RF 406

-4.3U

C112 15p
C111 47p
C110 30p
L105 3.3uH
R115 330
C114 100p
L104
NC
R117
C113 100n
Q103 BLU99
C109 15p
BC807 Q106
R118 10k
C118 18p

TP101

406SUP

C115 470p
R116 1k
L103
R111 2R7
Q104 BC807
Q102 BLU56
C108 470p
R114 330
PRESC.

R110 470
C119 1n
C107 nc
Q105 BC807
R112 100
R113 2k2
C106 33P
R109 330
R108 15
R107 330

C116 470p
C105 33p
Q101 BFQ17
R103 47
R104 33
C117 1u
L102
R102 2k7
C102 4p7
C103 10p
C101 7p5
R101 1k2
L101 60nH
R106 10k
C104 2p2
D102 BBY39
D101 VARSOT23-2
R105 10k

ANT105 GPS-P1P
J102 RG316
J102-INFO
3.0mm 1.5mm 2.0mm

LOOP

03.2000 15:05:33 f=1.033 G:\DOC\E_tegn.962\tron40s\gps\92717\92716.sch (Sheet: 1/5)

PRESC.
BIPH
CPP
LOOP
LD
406SUP

IC201B LM2904M
IC201A LM2904M
IC204 MC12080
IC203 74HC4046A
IC202 TC4S66F
IC205 EL0S0500
IC206 MAX1626
IC206' LT1117-5(alt.)

Q201 BC807
Q202 BC807

D201 BAV99
D202 BBY40
D203 NBRA1103

C214 100n
C208 470p
C207 1n
C206 100p
C205 100n
C215 1n
C204 470p
C203 100n
C202 1n
C201 100n
C209 15n
C210 3n3
C216 100p/omit
C221 100n
C225 1u/20v
C222 omit/100p
C212 15n
C213 1n
C211 100n
C217 15u/25v
C224 1u/20v
C220 150u/10v
C219 150u/10v
C223 100n

R223 omit
R212 6k8
R214 5k
R213 10k
R211 390
R208 100
R209 1k
R210 1k
R215 15k
R217 6k8
R222 390
R221 4k7
R216 1k
R226 omit/10k
R218 1k
R207 100
R206 10k
R205 1M
R204 1M
R203 100
R202 10k
R201 10k
R219 10K
R220 10K
R224 0R20

L202 68uH
L201 100uH

IC207 SI2307DS

TP201
TP202
TP203
TP204

J101 STRAP

+5V_KEYD

5V 5V_TAB

OCXO

VCO-IN
VCO-OUT
SIGN COMP C1A C1B R1 R2 INH
PC1 PC2 PC3 PCP DEM

VCC GND

SHDN V+ CS EXT
3·5 REF GND VOUT
ADJ OUT NC VCC
GND

03.2000 15:05:33 f=1.033 G:\DOC\E_tegn.962\tron40s\gps\92717\92716.sch (Sheet: 2/5)

LD
PWR_DET
TX121

406SUP
R407 39K
R406 12K
R405 10k
+5U

+5U
C401 100n
R401 10k
C402 NC

C403 15p
R402 1M
X401 3.58MHz
C404 15p

C405 100n
IC402
VDD A0 A1 A2 GND
NC SCL SDA
8 1 2 3 4
7 6 5
R413 6k8
R414 6k8
+5U

TP401
TP401
+5U
+5U
+5U
SW401
MOD. on/off 8
Rep. rate 7
UHF on/off 6
UHF on/off 5
1 2 3 4
R403 1k

IC401
Batt_check
17 RB0/INT RA0/AN0 6
18 RB1 RA1/AN1 7
1 RB2 RA2/AN2 8
2 RB3 RA3/AN3 9
3 RB4 RA4/T0CK 10
11 RB5 VDD 11
16 RB6 /MCLR 12
15 RB7 X1 13
X2 VSS 5
PIC16C62X

R404 10k

D402B BAU70

R409 3K3
R412 2K2

MOD_OFF
CPP
MOD121
TX406
+5U
R410 10k
TEST
BIPH
LED/FLSH

+14U
R408 82
D401 SFH415U
Q403 BC817
R411 10k
C407 100p
TXD
Q402 BP103B
C406 100p
RXD
Com. Port
+14U
+5U
SDA
SCL
PL401
1 2 3 4 5 6
6p-GPS conn.

Power supply section schematic — Tron40S Main board

Note : Version A to C : R525 not mounted, R509 mounted. (Test in bracket enabled)
Version D and up : R525 mounted, R509 not mounted. (Test in bracket disabled)

Main Switch
Shown in OFF position

EM 3091   R509 / R525 endret   300798

MASKERES FØR DYPPLAKKING

MASKERING MED TAPE OVER HULLENE I SKJERMBOKS FØR LAKKING.

MAL .S FOR S.NR. PLASSERING
BARE MED EN TAPE.

NB! monteres med avstands jigg.
må ikke ligge nedtil PCB !

L101 limes med Dow Corning 7091
NB! Liten mengde slik at fortinnet område ikke tildekkes

Replaces dwg.:	Repl. by dwg.:
26.01.99	

KP-97738-1 R9942

10   11

Material:

Scale:

Tolerance: (when not otherwise shown)

Dit.:	Date:
BA/FIT	28.10.99

Appr.: | BA/FIT

Tron40S
Main Board
Placeplan component side

File: 92716

| A | EN 3165 | MASKERING | 260199BJ |
| | EN 1599 | Spor for kont. ; er endret | 010990 BA |

03.2000 15:29:17 f=1.053 G:\DOC\E_tegn.962\tron40s\gps\92717\92716.brd

ANT105   Limes med Dow Corning 7091

406SUP

LOOP

+5U

REMOTE
SH_CONT
BR_SW
GND

+BATT

REL502

REL501

REL503

X-98942

BRSW   BATT   GND   REMOTE

F1

2,5A

LSH20 + B1

LSH20 + B2

LSH20 + B3

LSH20 + B4

0.5   rd   6
              5
              4
0.22   we   3
0.22   be   2
0.5   bk   1

PL1

Seawater contacts
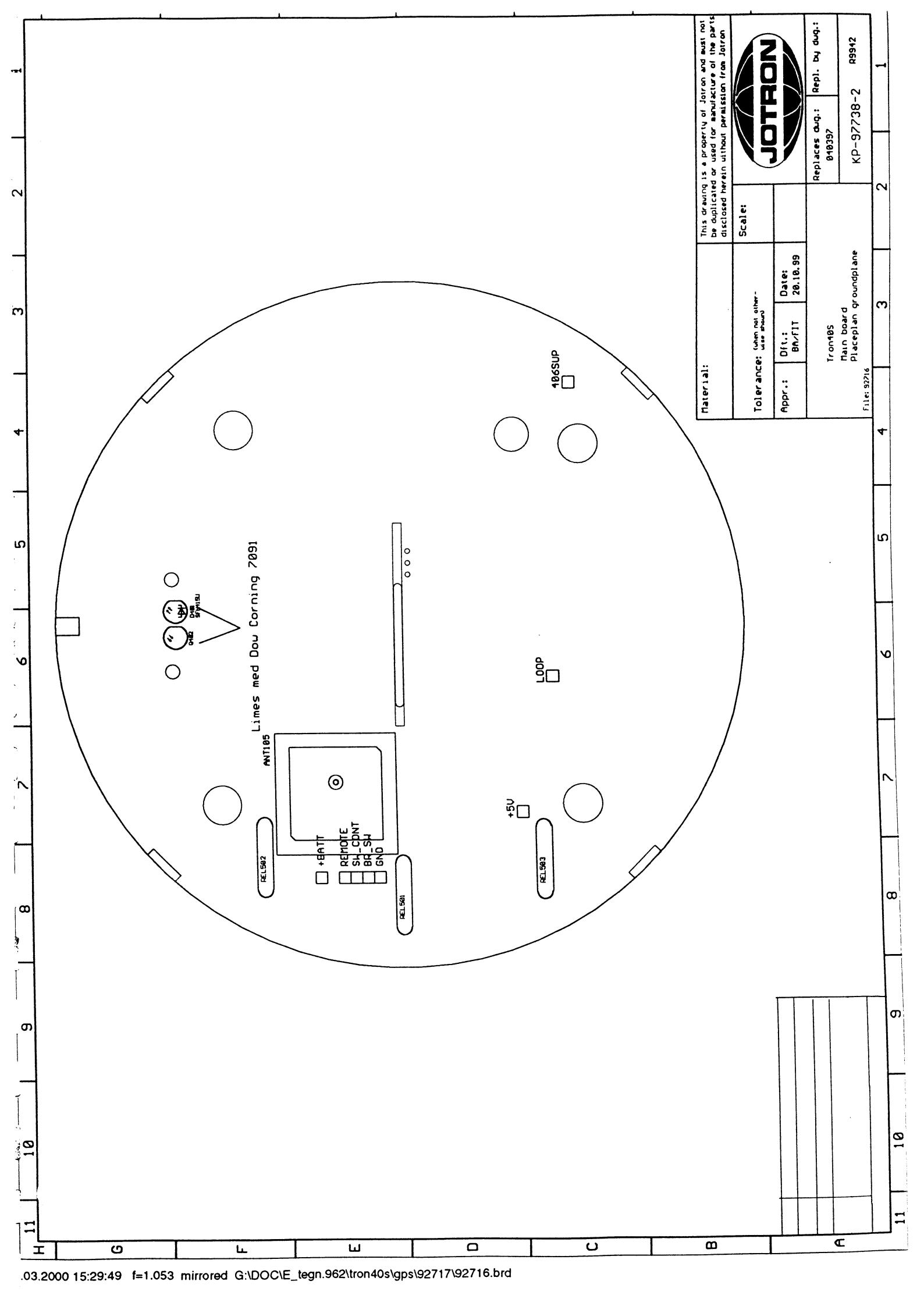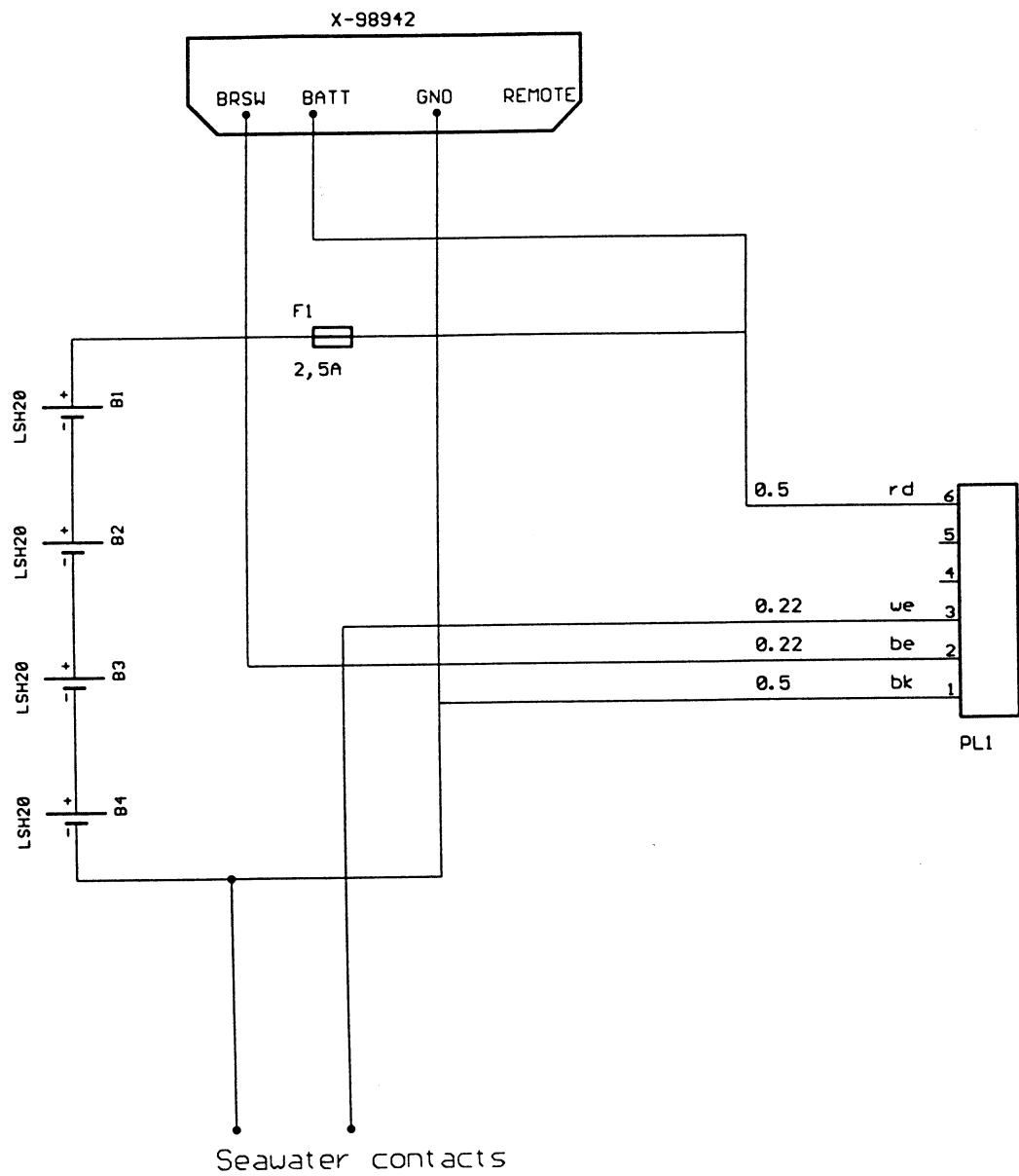
		Material:			This drawing is a property of Jotron and must not be duplicated or used for manufacture of the parts disclosed herein without permission from Jotron
		Tolerance:(when not other- wise shown)		Scale:	**JOTRON** electronics a.s
		Appr.:	Dft.: BA	Date: 070999	
EM3551	Sikring 2,5A innføres	Battery assembly Tron40S Circuit drawing		Replaces dwg.: 090398	Repl. by dwg.:
EM3048	Safety switch changed			E-97780	

MFT106MS
LA601

C601
5uF/300V

C604
100n

R604
100k

D604
150V

D605
150V

R602
10M

C602
22n/400V

C-38 T602
S
P
1
2
3

SCR601
MCR08BT1

R609
10k

C605
100n

D606
TEST LED

BC817
Q603

C606
100p

R603
68k

Q602
BC817

D603
BYD37

DY037
D602

Q601
BCP53

T601
1:25
2
4
5
3

R607
1M

C609
3u3

R606
270k

D608B
BAW56

D608A
BAW56

R601
4R7/1W

C603
100n

R611
1k

R605
1k

R608
1k

R610
1k

PL601

RF 406/GND

D601
BYD37

C608
1n

+14V

C607
1n

T.LED/FLASH

Cable
Not mounted

D404

12mm

Material:

Tolerances (when otherwise not shown)

| Dim.: | Date: |
| BA | 010899 |

Appr.:

Tron40S
Antenna board
Placeplan groundplane

Scale:

JOTRON
electronics a.s

Repl. by dwg:

Replaces dwg:
110599

KP-92718-2 rev9556

EM3229

Limes

6mm 3mm

36mm

Lim som skal brukes : Dow Corning 7091

JOTRON
electronics a.s

			Replaces dwg.:	Repl. by dwg.
			110599	
Material:				
Tolerance: (when otherwise			Tron40S	
not shown)			Antenna board	
Appr.:	Dif.:	Date:		KP-92718-1 rev993
	BA	040899	Placeplan component side	

Scale:

