal EA low and the microprocessor can reach the FLASHROMs D1021 ... D1024.

D1006 is a PAL that makes the selection for various chips on the unit. Examples are D1012 RAM selection via RAMCS-LT (pin 19) that results in RCS-LT via gate D1006. D1018 also generates the FlashROM write pulse FLSHWRLT for D1021 ... D1024. The EPROM selection occurs via D1006 output signals FLS.CSLT.

D1016 is a 3 to 8 decoder that controls circuits on unit A3. Depending on the state of the 3 inputs CPA04 through CPA06, one of the 8 outputs is low at a time.

Diagram 3

The resistance value of the indication ring in the probe at channels 1, 2, 3 and 4 is present between ground and the ADC input pins 16,18,20 and 24 of the processor. The analog probe resistance value results in a certain DC voltage that is converted by the ADC input of the processor D1001.

The circuit part indicated with 'RS232-C INTERFACE' consists of a buffer D1302 that converts the microprocessor's TTL signals (0 and 5 volt) into -12 and +12 volt RS232 output levels. The buffer D1301 does the same in the opposite direction.

The buzzer circuit incorporates an oscillator built around the buffer D1301 and amplifier D1302. D1302 is enabled by flipflop D1102. The buzzer H1001 is a piezo ceramic transducer.

The +5 V reference voltage for the A.D.C.'s inside D1001 is derived from the instrument's +10 V reference voltage via operational amplifier N1801.

Diagram 4

This diagram shows the "DAC-POT" IC D1112 that converts the digital data from the microprocessor into 16 analog voltages. Each of these voltages is independently adjustable between 1 V and 4 V. The reference voltage for this D/A converter comes from N1101.

This diagram also shows the IEEE interface that is a factory-installed option. The heart of the interface is IEEE-controller D1104. The registers inside D1104 can be controlled by microprocessor D1001 via the buffer D1103. The clock for D1104 is generated by crystal oscillator G1111, D1101 and divider stage D1102. The bidirectional buffers D1107, D1108, D1109, D1111 form an interface between D1104 and the IEEE bus devices outside the oscilloscope. D1106 controls the bidirectional buffers.

Diagram 5

Diagram 5 shows the pinning of the two connectors on microprocessor unit A3. Connector X1101 makes contact with the motherboard. Connector X1501 makes contact with the signal unit A1 via a flat cable. D1931 is a real-time clock that is controlled and read by the processor via the serial bus.

5.3.2 Signal name list A3

Note: In the signal name list you find the itemnumber of the component that is source or destination. Behind this itemnumber (separated by ":") you find the number of the diagram where the source/destination can be found (n.c. = not connected).

NAME	MEANING	SOURCE	DESTINATION
ALE	ADDRESS LATCH ENABLE	D1001:01	D1103:04 X1101:05 D1011:01 D1007:01
BATINTHT	BATGE INTERRUPT	X1101:05	D1001:01
CPCTS	RS232 CLEAR TO SEND (TTL)	D1301:02	D1001:01
CPDSR	RS232 DATA SET READY (TTL)	D1301:02	D1001:01
CPDTR	RS232 DATA TERMINAL READY (TTL)	D1019:01	D1302:02
CPRTS	RS232 REQUEST TO SEND (TTL)	D1019:01	D1302:02
CPRXD	RS232 RECEIVE DATA (TTL)	D1301:02	D1001:01
CPTXD	RS232 TRANSMIT DATA (TTL)	D1001:01	D1302:02
DACPEN-LT	ENABLE SIGNAL FOR DACPOT CIRCUIT	D1016:01	D1112:03