EN	0245	Ny bøyning av ben
EN	0229	Mont. dagslysbr.
Symb	EN	Change

JOTRON

J103 MCX769-01

C104 1n
L101 8n2
EXTIN
LNAOUT
IC101
NJG1103F1
LNAIN
GND
L102 10n
L104 8n2

J101 MCX769-01

U103 JUPITER-LP
ROM_DEFAU
NMEA
m_RST
1PPS
10KHZ
SDO1
SDI1
SDI2
3.3V
3.3V_BACK
PREANP
GND
GND
GND
GND

J3 1K
m_RST
Rx
C101 1n
3.3V_BAC

U101 LASSEN_LP
1PPS
RXD1
TXD1
RXD2
3.3V_BACK
3.3V
PWR_CTRL
GND
RB6/TX
C102 1n

U102 not-m12
1PPS
RXD1
TXD1
RTCM_IN
3.0V_BACK
3.3V
ANT_VOLTAG
GND
C103 1n

R114 1k
D102 597-3XX1
Q104 BC817
R113 10k
C111 100p

Q102 BST82
R104 10k
3.3V
R102 10k
Q101 BST82
R101 10k
R105 100k

C105 150u/10v
L103 100uH
C112 150u/10v
150u/10v

R110 R111 2W13/ 3k6
L105 68uH
C109 100
Q103 BST82
D101 MBRS340T3

IC104 LM2675M
CB
VSW
GND
FB
ON/OFF
VIN

Q103 BST82
100k R112

RB6/TX
R103 1k
R107 1k
TX106

IC103 16C622SO
RB7
RB6
RB5
RB4
RB3
RB2
RB1
RB0
OSC1
OSC2
MCLR\
RA4
RA3
RA2
RA1
RA0
VDD
VSS
LED
PX
TX106
GPS_RESE

D104 1M
X101
C106 115p
C107 115p 3.58Mhz
D103 10k
C110 omit
+5V
C108 100n

3.3V_BAC
IC102 LP2980IM5
VO
GND
UI
ON/OFF

BATT
C113 15u/25v

J104-1 1 BATT
J104-2 2 GND
J104-3 3 +5V
J104-4 4 SDA
J104-5 5 SCl
J104-6 6 TX106

J102-1 1 VPP
J102-2 2 +5V
J102-3 3 GND
J102-4 4 RB7/U_SW
J102-5 5 RB6/TX
J102-6 6
J102-7 7

RB7/U_SW

Grid reference markers (top): 5 4 3 2 1
Grid reference markers (sides): H G F E D C B A

J104

Material:			Scale:	JOTRON
Tolerance: (when not other- uise shoun)				
Appr.:	Dft.: FIT	Date: 4.11.1999		

Tron 40s GPS Interface

Jupiter LP/ Motorola M12/Trimble Lassen LP

Component placement, Bottom layer
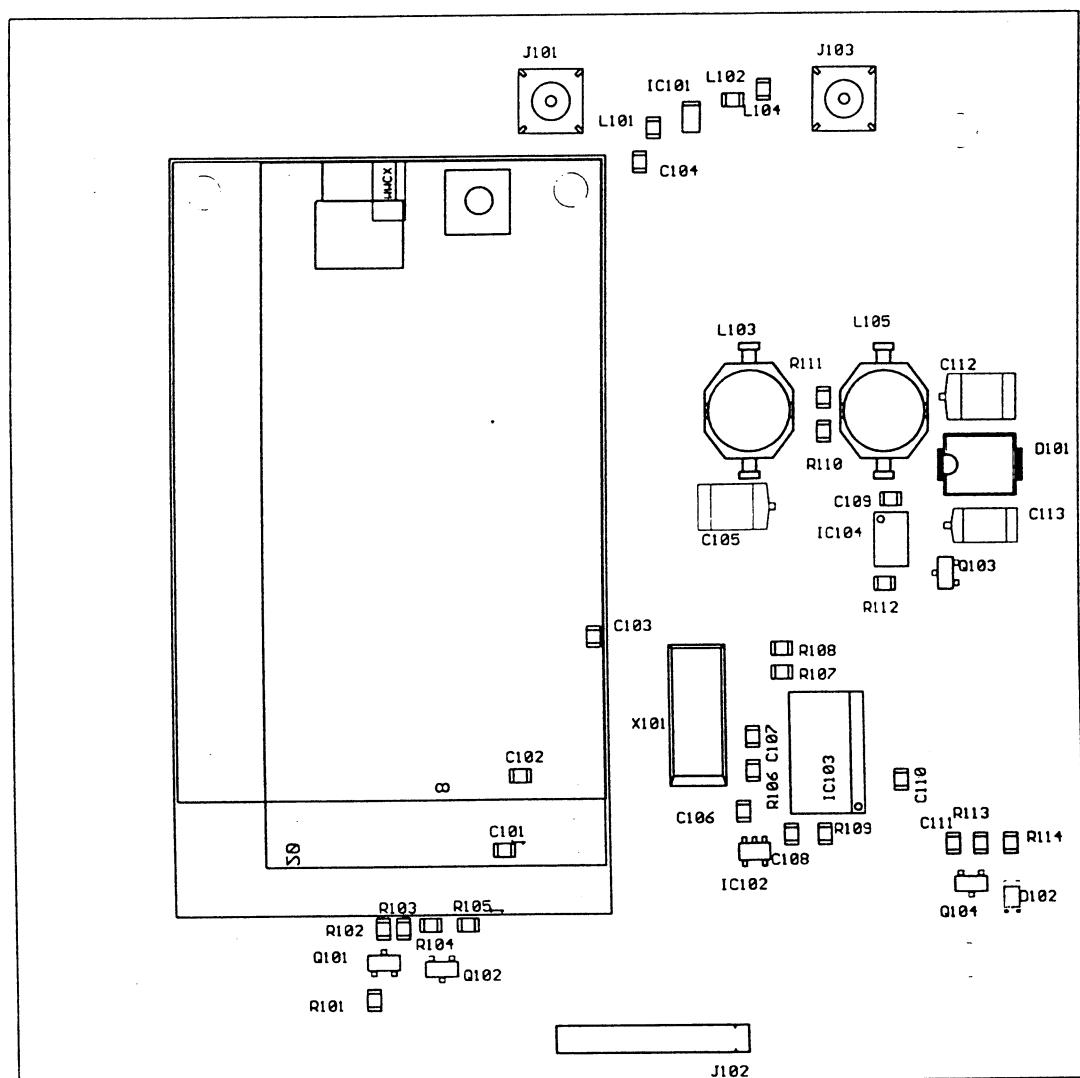
Replaces dug.:	Repl. by dwg.:
KP-99751-2	

J101
IC101 L102
L101 L104
C104
J103

HUCX

L103 L105
R111 C112
R110 D101
C109 C113
C105 IC104
C103 R112

R108
R107
X101
C102 C106 R106 C107 IC103 C110
C101 R109 C111 R113 R114
C108
IC102 Q104 D102
R103 R105
R102 R104
Q101 Q102
R101

J102

Material:

Tolerance: (when not otherwise shown)

Scale:

Appr.: | Dft.: FIT | Date: 4.11.1999

JOTRON

Tron 40s GPS Interface
Jupiter LP/ Motorola M12/Trimble Lassen LP

Component placement, Top layer

Replaces dwg.: | Repl. by dwg.:

KP-99751-1

Additional information about differences between standard TRON40S and TRON40GPS

I have attached schematic and board diagrams of the standard Tron40s and of the Tron40GPS:
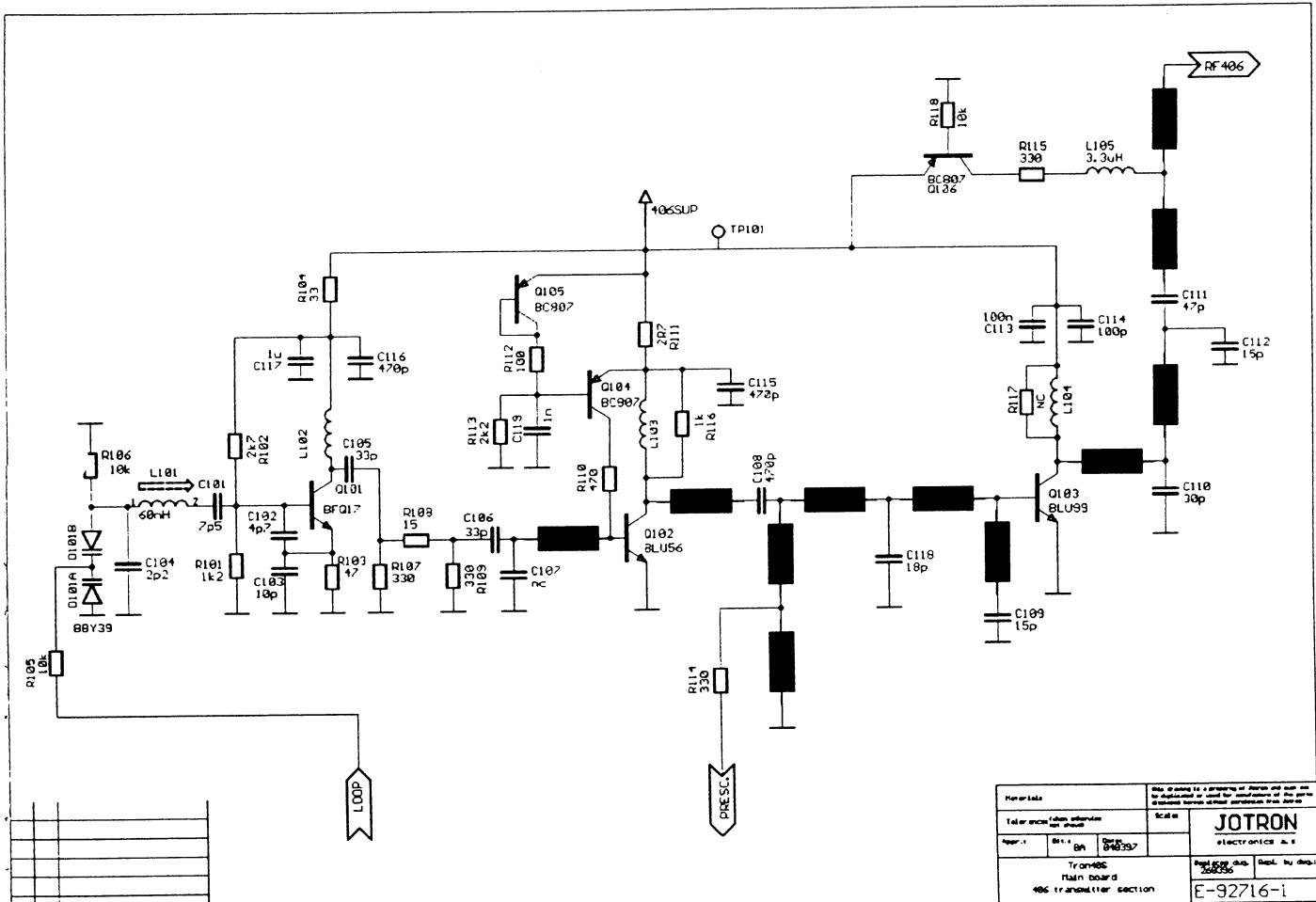
Figure 1 Schematic no.1,TRON40S, 406 Transmitter section
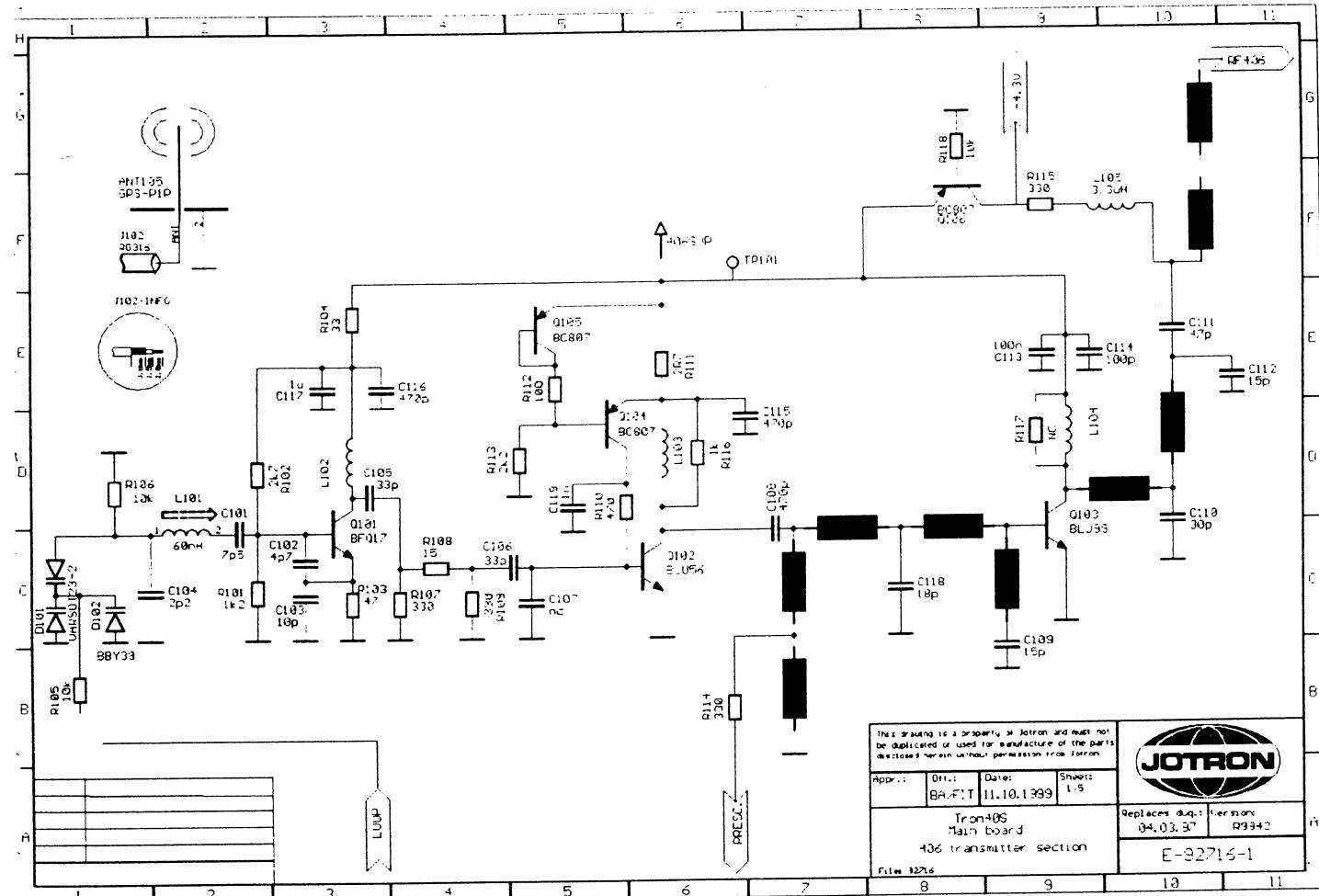
Figure 2 Schematic no.1 of TRON40S/GPS 406 Transmitter section

Note that the only difference between the standard 406 Transmitter section and the new schematic are the GPS antenna in the left upper corner, other differences are only corrections of minor errors in the schematic.
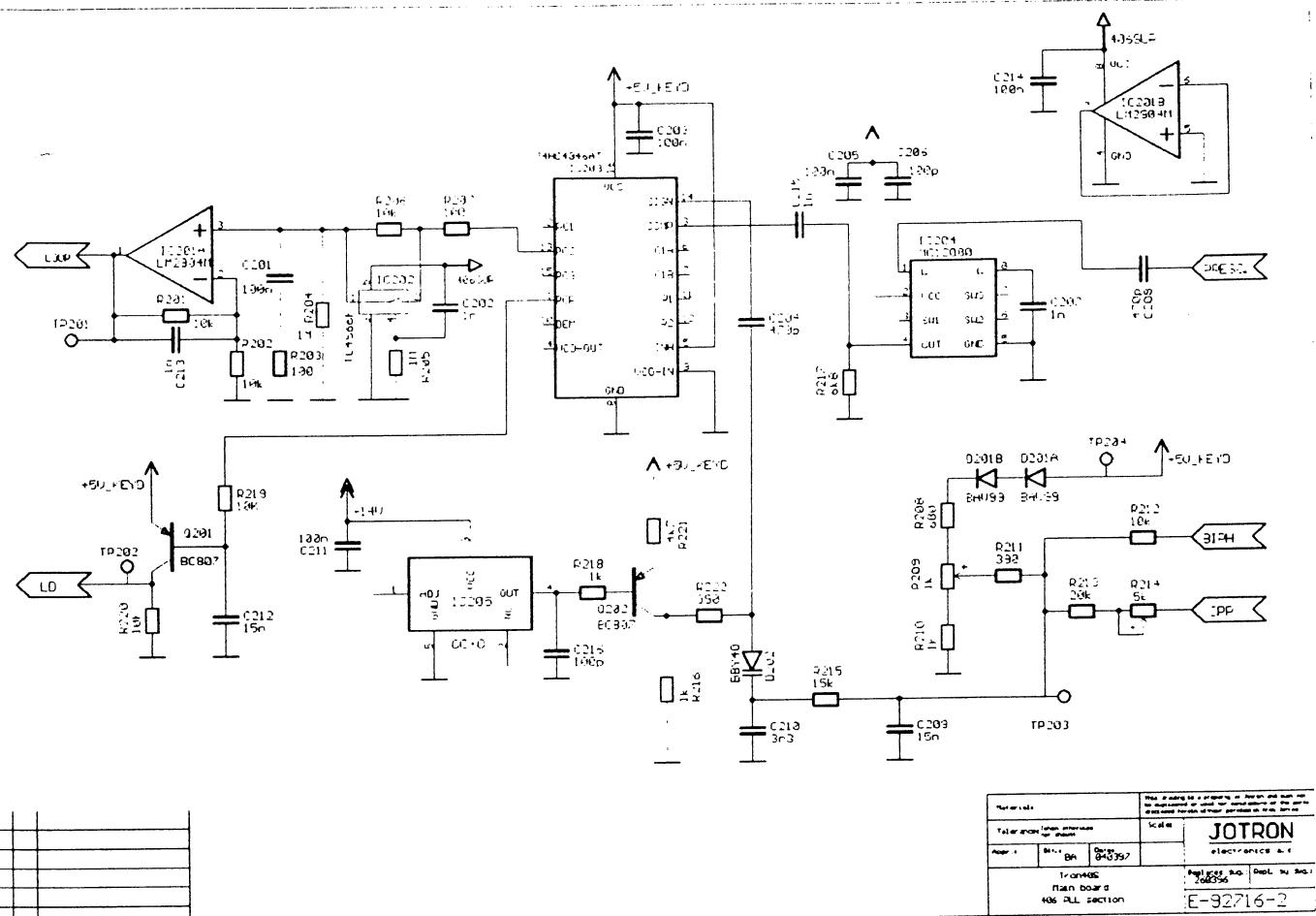
Figure 3 TRON40S, 406 PLL section
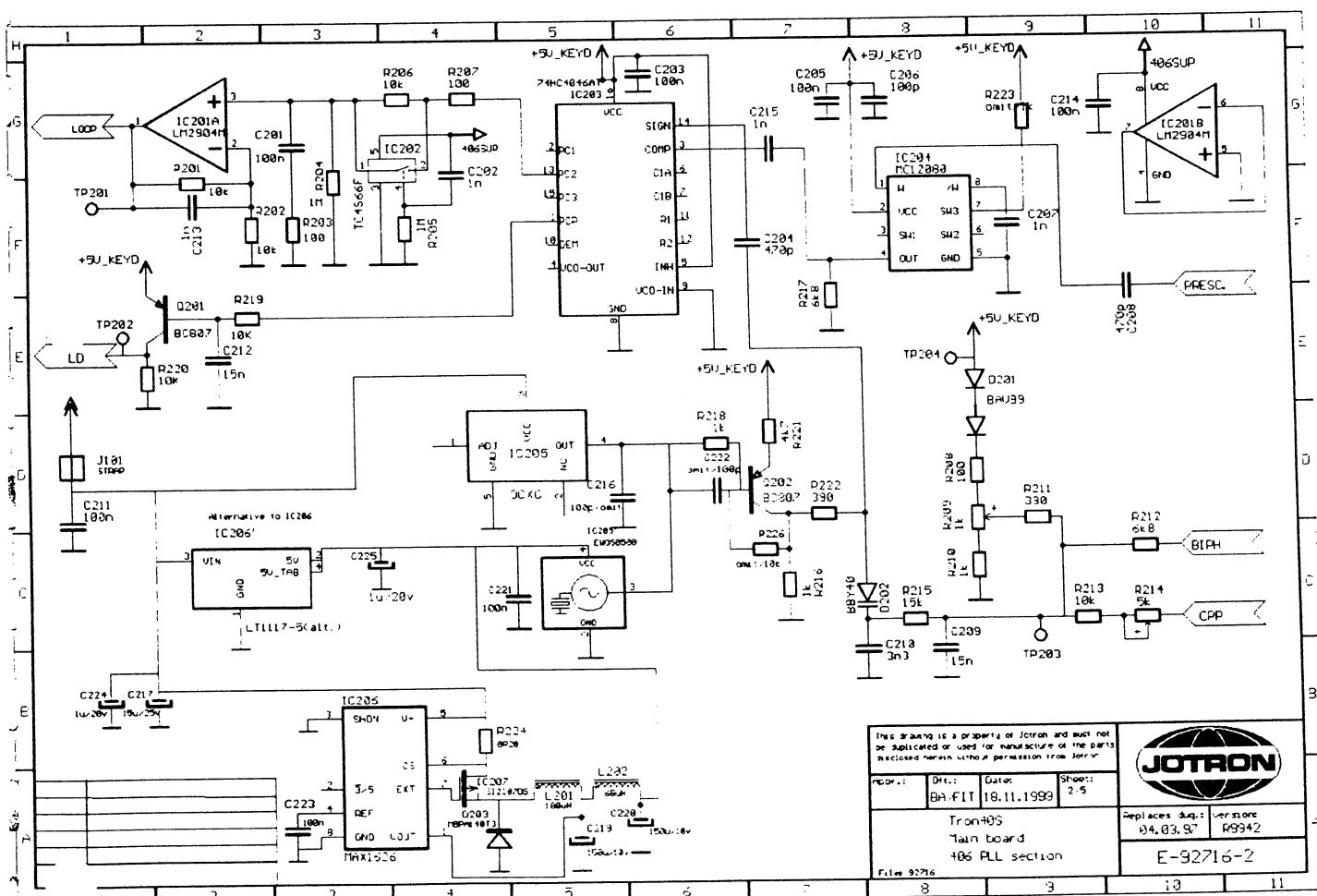
Figure 4 TRON40S/GPS 406 PLL section

Alternative oscillator OCXO:(Figure 4)

In the 406 PLL section the differences are that there are inserted an option of using another oscillator (IC205'), the SOREP EWOS0500 at the double frequency of the standard oscillator (IC205). The EWOS0500 are the same oscillator used in our TRON45S and since it operates at the double frequency, the divider IC204 must be changed from /80 to /40 by mounting a resistor R223. The reason that we wish use this oscillator as an alternative is that the current consumption of this oscillator are less than the standard FORDAHL oscillator, and when GPS is mounted, the overall current consumption should not be much more than a standard TRON40S without GPS. Since the SOREP EWOS0500 oscillator runs at +5v instead of the FORDAHL who runs at +12v, we had to use a switch regulator to get the voltage down to +5v. This is the IC206, (MAX1626) with additional circuitry around as seen at the low left corner of figure 4. If the noise from the switch regulator is too loud, we have to use the alternative linear regulator IC206' (Linear Tech. LT1117-5) instead.
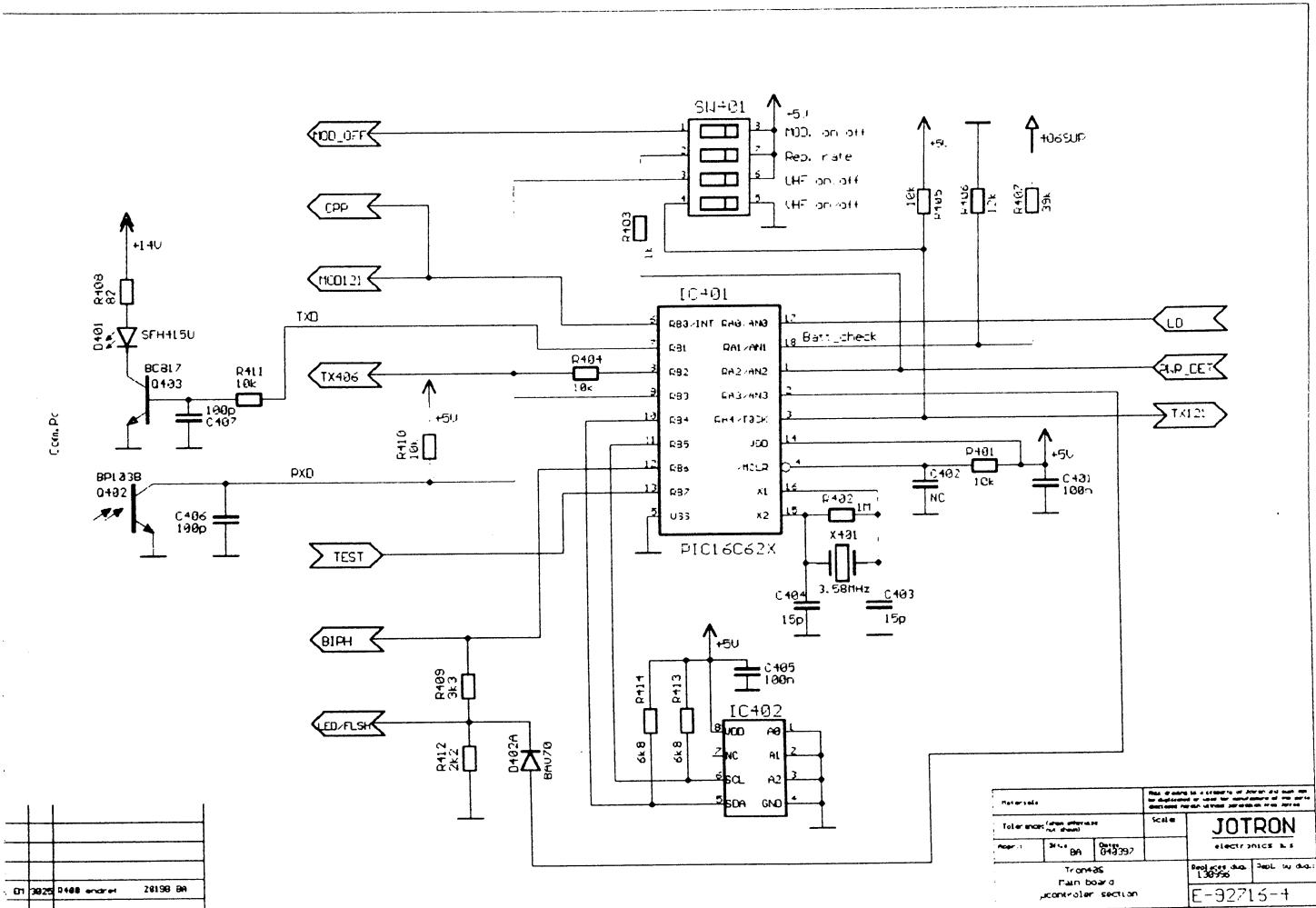
Fig. 5 Tron 40s microcontroller section
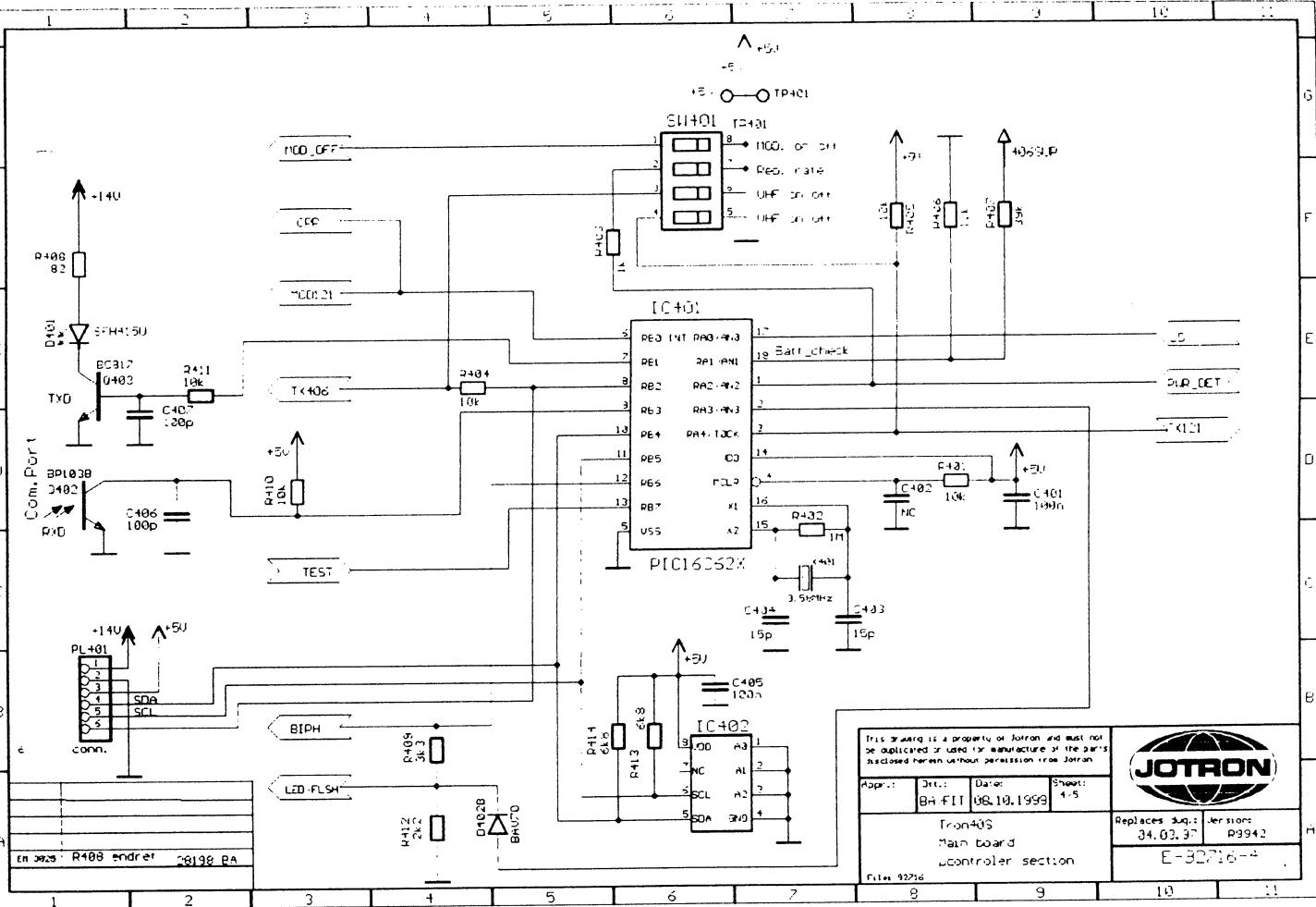
Figure 6 Tron 40S/GPS microcontroller section

Differences in the Tron 40s/GPS microcontroller section:(Figure 5 & 6)