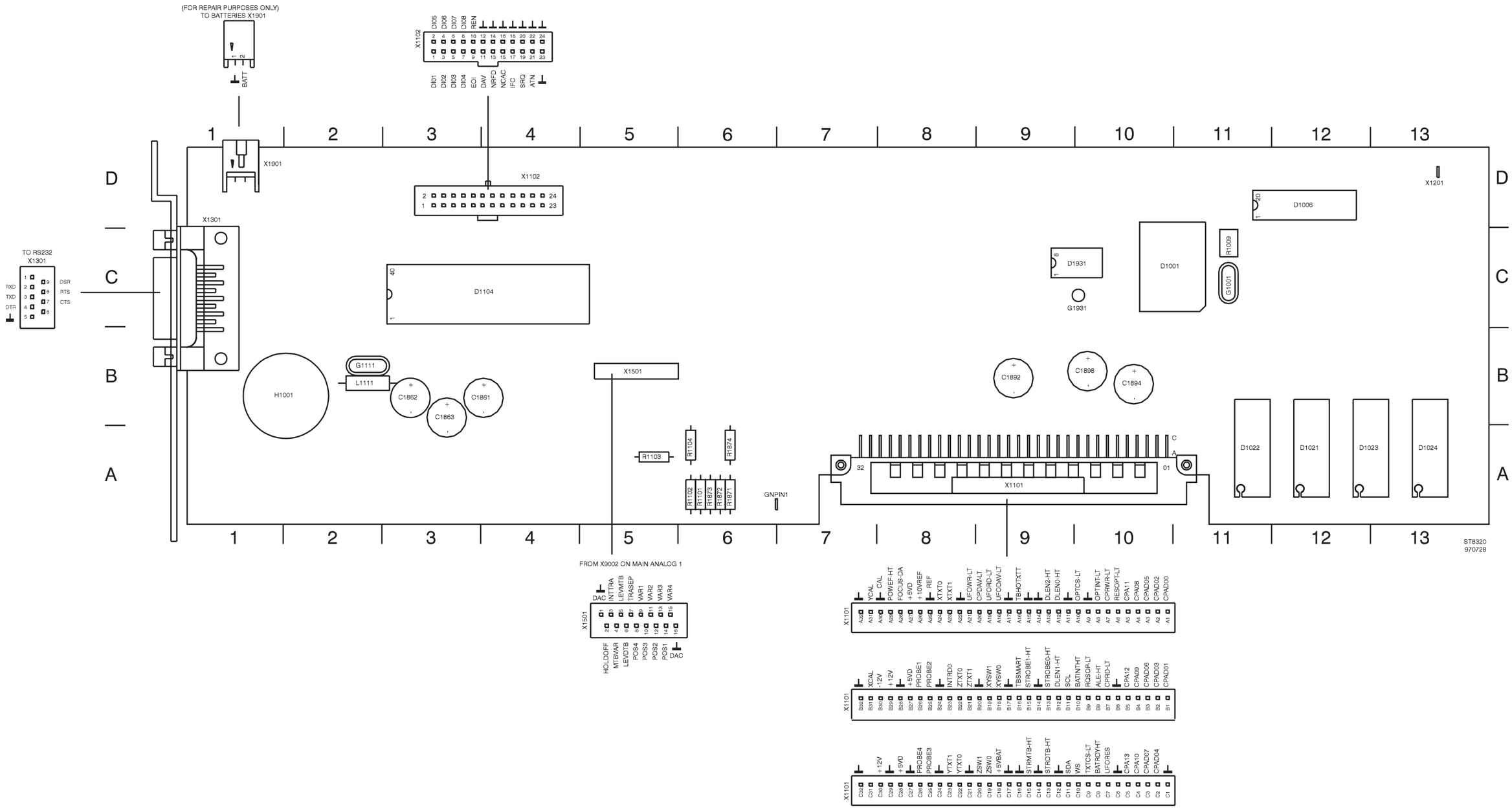
DACPWR-LT	WRITE SIGNAL FOR DACPOT CIRCUIT	D1016:01	D1112:03
DLEN0-HT	DATA LATCH ENABLE 0	R1063:01	X1101:04
DLEN1-HT	DATA LATCH ENABLE 1	R1064:01	X1101:04
DLEN2-HT	DATA LATCH ENABLE 2	R1066:01	X1101:04
FOCUS-DA	DC PART FOCUSING SIGNAL	R1136:03	X1101:04
HOLDOFF	HOLD OFF CONTROL SIGNAL	R1122:03	X1501:04
INTTRA	TRACE INTENSITY CONTROL SIGNAL	R1123:03	X1501:04
		R1123:04	X1501:05
		R1123:03	X1501:04
		R1123:02	X1501:03
MTBVAR	MAIN TB VAR CONTROL SIGNAL	R1124:03	X1501:04
LEVDTB	DELAYED TB LEVEL CONTROL SIGNAL	R1126:03	X1501:04
LEVMTB	MAIN TB LEVEL CONTROL SIGNAL	R1125:03	X1501:04
POS1	CH1 POSITION CONTROL SIGNAL	R1130:03	X1501:04
POS2	CH2 POSITION CONTROL SIGNAL	R1132:03	X1501:04
POS3	CH3 POSITION CONTROL SIGNAL	R1134:03	X1501:04
POS4	CH4 POSITION CONTROL SIGNAL	R1128:03	X1501:04
POWER-HT	POWER UP INDICATION SIGNAL	X1101:04	D1007:01
		D1001:01	D1008:02
		D1001:01	D1008:02
			D1001:01
		D1001:01	D1008:02
PROBE1	PROBE DETECTION/50Ω PROTECT CH1	X1101:04	V1014:02
			D1001:01
PROBE2	PROBE DETECTION/50Ω PROTECT CH2	X1101:04	V1013:02
			D1001:01
PROBE3	PROBE DETECTION/50Ω PROTECT CH3	X1101:04	V1012:02
			D1001:01
PROBE4	PROBE DETECTION/50Ω PROTECT CH4	X1101:04	V1011:02
			D1001:01
SCL	SERIAL CLOCK	R1054:01	X1101:04
SCLUP	SERIAL CLOCK AT MICROPROCESSOR	D1001:01	R1054:01
SDA	SERIAL DATA	R1052:01	X1101:04
SDAUP	SERIAL DATA AT MICROPROCESSOR	D1001:01	R1052:01
STRDTB	STROBE FOR DTB	R1058:01	X1101:05
STRMTB	STROBE FOR MTB	R1057:01	x1101:05
STROBE0-HT	STROBE/ENABLE SIGNAL 0	R1067:01	X1101:04
STROBE1-HT	STROBE/ENABLE SIGNAL 1	R1068:01	X1101:04
TRASEP	TRACE SEPARATION CONTROL SIGNAL	R1127:03	X1501:04
UFODAVLT	FRONT WRITES TO MICROPROCESSOR	X1101:04	D1001:01
UFORD-LT	MICROPROCESSOR READS FRONT	D1004:01	X1101:05
UFOWR-LT	MICROPROCESSOR WRITES TO FRONT	D1004:01	X1101:04
UFORD-LT	MICROPROCESSOR READS FRONT	D1004:01	X1101:05
VAR1	CH1 VARIABLE GAIN CONTROL SIGNAL	R1135:03	X1501:04
VAR2	CH2 VARIABLE GAIN CONTROL SIGNAL	R1133:03	X1501:04
VAR3	CH3 VARIABLE GAIN CONTROL SIGNAL	R1131:03	X1501:04
VAR4	CH4 VARIABLE GAIN CONTROL SIGNAL	R1129:03	X1501:04
XCAL	SIGNAL FOR X CALIBRATION	X1101:04	D1001:01
YCAL	SIGNAL FOR Y CALIBRATION	X1101:04	D1001:01

5.3.3 Location list

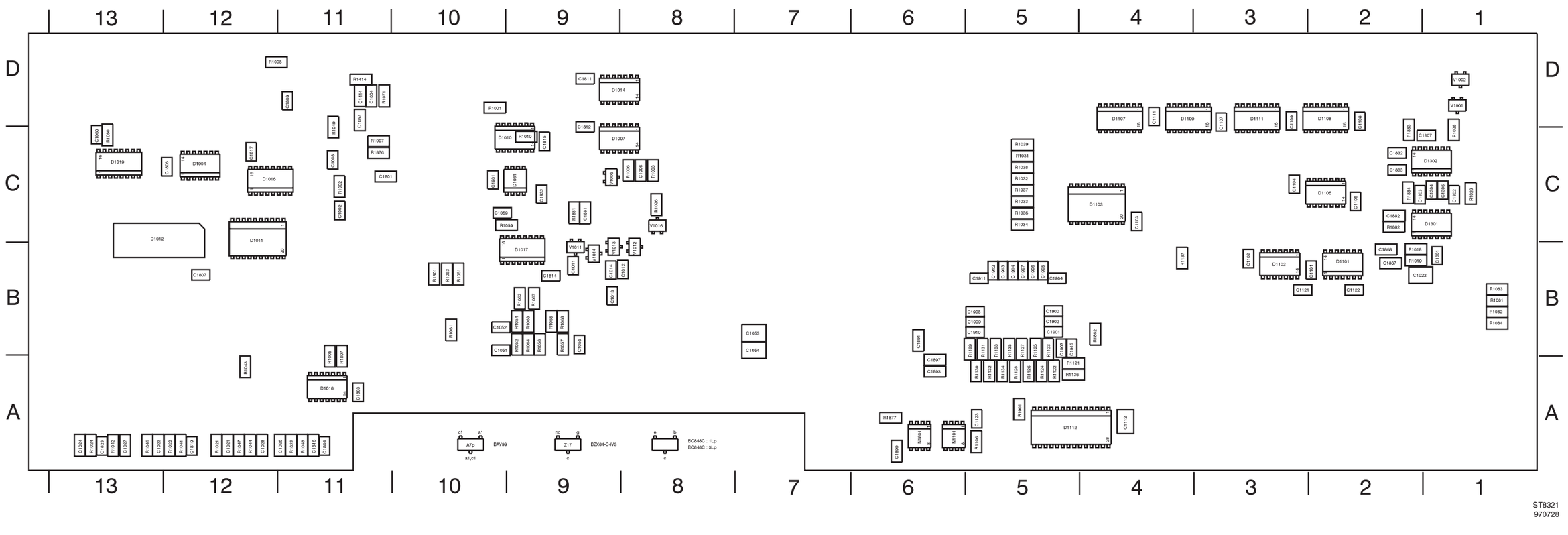
'-L' means that the component is located on the 'Large component side'. Others are components located on the 'small component side'.