An Interface Header has been added to the main board so that mounting a GPS interface and GPS receiver is possible. The communication between the GPS interface board and the Main board is through the I2C lines SCL (Serial Clock Line) and SDA (Serial Data) to the memory IC402 which are an EEPROM where the Programmed data from the programming station are stored. This solution was in mind when the Tron 40s was designed in 1996 and has now been implemented.
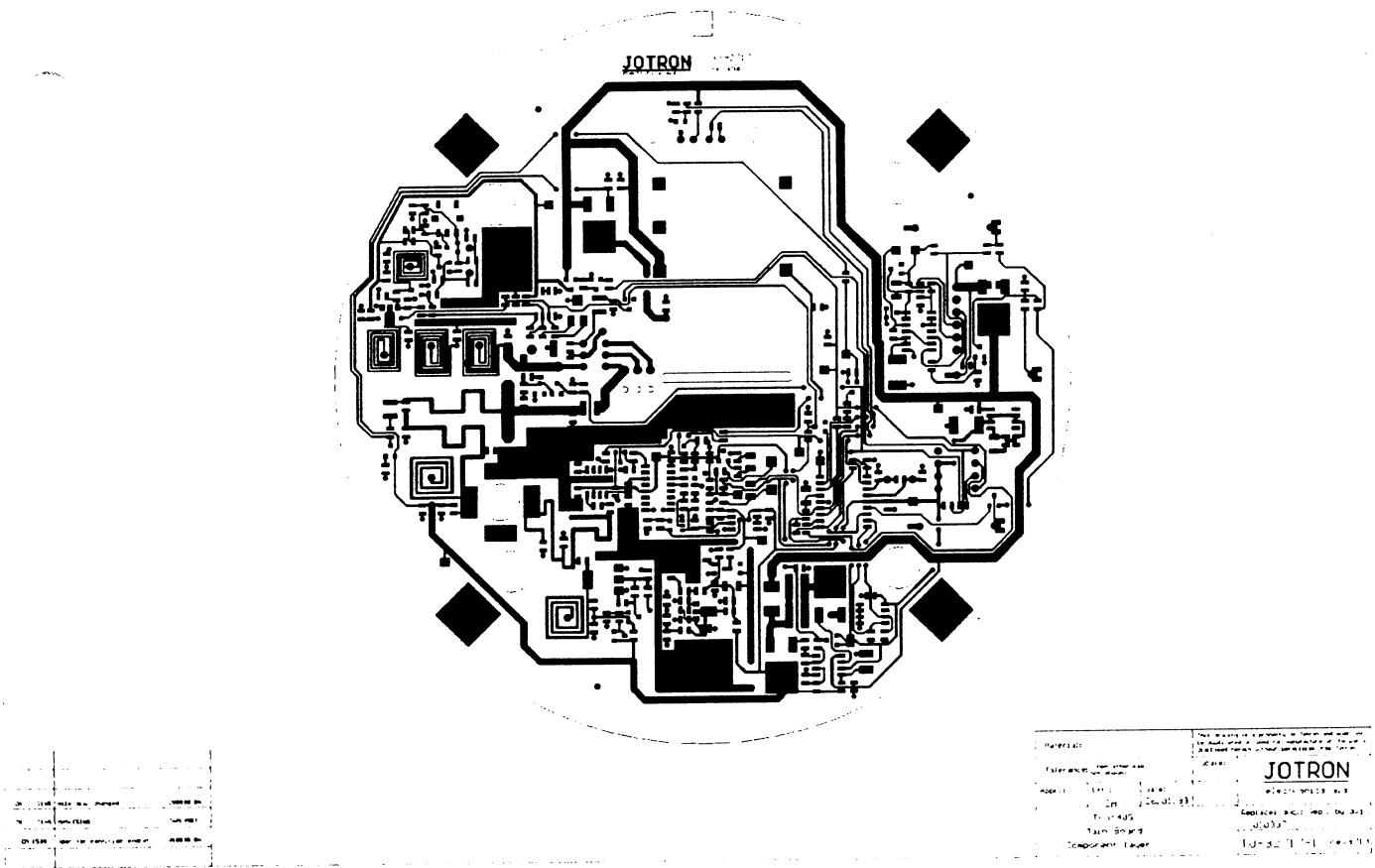
Figure 7 Tron 40s, Main Board, Component layer
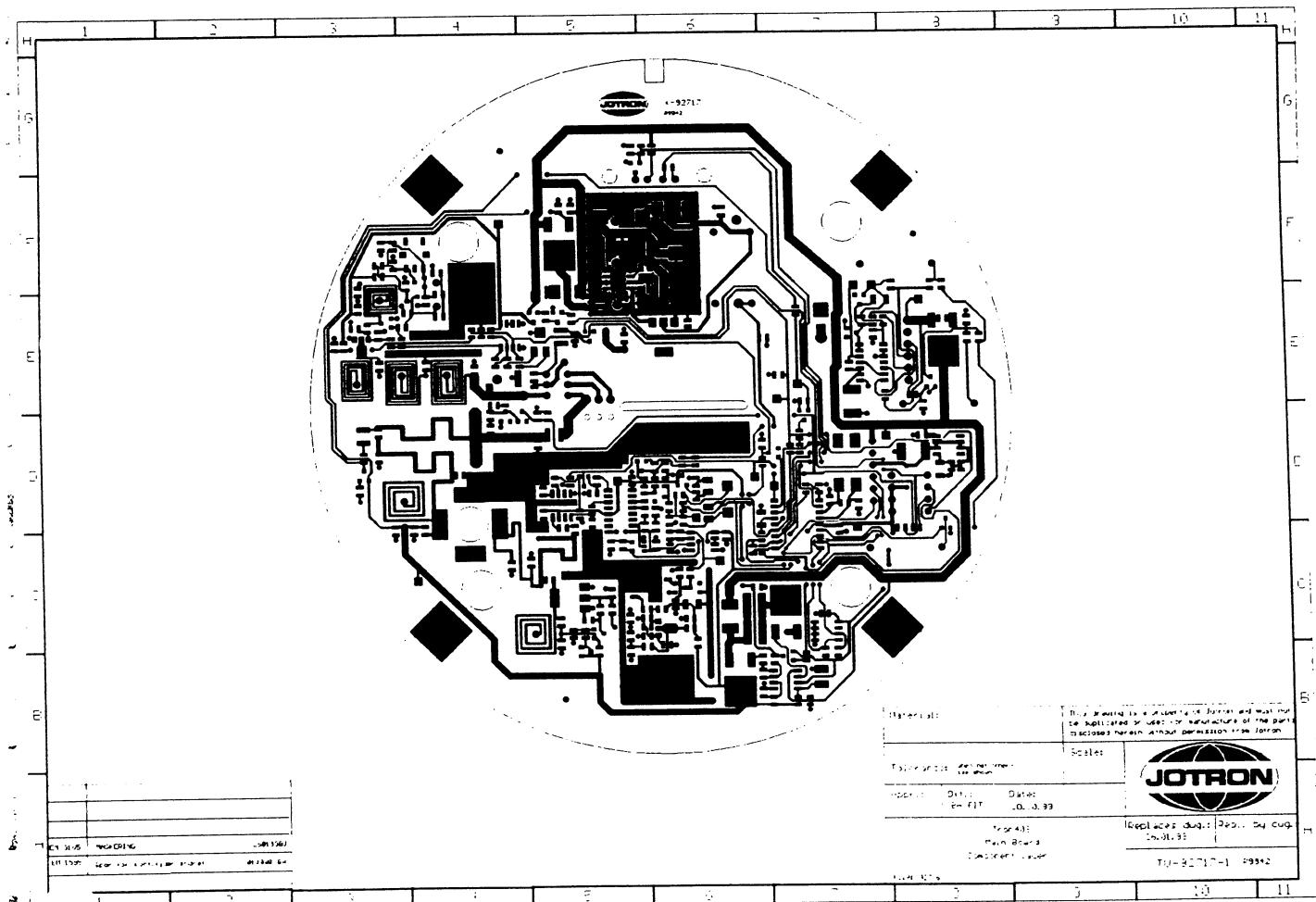
Figure 8 Tron 40S/GPS Main Board, Component Layer

Note new GPS interface connector at D7/D8 and additional ground plane around new oscillator/ Switch mode supply.(F5/F6)
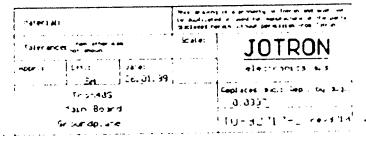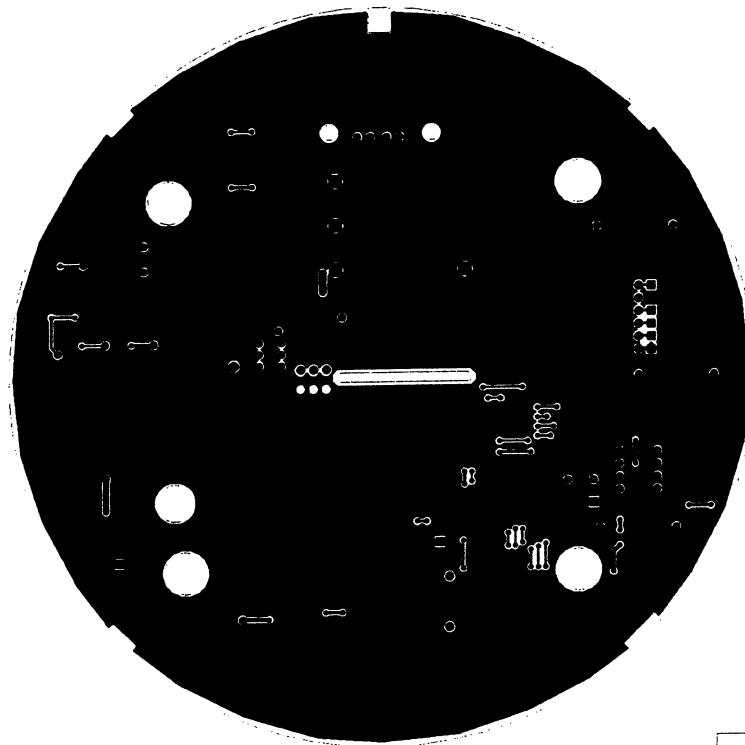
Figure 9 Tron 40S, Main board, Ground plane
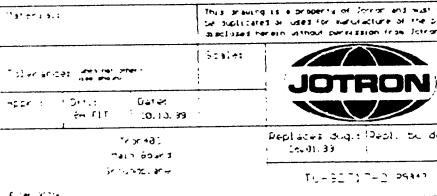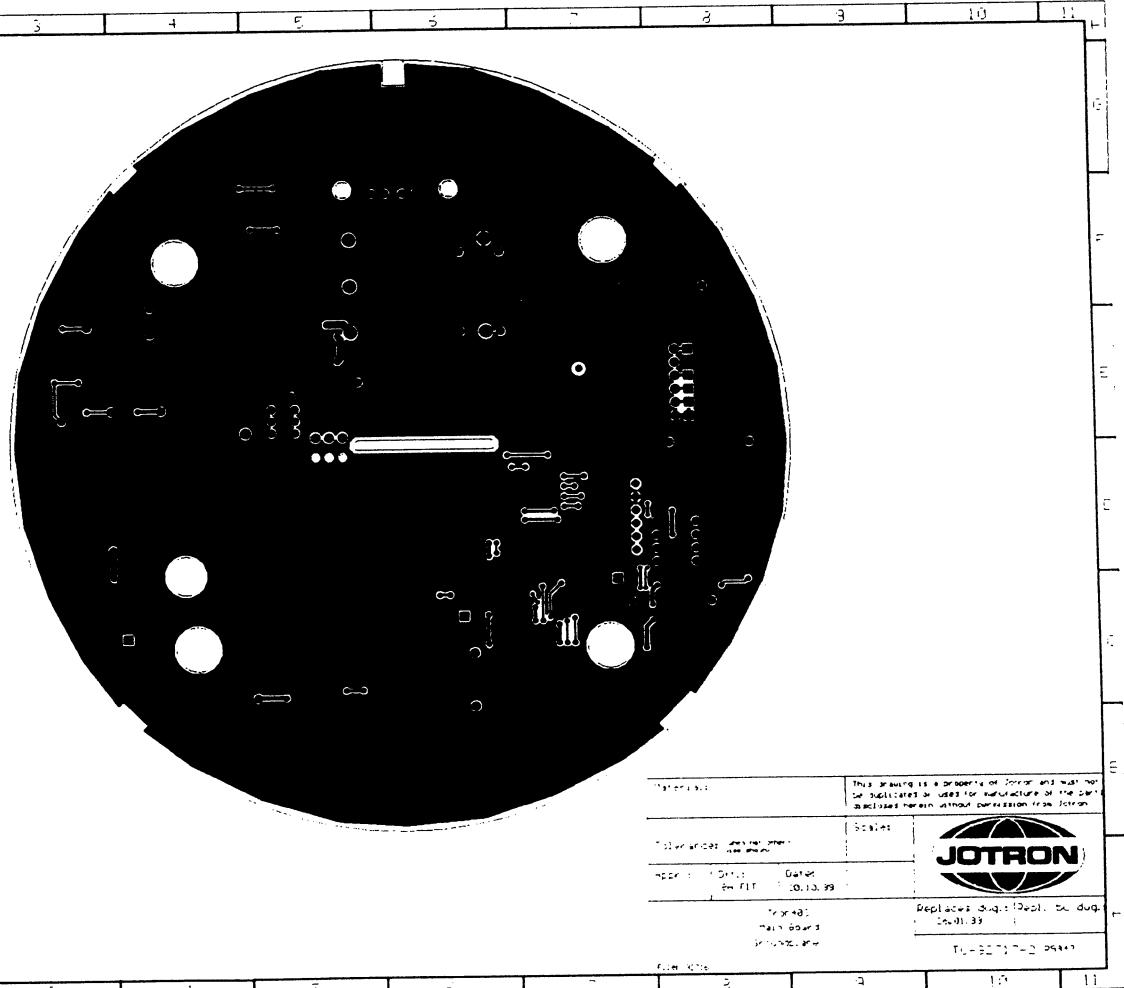
Figure 10 Tron40S/GPS, Main Board, Ground plane

No major differences here.
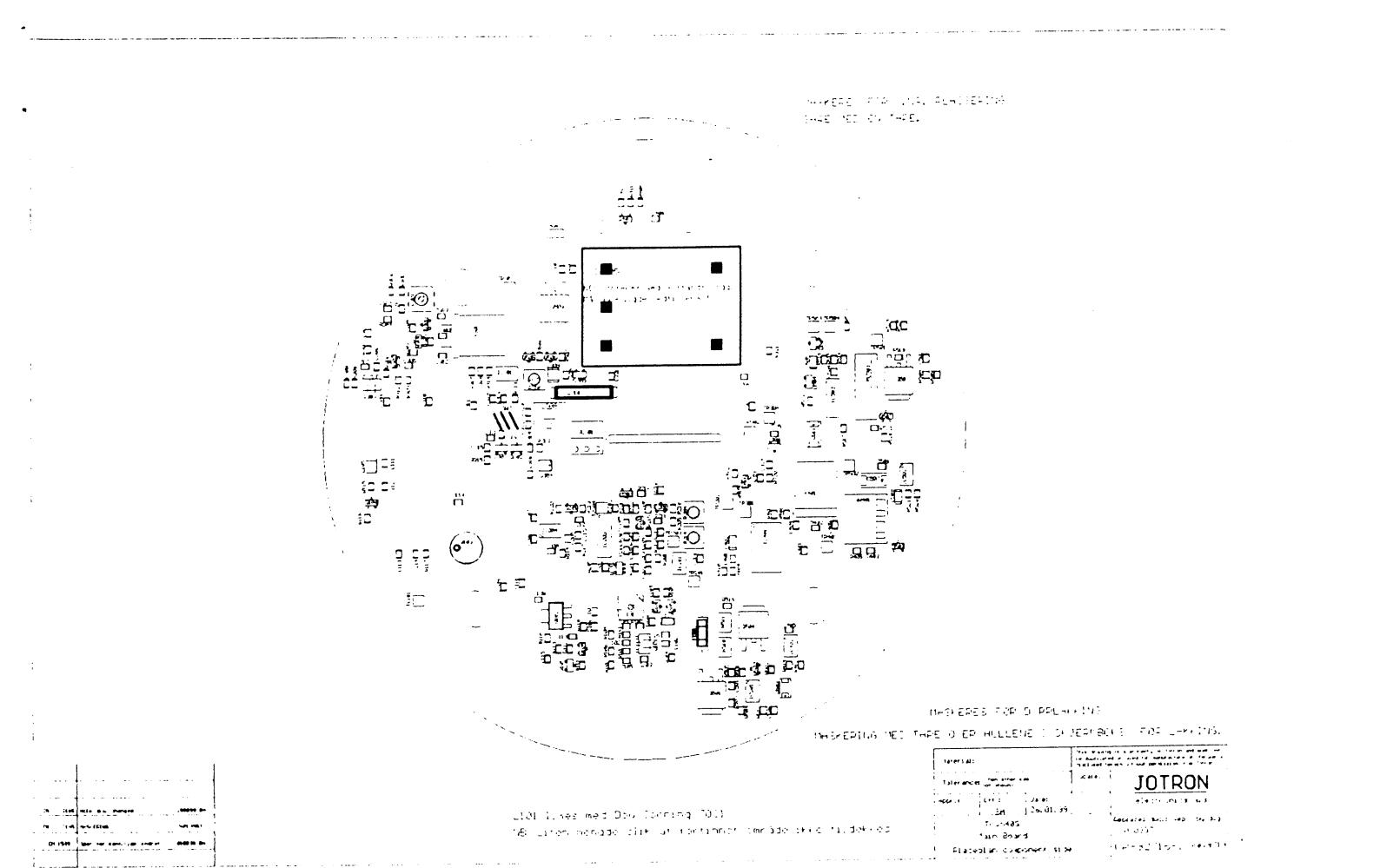
Figure 11. Tron40S Main Board, Placeplan, component side
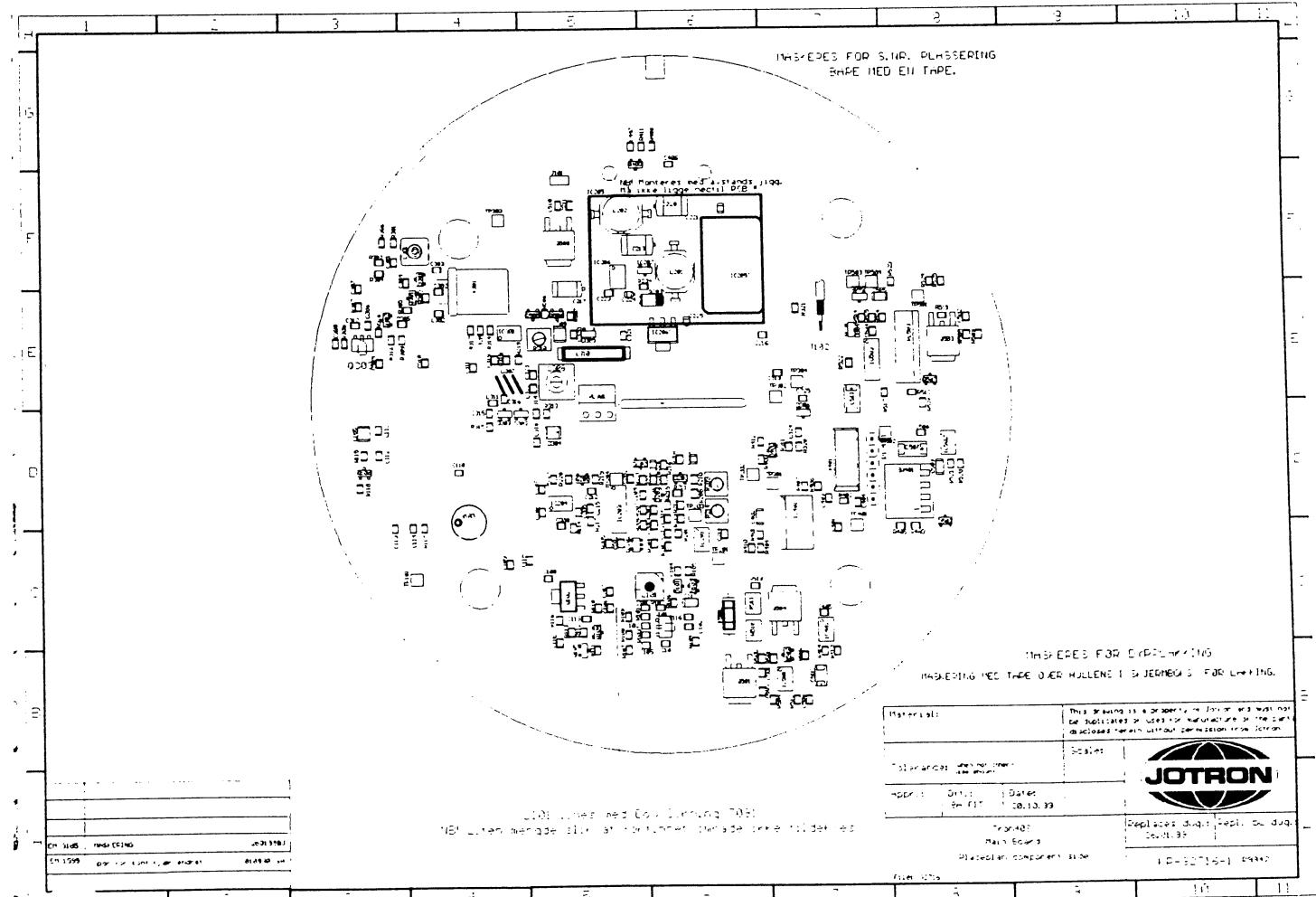
Figure 12 Tron40S/GPS Main Board, Placeplan Component side

Note Switch mode supply & oscillator at F5/F6 and GPS interface connector at D7/D8.
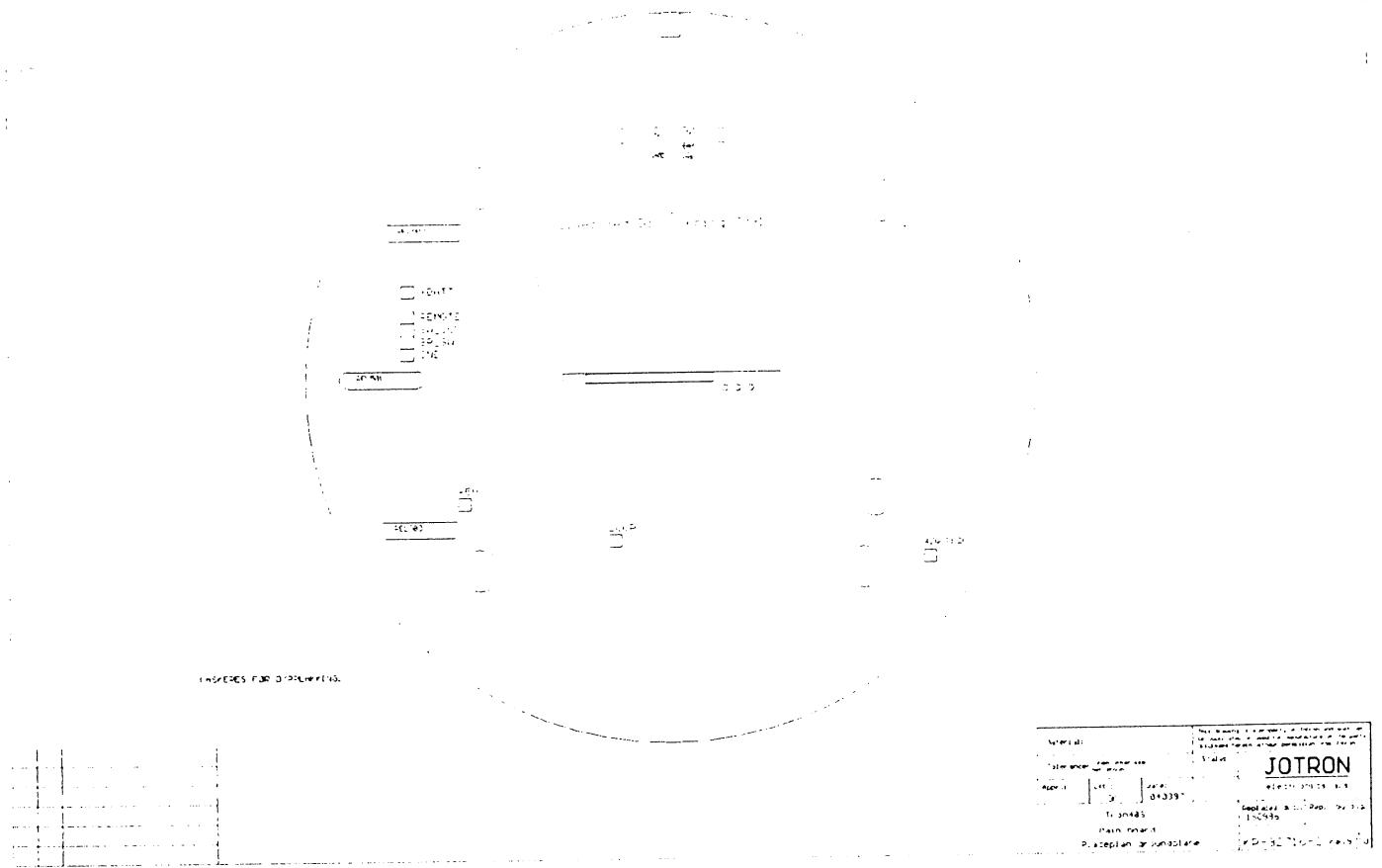
**Figure 13 Tron40S, Main Board , Placeplan Groundplane**
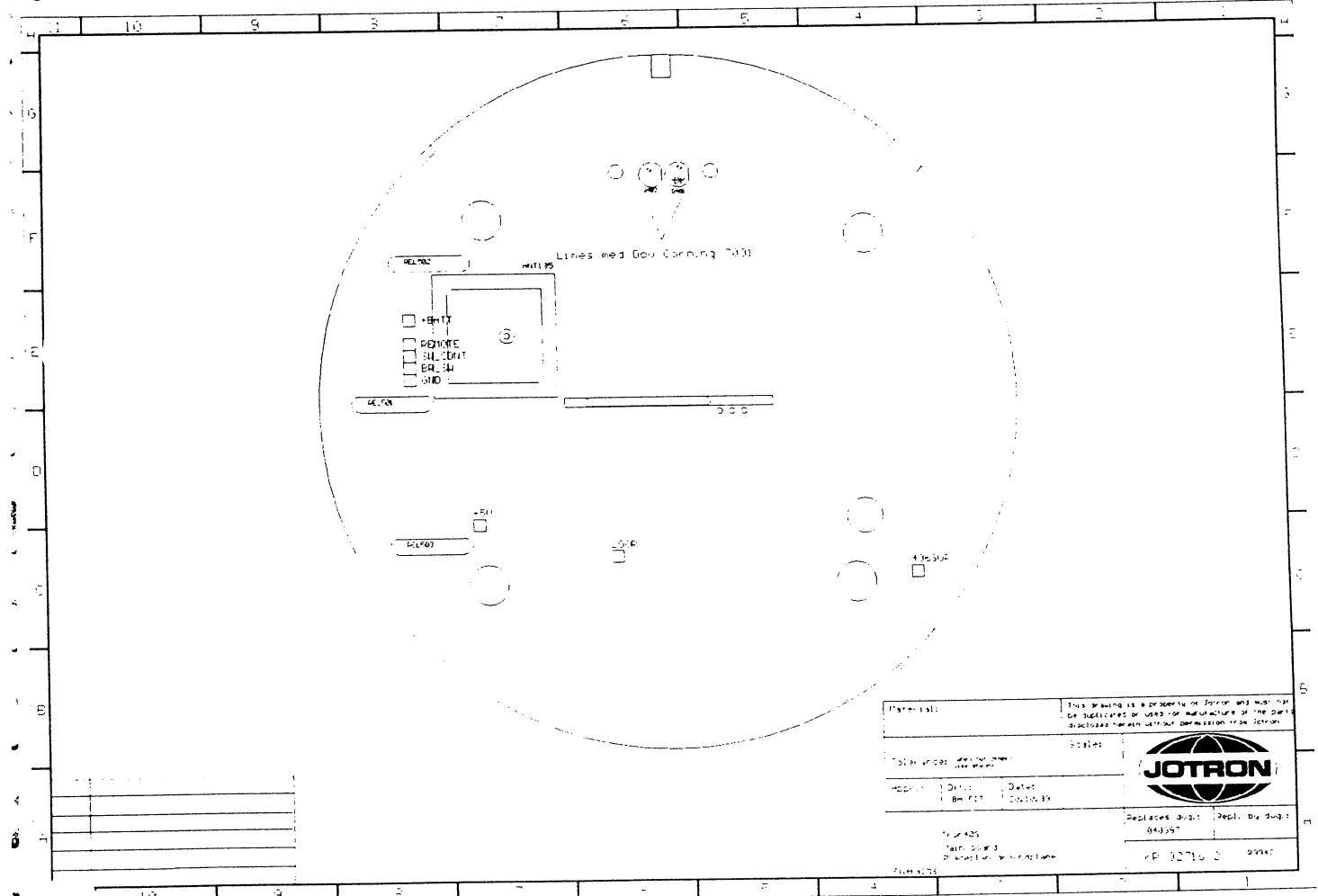
Figure 14 Tron40S/GPS, Main Board , Placeplan Groundplane

Note GPS antenna at E7.

All of the information above are made to clarify the differences between the standard Tron40S mainboard and the new main board which can be used both for standard Tron40S and the new Tron40GPS which will have an GPS interface board and a GPS receiver mounted under the Main Board. The GPS Interface board are made with its own microcontroller 16c62x which have NMEA0183 protocol to the three GPS receivers which are possible to mount (Connexant (Formerly Rockwell) JUPITER LP, Trimble Lassen LP and Motorola Oncore M12). The microcontroller control ON and OFF of the GPS receiver and store data to the EEPROM, IC402 when a valid longitude/latitude are received.

Fred Ivar Tallaksen
R &D JOTRON electronics a.s

LONG-TERM DRIFT ON UUT 2/2

SoREP mino 406 m° 007

WITH OCKO   SOREP EW050500

UUT   : 2/2
Name   : SOREP
Type   : micro
Number : 07
Date   : November / December, 1994

15.1. DEFINITION

The beacon was tested for 30 days at the laboratory ambient temperature. An external 7-V power supply was used. The different frequency measurements are plotted on the two diagrams below.

Experience shows that oscillator frequency drift depends on several factors, of which the most significant can be expressed by a law of the following form :

$$A \log(B.t + 1) + C$$

The curve providing the best fit to the points is plotted. Since its equation is not linear with respect to coefficient B, the least-squares method is not appropriate.

Refer to the appended note entitled "Aging specification measurement and analysis" by Raymond L. Filler, recommending a computerized series of iterations to determine the coefficients of the curve .

Once the coefficients are defined, the curve can be extrapolated to a five-year period and a check made to ensure that the results meet the specification.

15.2. RESULTS

Frequency	Specifications	Measurements
F0	406025 MHz ± 2 kHz	40602563 kHz
F(30) - F0	± 0.3 kHz	- 65 Hz
F(1825) - F0	± 5 kHz	≈ - 200 Hz

CERTIFICATION BALISES SARSAT
CNES
18, av. Ed.-Belin
31055 Toulouse Cédex
Tél. 61 27 32 33
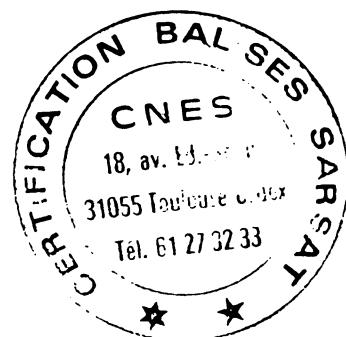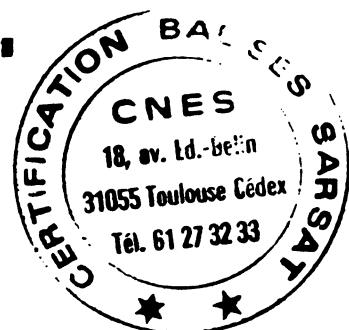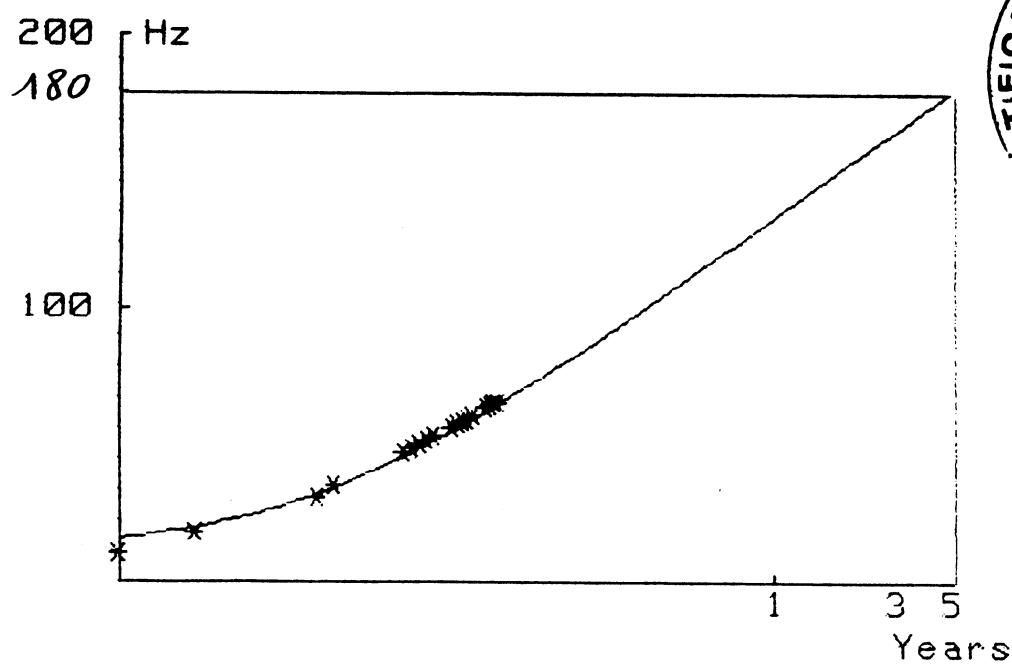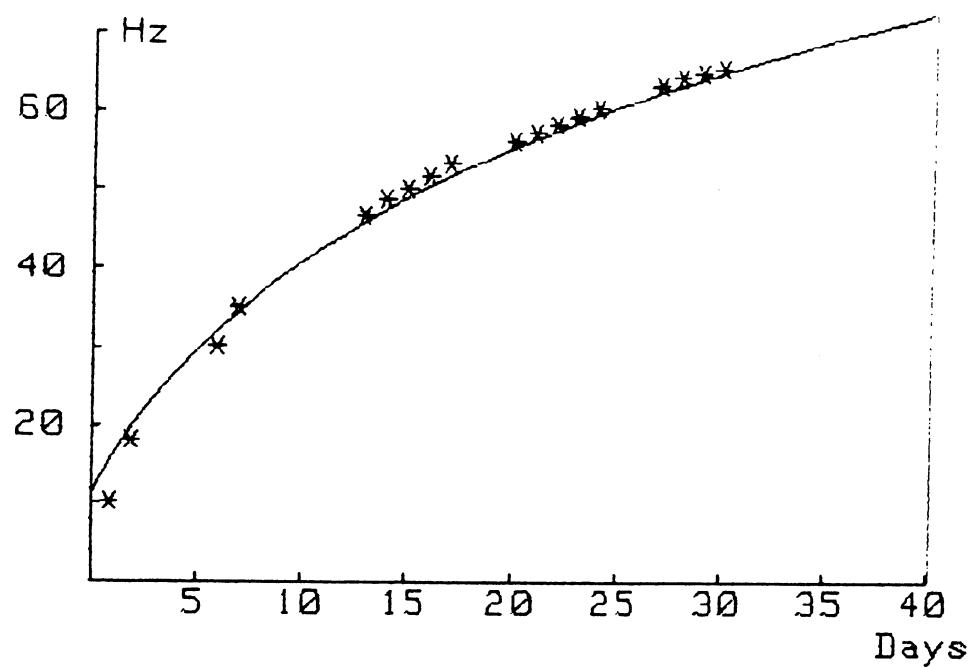
V. ALLAN