C1002 C11
C1003 C11
C1004 D11
C1006 C8
C1011 B9
C1012 B8
C1013 B9
C1014 B9
C1021 A12
C1022 B2
C1023 A13
C1024 A13
C1026 A11
C1027 A13
C1028 A12
C1051 B10
C1052 B10
C1053 B7
C1054 B7
C1056 B9
C1057 D11
C1059 C10
C1060 C13
C1101 B2
C1102 B3
C1103 C4
C1104 C3
C1106 C2
C1107 D3
C1108 D2
C1109 D3
C1111 D4
C1112 A4
C1121 B3
C1122 B2
C1123 A5
C1301 B1
C1302 C1
C1303 C2
C1304 C1
C1306 C1
C1307 C2
C1801 C11
C1803 A11
C1804 A11
C1806 C12
C1807 B12
C1809 D11
C1811 D9
C1812 C9
C1814 B9
C1815 C9
C1816 A11
C1817 C12
C1819 A12
C1823 A13
C1832 C2
C1833 C2
C1861 B4-L
C1862 B3-L
C1863 B3-L
C1867 B2
C1868 B2
C1881 C9
C1882 C2
C1891 B6
C1892 B9-L
C1893 A6
C1894 B10-L
C1897 A6
C1898 B10-L
C1899 A6
C1900 B5
C1901 B5
C1902 B5
C1903 B5
C1904 B5
C1905 B5
C1906 B5
C1907 B5
C1908 B5
C1909 B5
C1910 B5
C1911 B5
C1912 B5
C1913 B5
C1914 B5
C1915 B5
C1931 C10
C1932 C9
D1001 C11-L
D1004 C12
D1006 D12
D1007 C9
D1010 C9
D1011 B12
D1012 B13
D1014 D9
D1016 C12
D1017 B9
D1018 A11
D1019 C13
D1021 A12-L
D1022 A11-L
D1023 A13-L
D1024 A13-L
D1101 B2
D1102 B3
D1103 C4
D1104 C3-L
D1106 C2
D1107 D4
D1108 C2
D1109 D4
D1111 D3
D1112 A5
D1301 C1
D1302 C1
D1931 C9
G1001 C11-L
G1111 B2-L
H1001 B1-L
L1111 B2-L
N1101 A6
N1801 A6
R1001 D10
R1002 C11
R1003 C8
R1005 B11
R1006 C8
R1007 C11
R1008 D12
R1009 C11-L
R1010 C9
R1018 B2
R1019 B2
R1021 A12
R1022 A11
R1023 A12
R1024 A13
R1026 C8
R1028 C1
R1029 C1
R1031 C5
R1032 C5
R1033 C5
R1034 C5
R1036 C5
R1037 C5
R1038 C5
R1039 C5
R1041 A12
R1042 A13
R1043 A12
R1044 A12
R1046 A13
R1047 A12
R1048 A11
R1049 C11
R1051 B10
R1052 B9
R1053 B10
R1054 B9
R1057 B9
R1058 B9
R1059 C10
R1060 C13
R1061 B10
R1062 B9
R1063 B9
R1064 B9
R1066 B9
R1067 B9
R1068 B9
R1071 D11
R1081 B1
R1082 B1
R1083 B1
R1084 B1
R1101 A6-L
R1102 A6-L
R1103 A5-L
R1104 A6-L
R1106 A5
R1121 A5
R1122 A5
R1123 B5
R1124 A5
R1125 B5
R1126 A5
R1127 B5
R1128 A5
R1129 B5
R1130 A5
R1131 B5
R1132 A5
R1133 B5
R1134 A5
R1135 B5
R1136 A5
R1137 B4
R1801 B10
R1807 B11
R1862 B4
R1871 A6-L
R1872 A6-L
R1873 A6-L
R1874 A6-L
R1876 C11
R1877 A6
R1881 C9
R1882 C2
R1883 C2
R1884 C2
R1901 A5
V1006 C9
V1011 B9
V1012 B8
V1013 B9
V1014 B9
V1016 C8
V1901 D1
V1902 D1
X1101 A9
X1102 D2-L
X1201 D13-L
X1301 C1-L
X1501 B5-L