06-jan-96

VARIANCE D'ALLAN SUR 30 ECHANTILLONS MOYENNEE 10 FOIS

Constructeur : SOREP

Type OUS   : EWOS 0501

N° OUS   : 763

Fréquence   : 10150625 Hz
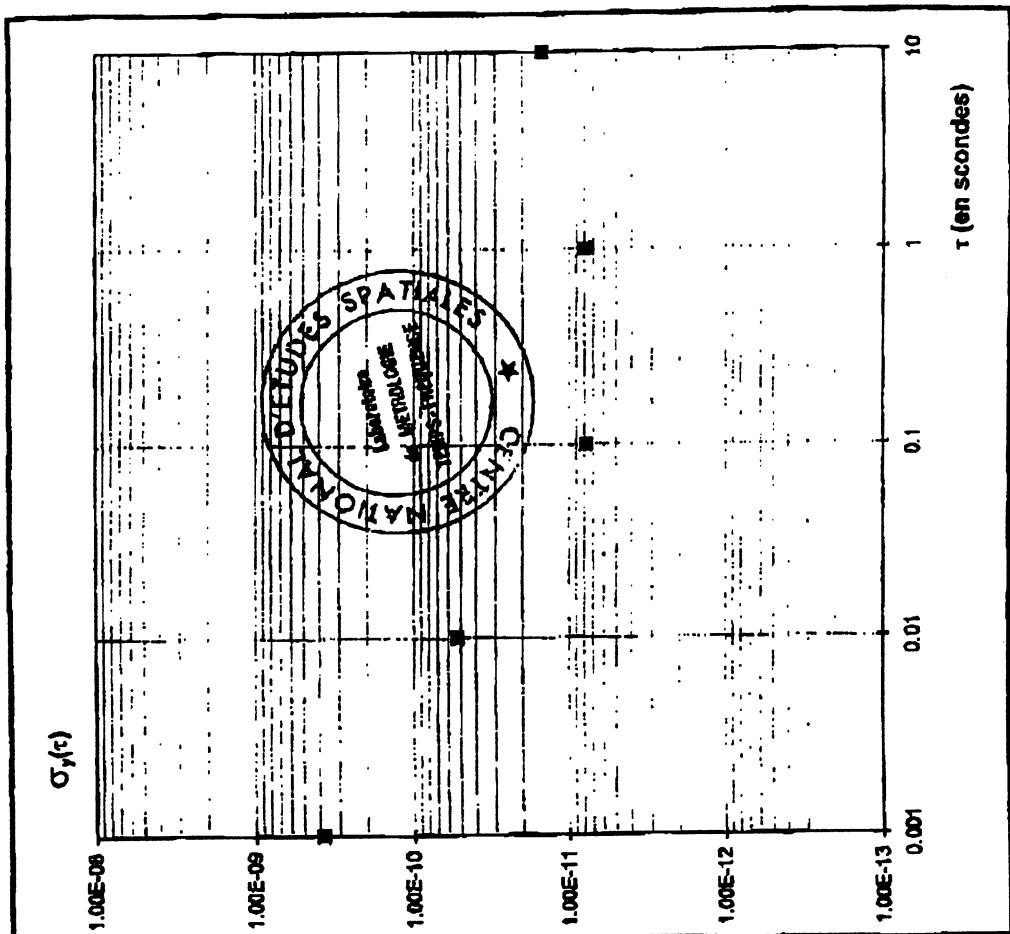
τ	Minimum	Moyenne	Maximum
1 ms	3.10E-10	3.80E-10	4.50E-10
10 ms	4.50E-11	5.30E-11	8.20E-11
100 ms	6.60E-12	7.80E-12	8.90E-12
1 s	6.70E-12	8.00E-12	9.30E-12
10 s	1.10E-11	1.50E-11	3.00E-11

σ_y(τ)

τ (en scondes)

EUROWAVE SOREP

OCXO OVEN CONTROLLED CRYSTAL OSCILLATOR

EW OS 0500

PRELIMINARY

OPERATING CONDITIONS

CHARACTERISTICS

ELECTRICAL SPECIFICATIONS @ 25°C, Vcc=5V, unless otherwise specified

OUTPUT FREQUENCY		MHz	10.150625
FREQUENCY TOLERANCE		ppm	± 2 (25°C)
TEMPERATURE RANGE	Operating	°C	-40, +55
	Storage	°C	-55, +75
SUPPLY VOLTAGE		Volts	5 ± 5 %
SUPPLY CURRENT (+ 5 V pin 14)	Warm-up	mA	250 max.
	Warm-up time	sec.	10
	Steady state +25°C	mA	20 typ.
	Steady state -40°C	mA	50 typ.
	Steady state +55°C	mA	10 typ.
FREQUENCY STABILITY	Temperature	ppm	± 0.2 typ.
	Supply voltage	ppm	± 0.1
	Short time		See note
AGING	Day		$\pm 2 . 10^{-9}$ *
	Year	ppm	± 0.5
PHASE NOISE (See curve)		dBc/Hz	-110 (100 Hz offset)
OUTPUT LEVEL (Load 10KΩ/10pF)		Vpp	2
SIZE			See figure

* : Over full temperature range.

Version 1.0

PIN n°	FUNCTION
1	N.C.
2	Ground
3	RF Out
4	VCC

Bottom view

12,2
12,5
7,62
4,58
15,24
20,12
9
6,35
0,8
⌀ 0,45
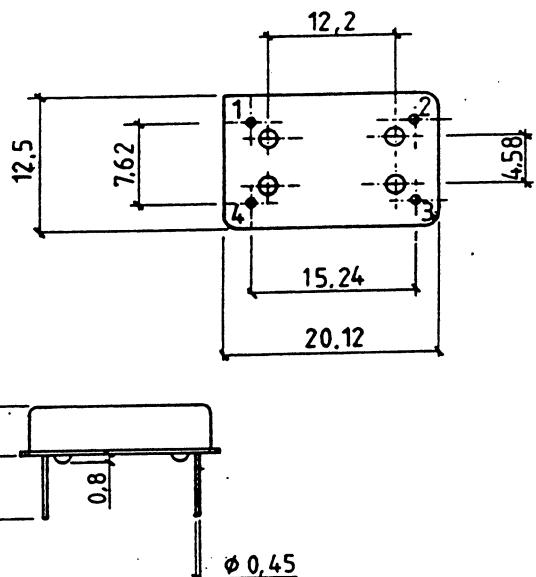
NOTES

SHORT TIME STABILITY

1 • As ALLAN (over stable 12 V supply)

S.E^{-9}
S.E^{-10}
S.E^{-11}
S.E^{-12}
10^{-3} 10^{-2} 10^{-1} 1 10   S
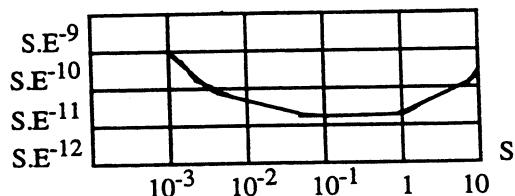
PHASE NOISE

Typical phase noise

Typical frequency recovery
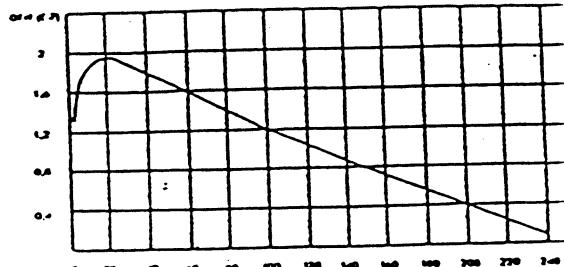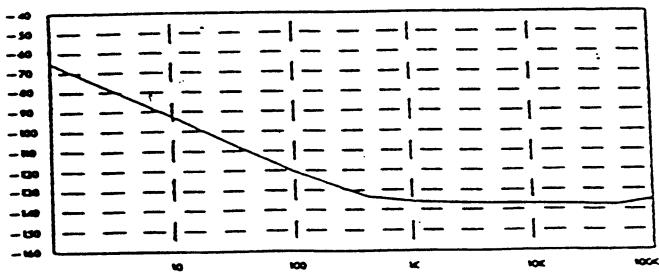
Jupiter LP GPS Receiver

TU30-D160

Conexant's Jupiter Low Power (LP) Global Positioning System (GPS) receiver is a single-board, 12 parallel-channel receiver engine intended as a component for an Original Equipment Manufacturer (OEM) product. The Jupiter LP features built-in power management algorithms and operates from 3.3 V, making it ideal for battery operated applications.

The receiver (shown in Figures 1 and 2) continuously tracks all satellites in view, thus providing accurate satellite positioning data. It is designed for high performance and maximum flexibility in a wide range of OEM configurations including handhelds, panel mounts, sensors, and in-vehicle automotive products. The Jupiter LP receiver is available in two configurations as shown in Table 1.

The highly integrated digital receiver uses the Zodiac chipset composed of two custom Conexant devices: the Gemini/Pisces MonoPac™ and the Scorpio Digital Signal Processor (DSP). These two custom chips, together with suitable memory devices and a minimum of external components, form a complete low-power, high-performance GPS receiver solution for OEMs.

The Jupiter LP receiver decodes and processes signals from all visible GPS satellites. These satellites, in various orbits around the Earth, broadcast radio frequency (RF) ranging codes and navigation data messages. The receiver uses all available signals to produce a highly accurate and robust navigation solution that can be used in a wide variety of end product applications.

The Jupiter LP is packaged on a miniature printed circuit board intended for harsh industrial applications. The receiver requires conditioned DC power and a GPS signal from a passive or active antenna.

The all-in-view tracking of the Jupiter LP receiver provides robust performance in applications that require high vehicle dynamics and in applications that operate in areas of high signal blockage such as dense urban centers. The receiver continuously tracks all visible GPS satellites and uses all the measurements to produce an overdetermined, smoothed navigation solution. This solution is relatively immune to the position jumps induced by blockage that can occur in receivers with fewer channels.

Features

- OEM product development is fully supported through applications engineering.
- One of the smallest, most compact GPS receiver footprints measuring 2.800" x 1.600" x 0.442" (approximately 71 x 41 x 11 mm).
- Twelve parallel satellite tracking channels for fast acquisition and reacquisition.
- Support for true NMEA-0183 data protocol.
- Direct, differential RTCM SC-104 data capability to dramatically improve positioning accuracy (in both Conexant binary and NMEA host modes).
- Enhanced algorithms provide superior navigation performance in "urban canyon" and foliage environments.
- Adaptive threshold-based signal detection for improved reception of weak signals.
- Static navigation enhancements to minimize wander due to Selective Availability (SA).
- Compatible with passive antennas for lowest total system cost or active antennas for installation flexibility.
- Maximum navigation accuracy achievable with the Standard Positioning Service (SPS).
- Enhanced TTFF upon power-up when in a "Keep-Alive" power condition before start-up.
- Meets rigid shock and vibration requirements.
- Automatic Altitude Hold Mode from Three-Dimensional to Two-Dimensional navigation.
- Automatic cold start acquisition process (when no initialization data is entered by the user).
- Maximum operational flexibility and configurability via user commands over the host serial port.
- Ability to accept externally supplied initialization data over the host serial port.
- User selectable satellites.
- User selectable visible satellite mask angle.
- Straight or right angle OSX subminiature, snap-on, coaxial RF jack receptacle (see Table 1).
- Standard 2x10 pin-field I/O connector.
- Operation/storage over an extended temperature range (-40° C to +85° C).

Table 1. Jupiter LP Configurations

Connector	Part Numbers
Straight OSX	TU30-D160-001
Right angle OSX	TU30-D160-011
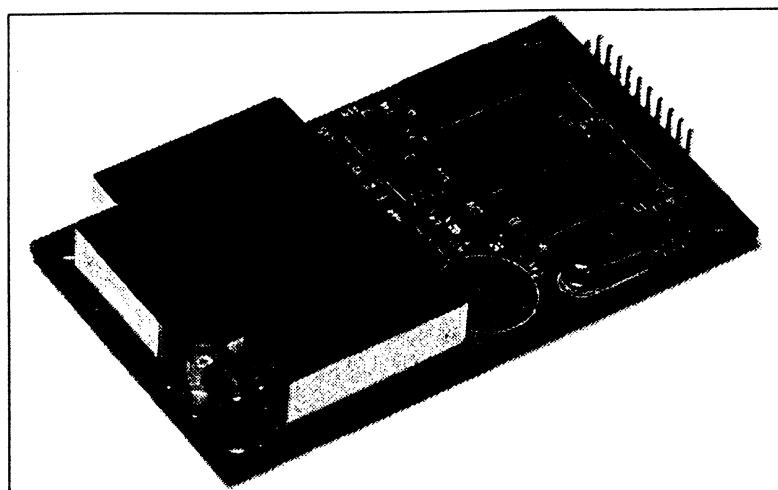
Figure 1. The Conexant Jupiter LP GPS Receiver With Straight OSX RF Connector (Top View -- Shown Approximately 1.5x Actual Size)

Figure 2. The Conexant Jupiter LP GPS Receiver With Straight OSX RF Connector (Bottom View -- Shown Approximately 1.5x Actual Size)

The 12-channel architecture provides rapid Time-To-First-Fix (TTFF) under all startup conditions. While the best TTFF performance is achieved when time of day and current position estimates are provided to the receiver, the flexible signal acquisition system takes advantage of all available information to provide a rapid TTFF. Acquisition is guaranteed under all initialization conditions as long as visible satellites are not obscured.

To minimize TTFF when prime power is removed from the receiver, an external OEM-supplied DC supply voltage is required to maintain power to the Static Random Access Memory (SRAM) and to the Real-Time Clock (RTC). In this case, the shortest possible TTFF is achieved by using the

RTC time data and prior position data stored in the receiver's SRAM.

The receiver supports Two-Dimensional (2-D) operation when less than three satellites are available or when required by operating conditions. Altitude information required for 2-D operation is determined by the receiver or may be provided by the OEM application.