5.3.4 Unit lay-outs

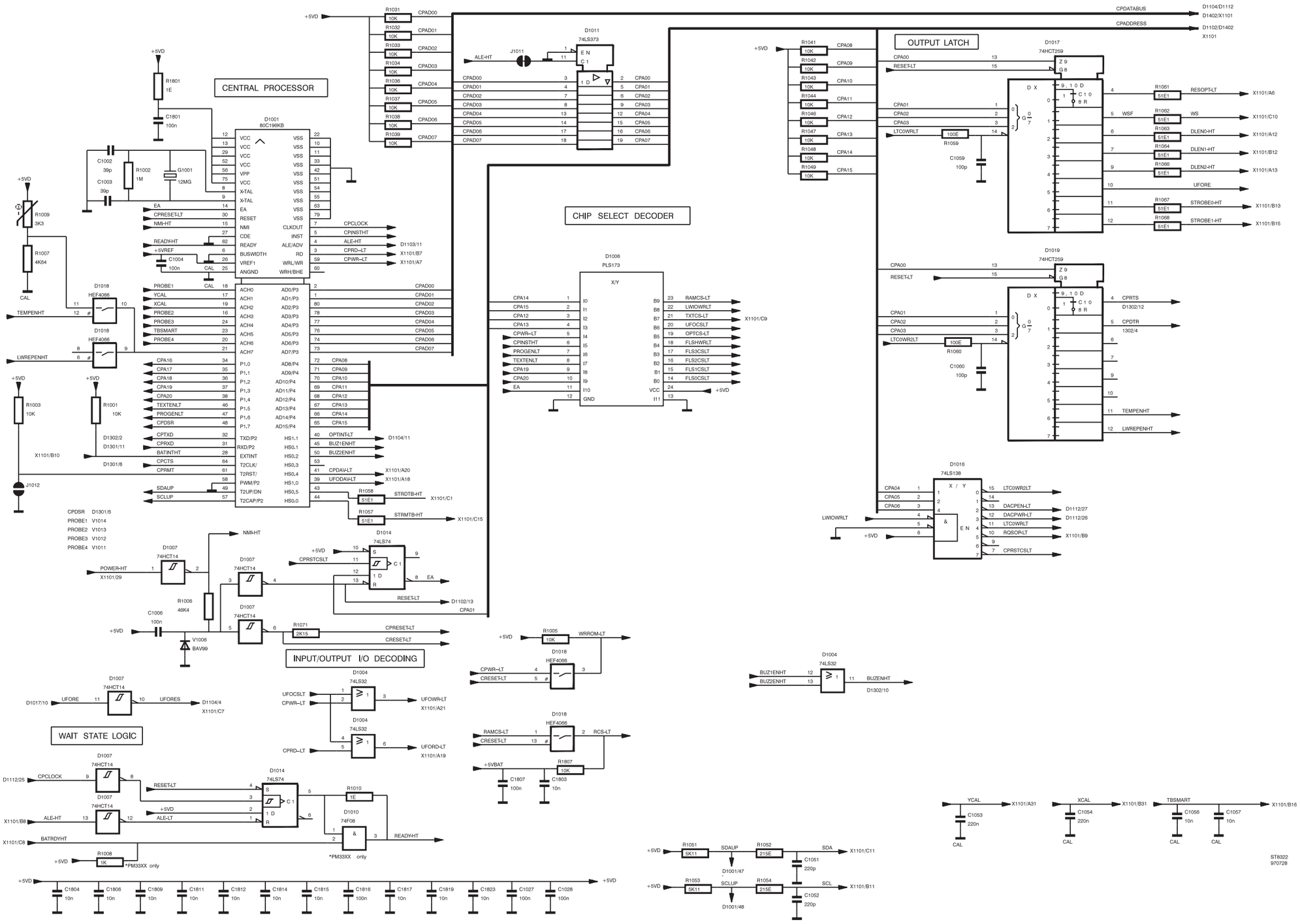


Lay-out 1 - Large component side of microprocessor unit A3

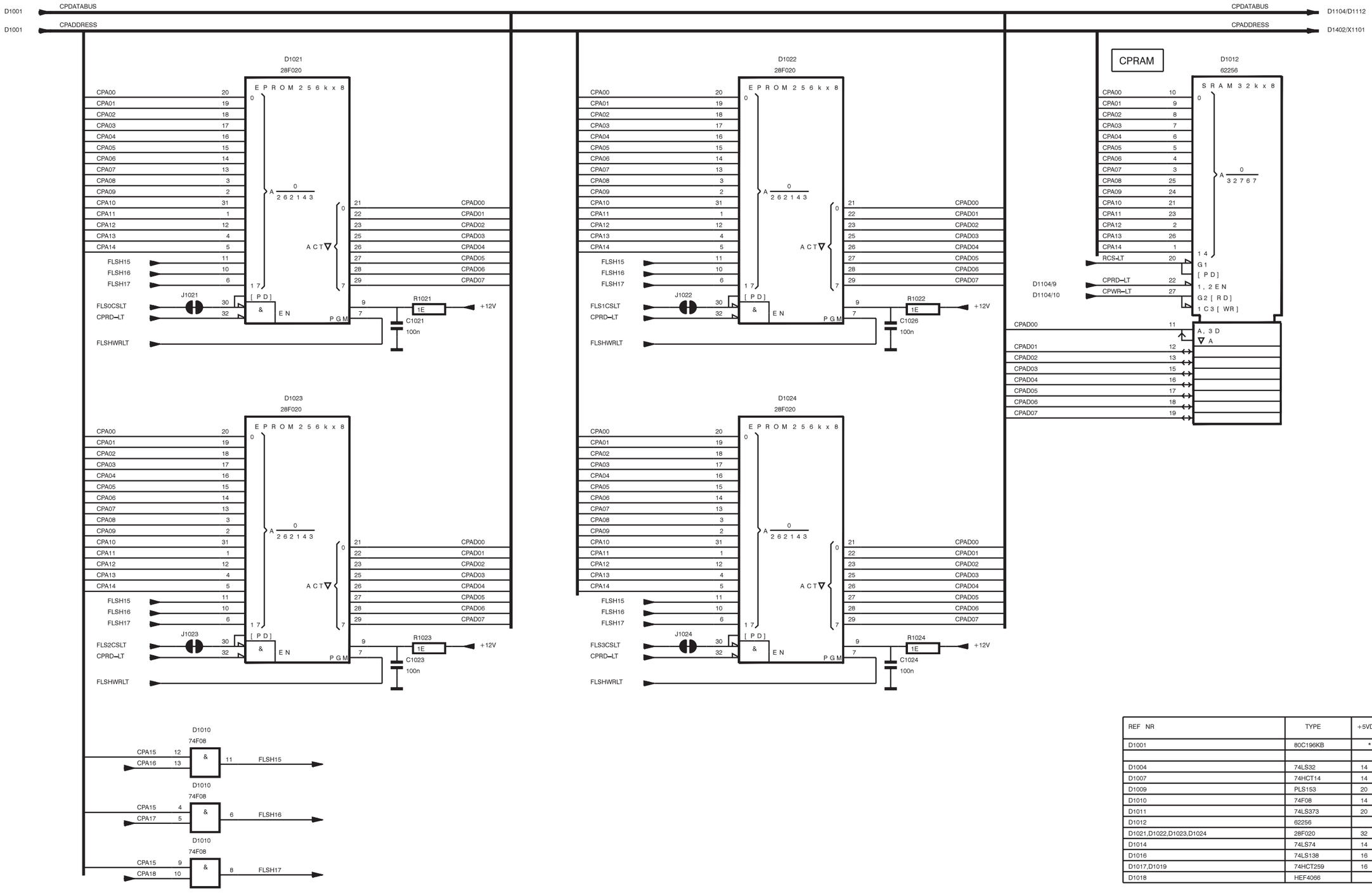


Lay-out 2 - Small component side of microprocessor unit A3

5.3.5 Circuit diagrams



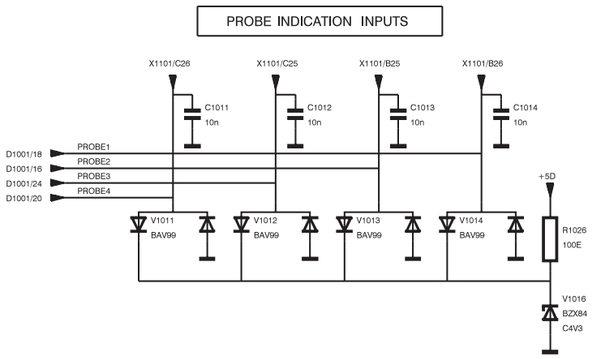
A3 - Diagram 1; Central processor unit

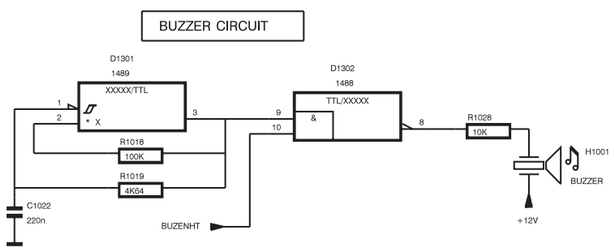


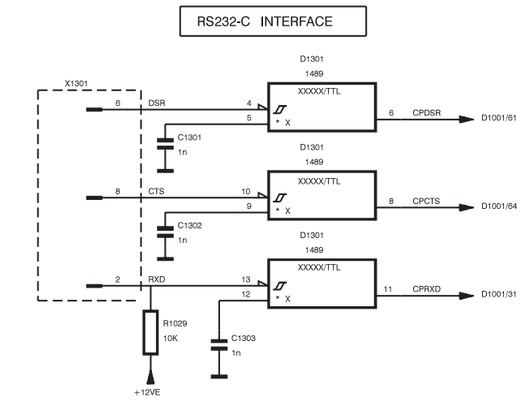
REF NR	TYPE	+5VD	+5V BAT	⊥
D1001	80C196KB	*		*
D1004	74LS32	14		7
D1007	74HCT14	14		7
D1009	PLS153	20		10
D1010	74F08	14		7
D1011	74LS373	20		10
D1012	62256		28	14
D1021,D1022,D1023,D1024	28F020	32		16
D1014	74LS74	14		7
D1016	74LS138	16		8
D1017,D1019	74HCT259	16		8
D1018	HEF4066		14	7

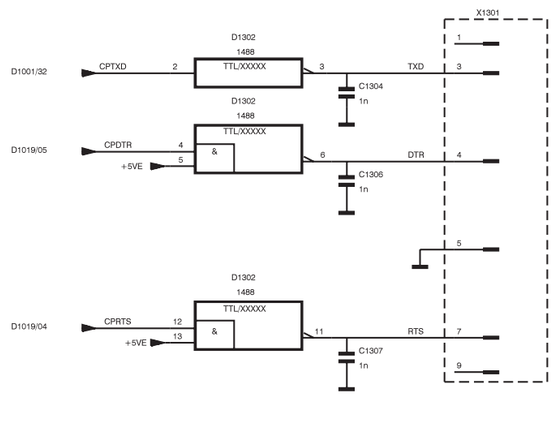
ST8323
970723

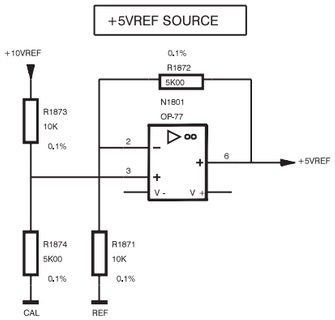
A3 - Diagram 2; Processor memory

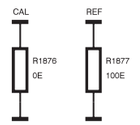




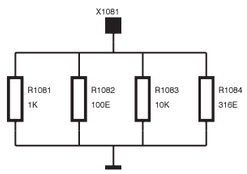


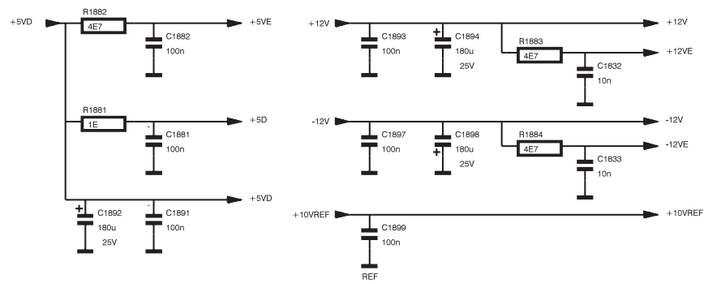






IDENTIFICATION RESISTOR		
REF.NR	VALUE	
R1081	1K	STANDARD PM33XX
R1082	100E	IEEE PM33XX
R1083	10K	STANDARD PM30XX
R1084	316E	IEEE PM30XX