Communication with the receiver is established through two identical, independent, asynchronous serial I/O ports that support full duplex data communication. The receiver's primary serial port (the host port) outputs navigation data and accepts commands from the OEM application in National
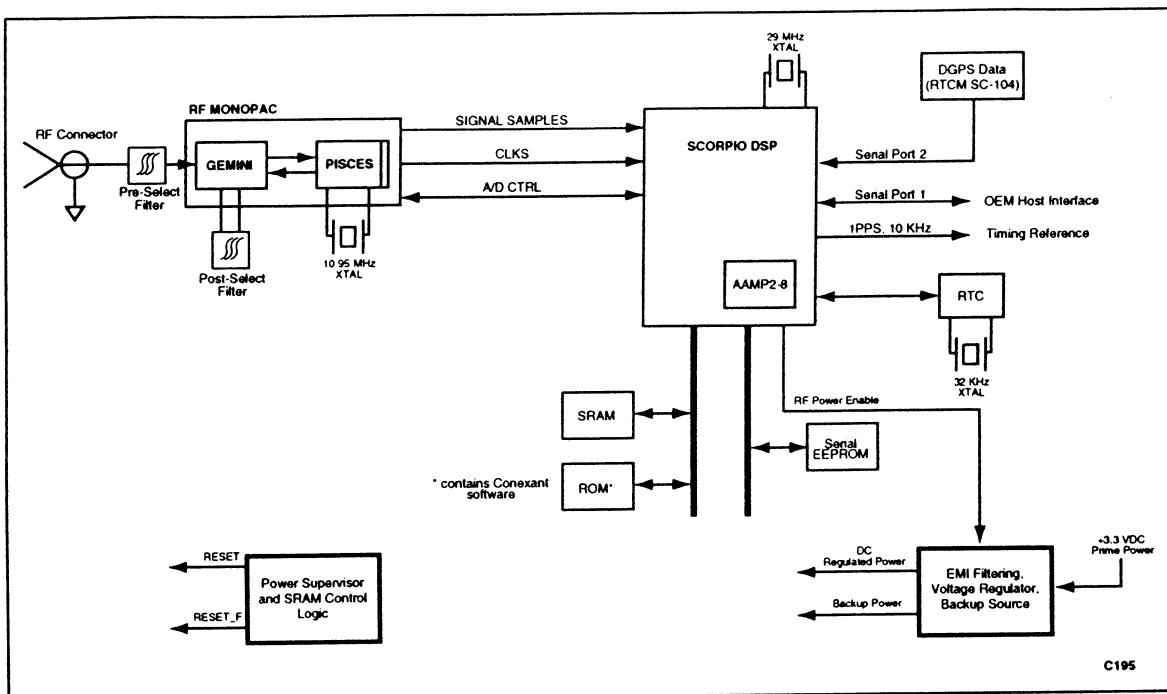
Figure 3. Jupiter LP Receiver Architecture

Marine Electronics Association (NMEA-0183) format or Conexant binary message format.

The secondary port (the auxiliary port) is configured to accept Differential GPS (DGPS) corrections in the Radio Technical Commission For Maritime Services (RTCM SC-104) format (a summary of the supported RTCM message types is listed in Table 9). A complete description of the serial data interface is contained in the Conexant document, *Zodiac GPS Receiver Family Designer's Guide.*

Receiver Architecture. The functional architecture of the Jupiter LP receiver is shown in Figure 3. The receiver design is based on the Conexant Zodiac chipset: the Gemini/Pisces MonoPac™ and the Scorpio DSP, which contain the required GPS functionality. The Gemini/Pisces MonoPac™ contains all the RF downconversion and amplification circuitry, and presents the In-Phase (I) and Quadrature-Phase (Q) Intermediate Frequency (IF) sampled data to the Scorpio device. The Scorpio device contains an integral microprocessor and all the required GPS-specific signal processing hardware. Memory and other external supporting components configure the receiver into a complete navigation system.

Product Applications

The Jupiter LP GPS receiver is suitable for a wide range of OEM highly integrated GPS design applications such as:

- Handheld GPS receiver applications.
- Automotive applications.
- Marine navigation applications.
- Aviation applications.
- Timing applications.

Figure 4 illustrates an architecture that might be used to integrate the receiver with an applications processor that drives peripheral devices such as a display and keyboard. The interface between the applications processor and the receiver is through the serial data interface.

Technical Description

General Information. The Jupiter LP GPS receiver requires +3.3 volts primary DC input power. The receiver can operate from either an active or passive GPS antenna, supplied by the OEM, to receive L1 band frequency GPS carrier signals.

Since the receiver determines its position by ranging signals from three or more GPS satellites orbiting the Earth, its antenna must have reasonable visibility of the sky. This is generally not a problem when the receiver is used outdoors in the open. However, when used indoors or inside of an automobile, the antenna should be positioned in such a way as to have an unobstructed "view" of the sky. To establish an initial navigation fix, the receiver requires a minimum of three satellites in track with good geometry (Geometric Dilution of Precision [GDOP]<10).
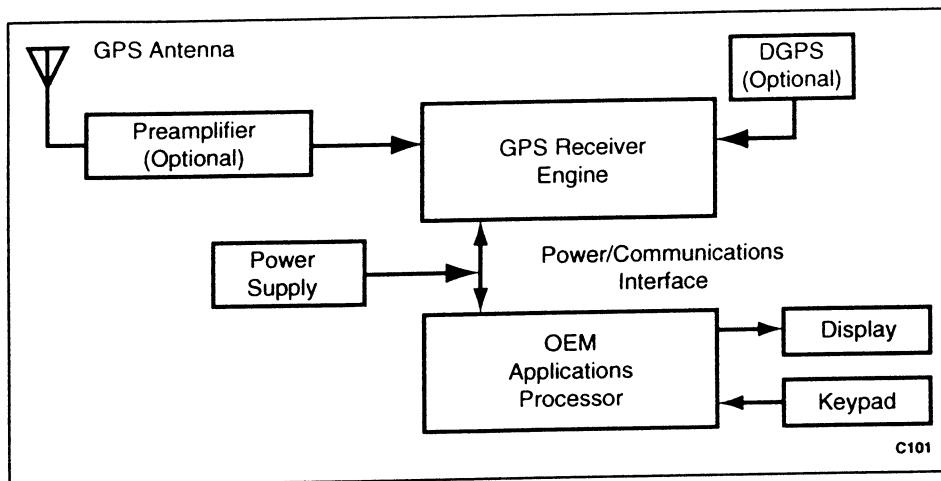
Figure 4. Typical Jupiter LP/OEM Architecture

If satellite signals are blocked, the length of time for the receiver to receive those signals and determine its position will be longer. If fewer than three satellites are being tracked, or if the satellite geometry is degraded, signal blockage may result in a failure to navigate.

Satellite Acquisition. The Jupiter LP GPS receiver supports four types of satellite signal acquisition depending on the availability of critical data. Table 2 provides the corresponding TTFF times for each of the following acquisition states.

- **Warm Start.** A warm start results from a software reset after a period of continuous navigation or a return from a short idle period (i.e., a few minutes) that was preceded by a period of continuous navigation. In this state, all of the critical data

(position, velocity, time, and satellite ephemeris) is valid to the specified accuracy and available in SRAM.

- **Initialized Start.** An initialized start typically results from user-supplied position and time initialization data or continuous RTC operation with an accurate last known position available from EEPROM. In this state, position and time data are present and valid but ephemeris data validity has expired.

- **Cold Start.** A cold start acquisition state results when position and/or time data is unknown, either of which results in an unreliable satellite visibility list. Almanac information is used to identify previously healthy satellites.

Table 2. Jupiter LP Receiver Signal Acquisition

| Satellite Acquisition State | Time-To-First-Fix | | Initial Error Uncertainties (3 Sigma) | | | Maximum Almanac Age | Maximum Ephemeris Age |
	Typical (minutes)	90% Probable (minutes)	Position (km)	Velocity (m/sec)	Time (minutes)	Weeks	Hours
Warm	0.30	0.4	100	75	5	1	4
Initialized	0.8	1.0	100	75	5	1	N/A
Cold	2.0	2.5	N/A	N/A	N/A	1	N/A
Frozen	Note 1	Note 1	N/A	N/A	N/A	N/A	N/A

N/A = Not available in real-time to the receiver. Note that times are valid at 25 degrees Celsius with no satellite signal blockage.

Note 1: Frozen start is considered to be a recovery mode. An "out-of-the-box" board that has not operated for a significant amount of time (months) may approximate this state because the data in EEPROM may be valid but expired or partially complete.

Table 3. GPS Receiver Navigational Accuracies

	Position (meters)				Velocity (meters/sec)
	Horizontal		3-D	Vertical	
	CEP	(2 dRMS)			3-D (2 sigma)
Full Accuracy C/A	25	50	93	78	0.1
Standard Positioning Service (SPS)	50	100 (95%)	200 (95%)	173 (95%)	Note 1

Note 1: Velocity accuracies for SPS are not specified for the GPS system.

- **Frozen Start.** A frozen start acquisition state occurs if there are no valid internal data sources available.

Navigation Modes. The Jupiter LP GPS receiver supports three types of Navigation Mode operations: Three-Dimensional (3-D), Two-Dimensional (2-D), and DGPS. Each of these modes is briefly described below:

- **Three-Dimensional Navigation (3-D).** The receiver defaults to 3-D navigation whenever at least three GPS satellites are being tracked. In 3-D navigation, the receiver computes latitude, longitude, altitude, and time information from satellite measurements. The accuracies that can be obtained in 3-D navigation are shown in Table 3.

- **Two-Dimensional Navigation (2-D).** When less than three GPS satellite signals are available and when a fixed value of altitude can be used to produce an acceptable navigation solution, the Jupiter LP receiver will enter the 2-D navigation mode from 3-D navigation. The receiver will use a fixed value of altitude determined either during prior 3-D navigation or as provided by the OEM. Forced operation in 2-D mode can be commanded by the OEM.

In 2-D navigation, the navigational accuracy is primarily determined by the relationship of the fixed value of altitude to the true altitude of the antenna. If the fixed value is correct, the horizontal accuracies shown in Table 3 apply. Otherwise, the horizontal accuracies will degrade as a function of the error in the fixed altitude.

- **DGPS Navigation.** The Jupiter LP receiver processes DGPS corrections through its Auxiliary serial port (port 2). These corrections must be compliant with the RTCM recommended standards for differential Navstar GPS service, also known as RTCM SC-104.

Depending on the DGPS configuration, navigational accuracies can be improved dramatically in 3-D

DGPS mode and the Jupiter LP supports the accuracies described in the RTCM SC-104 document.

Power Modes And Power Sequencing Requirements. The Jupiter LP receiver has four power modes: Off, Operate, "Keep-Alive," and Power Management. Table 4 summarizes the signal conditions and current requirements for each of these modes. The Off mode assumes that neither prime power nor external "Keep-Alive" voltage is available.

The Off mode implies that the receiver is completely de-energized. The Operate mode implies that the receiver is completely energized. The "Keep-Alive" mode implies that prime power has been removed but that an external DC voltage source is provided for backup of the SRAM and RTC. The Power Management Mode implies that the receiver will cycle the power to the RF portion of the hardware.

- **Off mode.** The receiver is completely de-energized including all DC supply input signals, serial data input signals, and control input signals.

- **Operate mode.** The receiver enters its Operate power mode when the receiver's components are fully energized at +3.3 ± 0.165 VDC. The M_RST control signal must be asserted or at a CMOS "high" logic level.

- **"Keep-Alive" mode.** From Operate mode, the receiver will enter a "Keep-Alive" mode when PWRIN voltage is removed, provided that an external DC supply voltage is available at the VBATT signal input. In this state, the external voltage supply provides power for the SRAM and RTC. If the board is subsequently powered up from this state, the receiver uses the current time maintained by the RTC as well as critical satellite data stored in SRAM to achieve rapid TTFF.

Table 4. Jupiter LP GPS Receiver External Power Requirements
(typical, measured at 25° C)

INPUT VOLTAGE	REQUIREMENT BY MODE		
	Operate	"Keep-Alive" (3 VDC)	Power Management
PWRIN Voltage	+3.3 ± 0.165V	0V or GND	+3.3 ± 0.165 V
PWRIN (Typical)	130 mA (429 mW)	N/A	70 mA (231 mW)
PWRIN (Maximum)	190 mA (627 mW)	N/A	190 mA (627 mW)
PWRIN Ripple P-P (mV)	100	N/A	100
VBATT Voltage	Note 1	+3 ± 0.25 V	N/A
VBATT Current	N/A	40 µA	N/A
VBATT Maximum Power	N/A	0.12 mW	N/A

Note 1: VBATT should not exceed PWRIN while in Operate Mode.

CAUTION:

During the OFF or "Keep-Alive" modes, de-energizing (i.e., not driven to a CMOS "high" level) the following I/O functions is recommended:

- Master Reset (pin J1-5).
- NMEA Protocol Select (pin J1-7).
- ROM Default Select (pin J1-8).
- Host Port Serial Data Input (pin J1-11).
- Auxiliary Port Serial Data Input (pin J1-15).

Violation of the specified operating voltages will result in erratic receiver operation. The voltage threshold level at which the receiver's power supervisory circuit places the receiver's microprocessor in reset is +2.85 to 3.0 VDC, in which case PWRIN will continue to supply power to the receiver. No damage will occur if PWRIN dwells in this uncertainty region, but power dissipation will be affected. Also, critical SRAM data and RTC time keeping may become corrupted, affecting TTFF when the receiver is returned to normal operating conditions.

- **Power Management Mode.** From Operate mode, the receiver will enter Power Management mode when the power management setting is selected (the default is "off"). Power Management mode can be selected through LABMON or by serial data message 1317 (Power Management Control Message). The receiver cycles off the RF portion of the hardware at a pre-programmed interval of one to four seconds.

The power reduction is based on this interval setting. A one second interval setting provides approximately 33 percent reduction in average power consumption.

A four second interval setting provides approximately 50 percent reduction in average power consumption.

CAUTION:

During Power Management Mode, power cycling the RF portion of the hardware reduces the number of GPS measurements. This may degrade receiver performance.

Power-Up Sequencing. The power-up sequence for the Jupiter LP receiver is the same from either the OFF mode or the "Keep-Alive" mode. Primary DC power, as specified in Table 4, is applied to the PWRIN pin of the receiver's OEM interface connector by the host system. If the M_RST pin on the interface connector is asserted high when DC power is applied, the receiver will begin normal operation after 200 msec.

Technical Specifications

Operational Characteristics

Signal Acquisition Performance. Refer to Table 2. The values shown are based on unobscured satellite signals.

Accuracy. Accuracy is a function of the entire Navstar system and geometry of the satellites at the time of measurement. In general, individual receivers have very little influence over the accuracy provided. Navigational accuracies using Full Accuracy C/A Code (SA Off) and the SPS (SA On) are shown in Table 3. These accuracies are based on a Position Dilution of Precision (PDOP) of 6.0 and the maximum vehicle dynamic of 500 m/sec.

**Solution Update Rate.** Once per second.
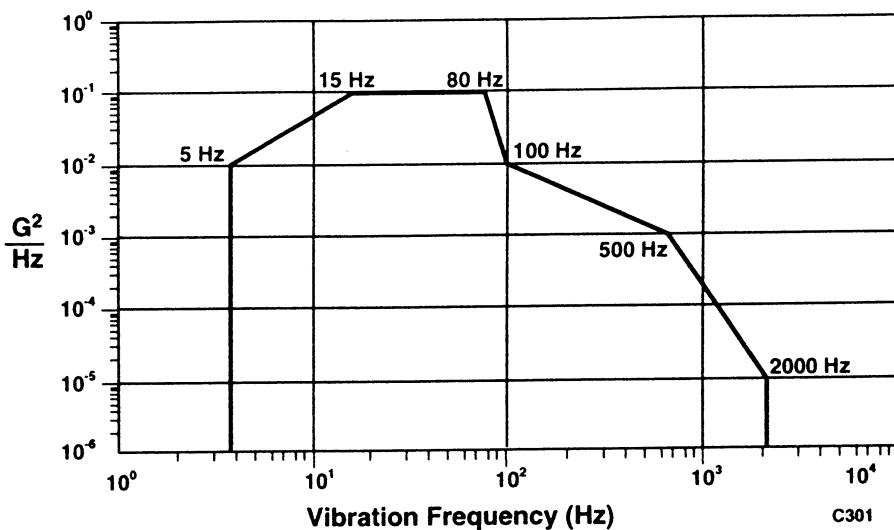
Figure 5. SAE Composite Curve (Random Noise)

Reacquisition. 2 seconds typical with a 10 second blockage.