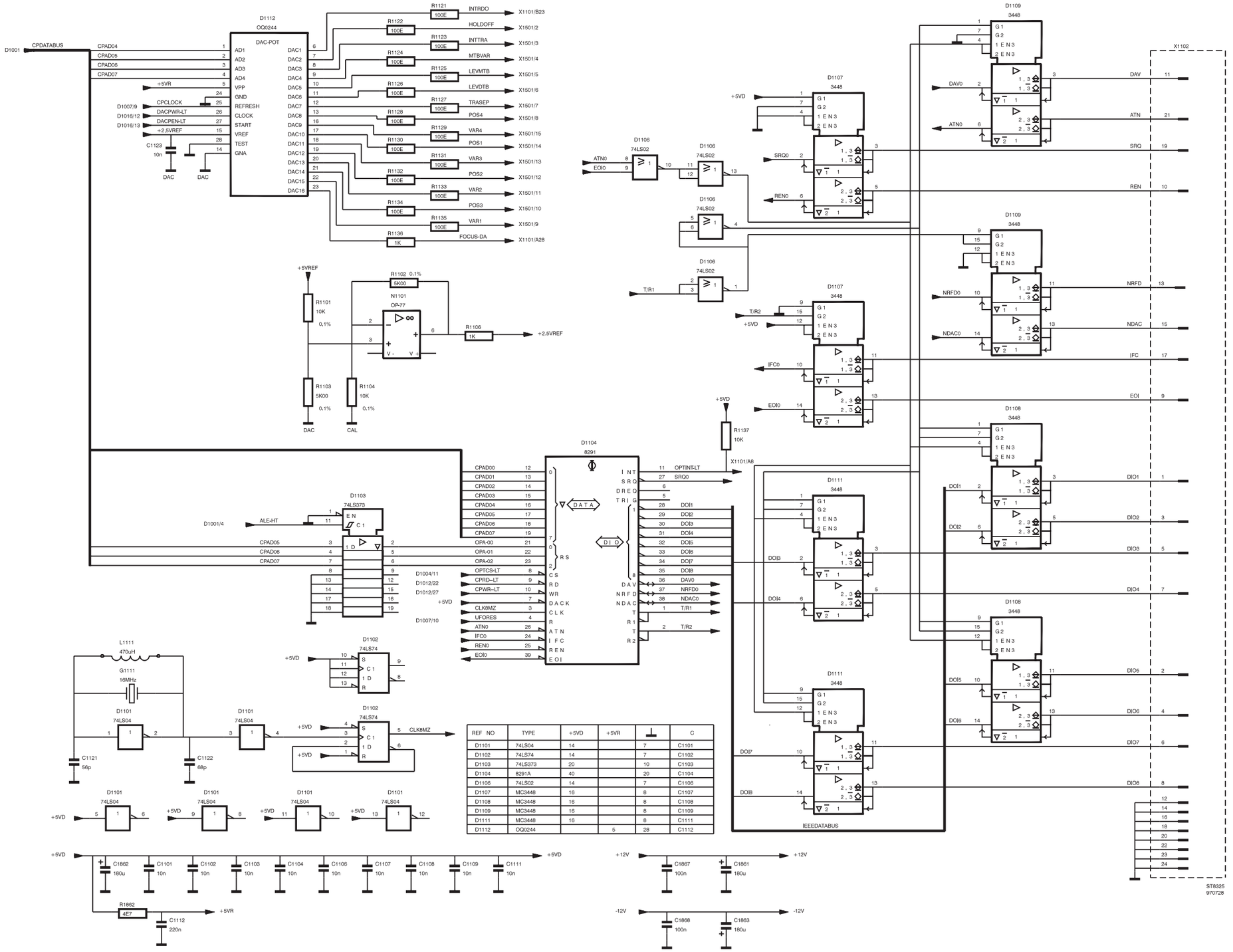




REF NR	TYPE	+5D	+5VE	+12V	-12V	+12VE	-12VE	⊥	C
D1008	HEF4051	16						7,8	
D1301	1489		14					7	C1831
D1302	1488					14	1	7	C1832; C1833
N1801	OP-77			7	4				

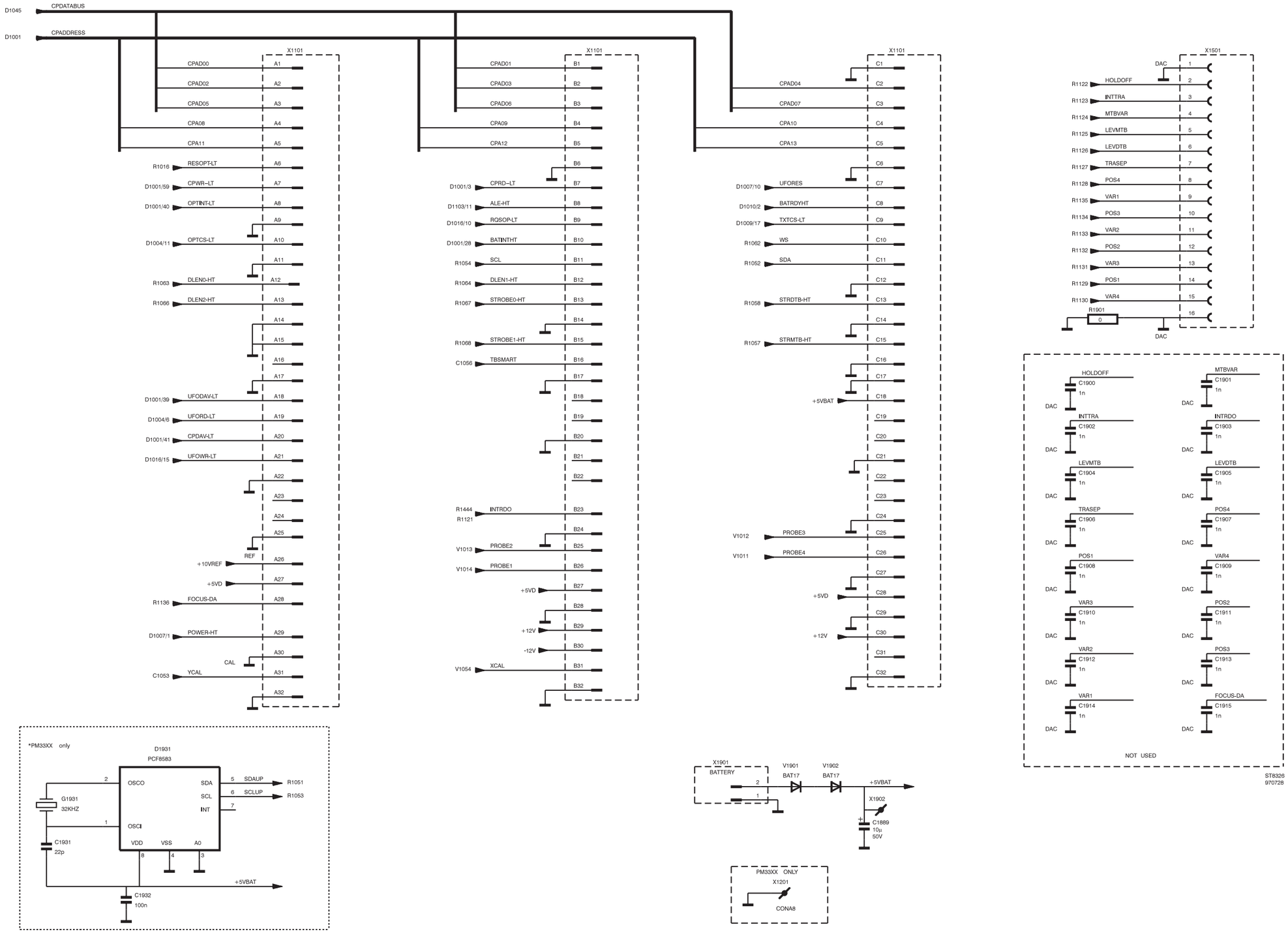
ST8324
970728

A3 - Diagram 3; Auxiliary circuits



REF NO	TYPE	+5VD	+5VR	⏚	C
D1101	74LS04	14		7	C1101
D1102	74LS74	14		7	C1102
D1103	74LS373	20		10	C1103
D1104	8291A	40		20	C1104
D1106	74LS02	14		7	C1106
D1107	MC3448	16		8	C1107
D1108	MC3448	16		8	C1108
D1109	MC3448	16		8	C1109
D1111	MC3448	16		8	C1111
D1112	OQ0244		5	28	C1112

A3 - Diagram 4; Potentiometer DAC and IEEE-option



A3 - Diagram 5; Text and cursor circuit

5.3.6 Parts list

CAPACITORS

Item	Description		Ordering code
C1002	CAP.CERAMIC	AP 63V 5% 39PF	5322 122 32966
C1003	CAP.CERAMIC	AP 63V 5% 39PF	5322 122 32966
C1004	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1006	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1011	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1012	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1013	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1014	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1021	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1022	CAP.CHIP	AP 63V 10% 220NF	4822 122 32916
C1023	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1024	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1026	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1027	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1028	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1051	CAP.CHIP	AP 63V 5% 220PF	4822 122 33575
C1052	CAP.CHIP	AP 63V 5% 220PF	4822 122 33575
C1053	CAP.CHIP	AP 63V 10% 220NF	4822 122 32916
C1054	CAP.CHIP	AP 63V 10% 220NF	4822 122 32916
C1056	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1057	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1059	CAP.CHIP	AP 63V 5% 100PF	5322 122 32531
C1060	CAP.CHIP	AP 63V 5% 100PF	5322 122 32531
C1101	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1102	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1103	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1104	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1106	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1107	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1108	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1109	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1111	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1112	CAP.CHIP	AP 63V 10% 220NF	4822 122 32916
C1121	CAP.CHIP	AP 63V 5% 56PF	5322 122 32661
C1122	CAP.CHIP	AP 63V 5% 68PF	4822 122 33514
C1123	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1301	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1302	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1303	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1304	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1306	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1307	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1801	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1803	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1804	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098

Item	Description		Ordering code
C1806	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1807	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1809	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1811	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1812	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1814	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1815	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1816	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1817	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1819	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1823	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1832	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1833	CAP.CHIP	AP 63V 10% 10NF	5322 122 34098
C1861	CAP.ELECTROLYT.	25V 20% 180UF	5322 124 42228
C1862	CAP.ELECTROLYT.	25V 20% 180UF	5322 124 42228
C1863	CAP.ELECTROLYT.	25V 20% 180UF	5322 124 42228
C1867	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1868	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1881	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1882	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1891	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1892	CAP.ELECTROLYT.	25V 20% 180UF	5322 124 42228
C1893	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1894	CAP.ELECTROLYT.	25V 20% 180UF	5322 124 42228
C1897	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1898	CAP.ELECTROLYT.	25V 20% 180UF	5322 124 42228
C1899	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496
C1900	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1901	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1902	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1903	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1904	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1905	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1906	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1907	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1908	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1909	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1910	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1911	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1912	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1913	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1914	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1915	CAP.CHIP	AP 63V 5% 1NF	5322 126 10511
C1931	CAP.CHIP	AP 63V 5% 22PF	5322 122 32658
C1932	CAP.CHIP	AP 63V 10% 100NF	4822 122 33496

Item	Description		Ordering code
INTEGRATED CIRCUITS			
D1001	MICROPROCESSOR	INT0001N1 UPROC	5322 209 12591
D1004	INTEGR.CIRCUIT	SN74LS32DR2 MOT	5322 209 52442
D1006	INTEGR.CIRCUIT	PAL PROGR CHIP SEL	5322 209 33501
D1007	INTEGR.CIRCUIT	PC74HCT14T PEL	5322 209 71568
D1010	INTEGR.CIRCUIT	N74F08D PEL	5322 209 61002
D1011	INTEGR.CIRCUIT	SN74LS373DW MOT	5322 209 52445
D1012	INTEGR.CIRCUIT	HM62256LFP-10TZU HIT	5322 209 30228
D1014	INTEGR.CIRCUIT	SN74LS74ADR2 MOT	5322 209 52443
D1016	INTEGR.CIRCUIT	SN74LS138DR2MOT	5322 209 52444
D1017	INTEGR.CIRCUIT	PC74HCT259T PEL	4822 209 30086
D1018	INTEGR.CIRCUIT	HEF4066BT PEL	5322 209 14542
D1019	INTEGR.CIRCUIT	PC74HCT259T PEL	4822 209 30086
D1021	I.C. ROM	E28F020-150 FLASH 2M	5322 209 52565
D1022	I.C. ROM	E28F020-150 FLASH 2M	5322 209 52565
D1023	I.C. ROM	E28F020-150 FLASH 2M	5322 209 52565
D1024	I.C. ROM	E28F020-150 FLASH 2M	5322 209 52565
D1101	INTEGR.CIRCUIT	74LS04D	5322 209 12596
D1102	INTEGR.CIRCUIT	SN74LS74ADR2 MOT	5322 209 52443
D1103	INTEGR.CIRCUIT	SN74LS373DW MOT	5322 209 52445
D1104	INTEGR.CIRCUIT	P8291A GPIB	5322 209 81264
D1106	INTEGR.CIRCUIT	74LS02D	5322 209 12595
D1107	INTEGR.CIRCUIT	MC3448ADR1 MOT	5322 209 12597
D1108	INTEGR.CIRCUIT	MC3448ADR1 MOT	5322 209 12597
D1109	INTEGR.CIRCUIT	MC3448ADR1 MOT	5322 209 12597
D1111	INTEGR.CIRCUIT	MC3448ADR1 MOT	5322 209 12597
D1112	INTEGR.CIRCUIT	OQ0244 DACPOT	5322 209 12468
D1301	INTEGR.CIRCUIT	MC1489ADR2 MOT	5322 209 30232
D1302	INTEGR.CIRCUIT	MC1488DR2 MOT	5322 209 30269
D1931	INTEGR.CIRCUIT	PCF8583T/F4 PEL	4822 209 32504
N1101	I.C. ANALOGUE	OP-77GSR PMI	5322 130 62791
N1801	I.C. ANALOGUE	OP-77GSR PMI	5322 130 62791
RESISTORS			
R1001	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1002	RES.CHIP	HIP RC-02H 1% 1M	4822 051 10105
R1003	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1005	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1006	RES.CHIP	HIP RC-02H 1% 46K4	5322 117 10486
R1007	RES.CHIP	HIP RC-02H 1% 4K64	4822 051 54642
R1008	RES.CHIP	HIP RC-02H 1% 1K	4822 051 10102
R1009	RES.N.T.C.	NTC640 2% 3K3	5322 116 30421
R1010	RES.CHIP	HIP RC-01 5% 1E	4822 051 10108
R1018	RES.CHIP	HIP RC-02H 1% 100K	4822 051 10104
R1019	RES.CHIP	HIP RC-02H 1% 4K64	4822 051 54642
R1021	RES.CHIP	HIP RC-01 5% 1E	4822 051 10108
R1022	RES.CHIP	HIP RC-01 5% 1E	4822 051 10108

Item	Description		Ordering code
R1023	RES.CHIP	HIP RC-01 5% 1E	4822 051 10108
R1024	RES.CHIP	HIP RC-01 5% 1E	4822 051 10108
R1026	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1028	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1029	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1031	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1032	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1033	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1034	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1036	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1037	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1038	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1039	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1041	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1042	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1043	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1044	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1046	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1047	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1048	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1049	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1051	RES.CHIP	HIP RC-02H 1% 5K11	5322 117 10487
R1052	RES.CHIP	HIP RC-02H 1% 215E	5322 117 10484
R1053	RES.CHIP	HIP RC-02H 1% 5K11	5322 117 10487
R1054	RES.CHIP	HIP RC-02H 1% 215E	5322 117 10484
R1057	RES.CHIP	RMC1/8 1% 51E1	5322 111 91893
R1058	RES.CHIP	RMC1/8 1% 51E1	5322 111 91893
R1059	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1060	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1061	RES.CHIP	RMC1/8 1% 51E1	5322 111 91893
R1062	RES.CHIP	RMC1/8 1% 51E1	5322 111 91893
R1063	RES.CHIP	RMC1/8 1% 51E1	5322 111 91893
R1064	RES.CHIP	RMC1/8 1% 51E1	5322 111 91893
R1066	RES.CHIP	RMC1/8 1% 51E1	5322 111 91893
R1067	RES.CHIP	RMC1/8 1% 51E1	5322 111 91893
R1068	RES.CHIP	RMC1/8 1% 51E1	5322 111 91893
R1071	RES.CHIP	HIP RC-02H 1% 2K15	5322 117 10485
R1081	RES.CHIP	HIP RC-02H 1% 1K	4822 051 10102
R1082	RES.CHIP	RC-02H 1% 100E	4822 051 10101
R1083	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1084	RES.METAL FILM	RC-02H 1% 316E	5322 117 10552
R1101	RES.METAL FILM	PR24 1/4W 0.1% 10K	5322 116 82868
R1102	RES.METAL FILM	PR24 1/4W 0.1% 5K	5322 116 80369
R1103	RES.METAL FILM	PR24 1/4W 0.1% 5K	5322 116 80369
R1104	RES.METAL FILM	PR24 1/4W 0.1% 10K	5322 116 82868
R1106	RES.CHIP	HIP RC-02H 1% 1K	4822 051 10102
R1121	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101

Item	Description		Ordering code
R1122	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1123	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1124	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1125	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1126	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1127	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1128	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1129	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1130	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1131	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1132	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1133	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1134	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1135	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1136	RES.CHIP	HIP RC-02H 1% 1K	4822 051 10102
R1137	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1801	RES.CHIP	HIP RC-01 5% 1E	4822 051 10108
R1807	RES.CHIP	HIP RC-02H 1% 10K	4822 051 10103
R1862	RES.CHIP	HIP RC-01 5% 4E7	4822 051 10478
R1871	RES.METAL FILM	PR24 1/4W 0.1% 10K	5322 116 82868
R1872	RES.METAL FILM	PR24 1/4W 0.1% 5K	5322 116 80369
R1873	RES.METAL FILM	PR24 1/4W 0.1% 10K	5322 116 82868
R1874	RES.METAL FILM	PR24 1/4W 0.1% 5K	5322 116 80369
R1876	RES.CHIP	HIP RC-01 0E	4822 051 10008
R1877	RES.CHIP	HIP RC-02H 1% 100E	4822 051 10101
R1881	RES.CHIP	HIP RC-01 5% 1E	4822 051 10108
R1882	RES.CHIP	HIP RC-01 5% 4E7	4822 051 10478
R1883	RES.CHIP	HIP RC-01 5% 4E7	4822 051 10478
R1884	RES.CHIP	HIP RC-01 5% 4E7	4822 051 10478
R1901	RES.CHIP	HIP RC-01 0E	4822 051 10008

SEMICONDUCTORS

V1006	DIODE,CHIP	DE BAV99 PEL	5322 130 34337
V1011	DIODE,CHIP	DE BAV99 PEL	5322 130 34337
V1012	DIODE,CHIP	DE BAV99 PEL	5322 130 34337
V1013	DIODE,CHIP	DE BAV99 PEL	5322 130 34337
V1014	DIODE,CHIP	DE BAV99 PEL	5322 130 34337
V1016	DIODE,REFERENCE	IODE BZX84-C4V3 PEL	5322 130 80256
V1901	DIODE,CHIP	IODE BAT17 PEL	5322 130 31544
V1902	DIODE,CHIP	IODE BAT17 PEL	5322 130 31544

CONNECTORS

X1101	CONNECTOR	96-P PIN 2.54	5322 265 61238
X1102	CONNECTOR	26-P DBL STRGHT	5322 265 61071
X1201	PIN	CONTACT PIN	5322 268 14156
X1301	CONNECTOR	SQR 9-P PIN DIPS	5322 265 41143
X1501	CONNECTOR	16-P 1.25MM STR	5322 267 51107

Item	Description		Ordering code
MISCELLANEOUS			
G1001	CRYSTAL	XTAL 12.0MHZ PEL	4822 242 71663
G1111	RESONATOR	XTAL 16MHZ MUR	5322 242 72193
H1001	BUZZER	PKM17EPP-4001 MUR	4822 280 10198
L1111	COIL	470UH TDK	5322 157 52362