RTCM SC-104 Differential Compatibility. Direct data input over the Auxiliary serial port.

Time Mark. Once per second.

Serial Data Output Protocol. Conexant binary serial I/O messages or NMEA-0183 serial I/O messages.

Power Requirements _____

Regulated power for the Jupiter LP GPS receiver is required according to the information provided in Table 4.

When the receiver is operated with an active GPS antenna, the antenna's maximum preamp "pass-through" current is 100 mA at voltages up to +12 volts. This current must be limited outside of the receiver.

Radio Frequency Signal Environment _____

RF Input. 1575.42 MHz (L1 band) at a level between -130 dBW and -163 dBW. The RF input connects to an OSX high-retention female connector.

Burnout Protection. -10 dBW signal within a bandwidth of 10 MHz centered about the L1 carrier frequency.

Physical _____

Dimensions. 2.800" x 1.600" x 0.442" (71 mm x 41 mm x 11 mm) with an OSX straight (or optional right angle), coaxial RF jack receptacle and a standard 2x10 pin-field I/O connector.

Weight. 0.85 ounces (23.8 gm)

Environmental _____

Cooling (operating/storage). Convection

Temperature. -40°C to +85°C

Humidity. Relative humidity up to 95% noncondensing or a wet-bulb temperature of +35° C, whichever is less.

Altitude (operating/storage). -1000 feet to 60,000 feet.

Maximum Vehicle Dynamic. 500 m/sec (acquisition and navigation).

Vibration. Full Performance, see the composite SAE curve in Figure 5. Survival, 18G peak, 5 msec duration.

Shock. Shipping (in container): 10 drops from 75 cm onto a concrete floor.

RF Connector _____

The RF connector is a 50 Ohm standard straight OSX subminiature, snap-on coaxial RF jack receptacle. An optional right angle OSX connector is also available.

OEM Interface Connector _____

The OEM communications interface is a dual row, straight 2x10 pin field connector header. The pins are spaced on 2.0 mm (0.0787 in) centers and the pin lengths are 6.4 mm (0.250 in) on the board configuration containing a straight OSX RF connector. The pin lengths are 7.62 mm (0.300 in) on the board configuration containing the optional right angle OSX connector. Figure 6 diagrams the pin 1 reference location (pin 2 is not installed).
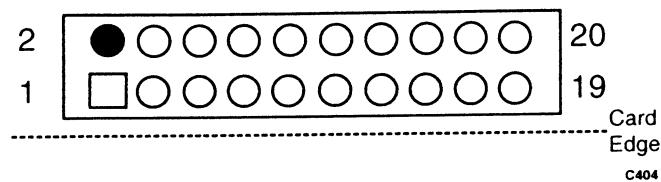
Figure 6. 2x10 Pin Field Connector (J1) Pin 1 Reference Location (Top View)

Mechanical Layout

The mechanical drawing for the Jupiter LP board is shown in Figures 7 and 8. Figure 7 illustrates the board with a straight OSX connector and Figure 8 illustrates the board with an optional right angle OSX connector.

ESD Sensitivity

The Jupiter LP GPS receiver is a Class 1 device. The following Electrostatic Discharge (ESD) precautions are required:

- Protective outer garments.
- Handle device in ESD safeguarded work area.
- Transport device in ESD shielded containers.
- Monitor and test all ESD protection equipment.

Treat the Jupiter LP GPS receiver as extremely sensitive to ESD.

Hardware Interface

The electrical interface for the Jupiter LP receiver is a standard 2x10 pin field connector header that is used for all data input and output. A pinout description for this connector is provided in Table 5.

The following paragraphs describe the basic functions allocated to the various pins on the 2x10 pin field interface connector. These functions are divided into three groups: Configuration and timing signals, serial communication signals, and DC input signals.

Configuration And Timing Signals

Pin J1-5: Master Reset (M_RST)
This signal allows the OEM to generate a system hardware reset to the receiver. This signal is capable of being driven directly by an external microprocessor or by external logic without the need for any external pull-up or pull-down resistors. The OEM can generate a system reset to the receiver by pulling the M_RST control signal low to ground.

NOTE: The M_RST signal must be pulled to a CMOS logic "high" level coincident with, or after, the application of prime DC power for the receiver to enter its Operate mode. The M_RST must be held at ground level for a minimum of 150 nsec to assure proper generation of a hardware reset to the receiver.

Table 5. Jupiter LP Receiver Standard 2x10 Pin Field OEM Interface Connector Pinout

| Pin #	Name	Description	Pin #	Name	Description
1	PREAMP	Preamp power input	11	SDO1	Serial data output port #1
2	NC	Reserved (no connect)	12	SDI1	Serial data input port #1
3	VBATT	Battery backup voltage input	13	GND	Ground
4	PWRIN_3	Primary +3.3 VDC power input	14	N/C	Reserved (no connect)
5	M_RST	Master reset input (active low)	15	SDI2	Serial data input port #2
6	N/C	Reserved (no connect)	16	GND	Ground
7	GPIO2	NMEA protocol select	17	GND	Ground
8	GPIO3	ROM default select	18	GND	Ground
9	GPIO4	Reserved (no connect)	19	TMARK	1PPS time mark output
10	GND	Ground	20	10kHZ	10 kHz clock output
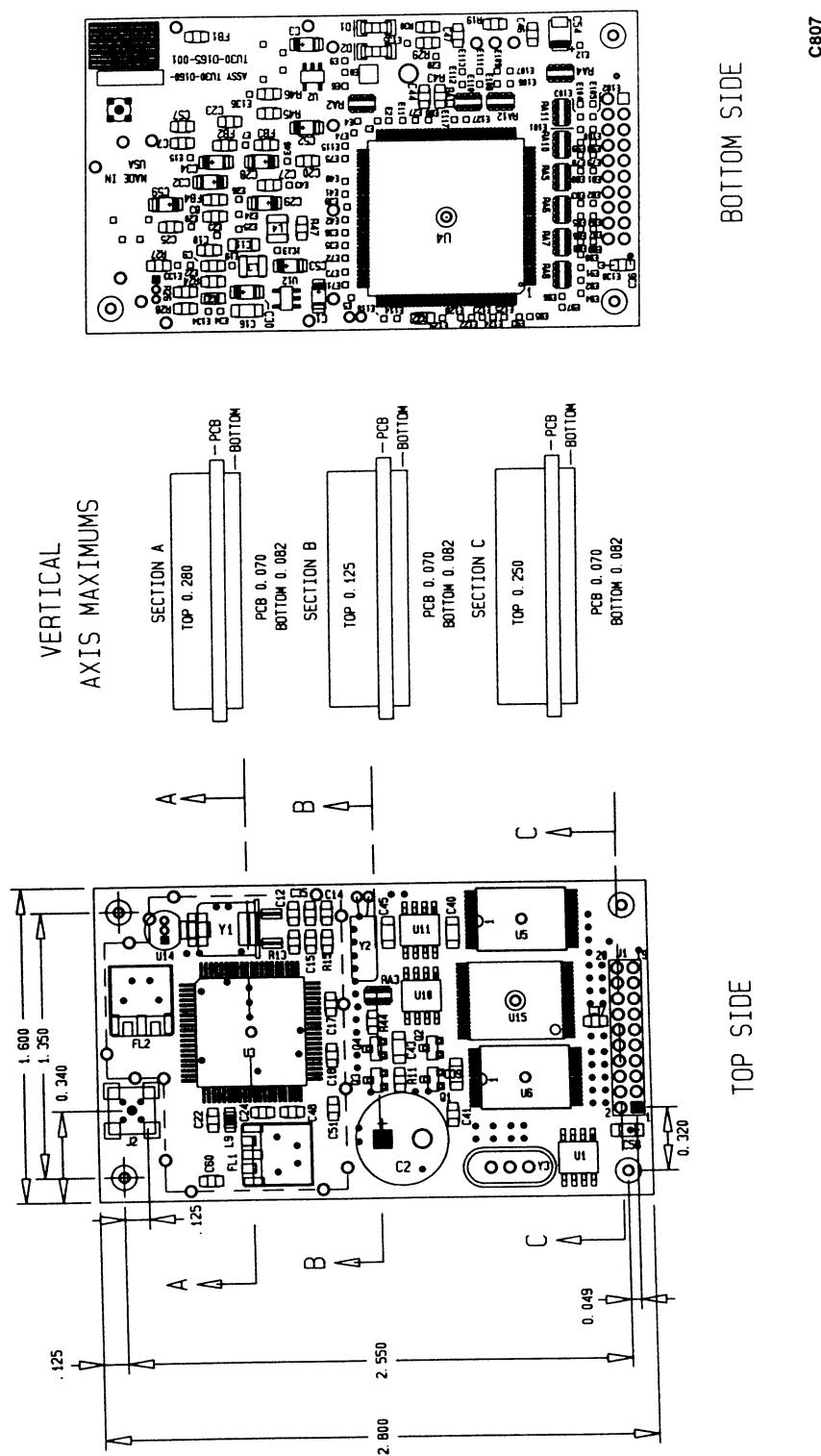
Figure 7. Mechanical Drawing of Jupiter LP Board With Straight OSX Connector
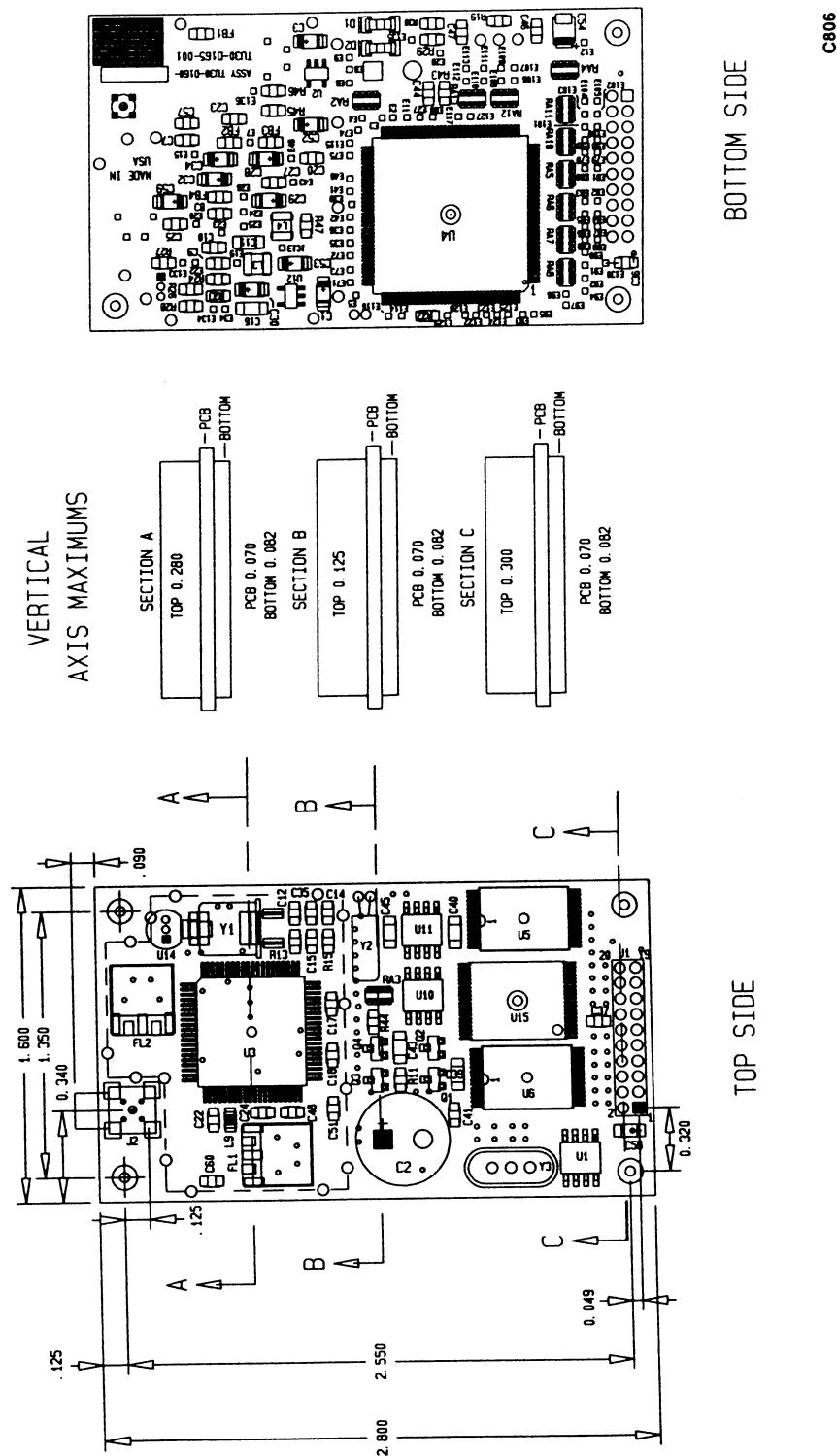
Figure 8. Mechanical Drawing of Jupiter LP Board With Right Angle OSX Connector

Table 6. Jupiter LP Receiver Serial Port Configuration Truth Table

NMEA Protocol Select (pin 7)	ROM Default Select (pin 8)	Result
0	0	NMEA message format; host port communication settings = 4800 bps, no parity, 8 data bits, 1 stop bit. The receiver operates from default initialization values stored in ROM and will output the default NMEA message set from ROM.
0	1	NMEA message format; host port communication settings = 4800 bps, no parity, 8 data bits, 1 stop bit. The receiver selects the default NMEA output message set and uses initialization values from the data stored in SRAM or EEPROM (Note 1).
1	0	Binary message format; host port communication settings = 9600 bps, no parity, 8 data bits, 1 stop bit. The receiver operates from default initialization values stored in ROM.
1	1	Data stored in SRAM or EEPROM determines message format, host port communication settings, and default message set (Note 1).
Note 1: For further information, refer to the description of the ROM Default Select pin (J1-8) below.		

This signal can also be used to provide control of the Jupiter LP receiver's Operate mode without removing prime input power from the receiver. When M_RST is pulled to ground, the receiver will enter a low power state for as long as the M_RST signal is asserted low. In this state, a portion of the receiver's RF circuitry is de-energized, the SRAMs are transitioned into their low power data retention state, and the RTC device is maintained. When the receiver is placed into this low power state through the use of the M_RST control signal, the receiver will continue to draw current from the primary input power (PWRIN) but at a reduced level.

When the M_RST signal is subsequently asserted high by the OEM, RF power is re-applied, a system reset is generated, and the receiver will return to its normal Operate mode.

Pin J1-6: Reserved
This signal is reserved and **NO** electrical connections should be made to the OEM application.

Pin J1-7: NMEA Protocol Select (GPIO2)
The Jupiter LP receiver has two hardware selectable message protocols that may be used to communicate over the host serial I/O port. These message protocols are a Conexant binary message format and a NMEA ASCII message format. When this signal is pulled "low," the receiver communicates over the host serial port using the NMEA message format (4800 bps, no parity, 8 data bits, and 1 stop bit).

When this signal is pulled "high," the receiver communicates over the host serial I/O port using the format determined by the setting of the Read-Only Memory (ROM) Default Select pin (J1-8).

Binary and NMEA messages are both described in the Conexant document, *Zodiac GPS Receiver Family Designer's Guide*.

The relationship between the user-selectable functions (GPIO2 and GPIO3) is shown in Table 6.

Pin J1-8: ROM Default Select (GPIO3)
This signal determines whether the message format, host port communication settings, receiver default message set, and initialization data parameters are obtained from default values stored in ROM or from user-configurable settings stored in SRAM/EEPROM. If this signal is pulled "low," the ROM-based factory default values are used.

Note: when the ROM defaults select (GPIO3) signal is pulled "low," each power cycle or reset of the receiver will result in a longer TTFF. This is because the receiver will use default initialization parameters stored in ROM rather than the current initialization parameters that may be available in SRAM or EEPROM.

The default values for NMEA protocol are 4800 bps RX/TX, no parity, 8 data bits, and 1 stop bit. The default values for binary protocol are 9600 bps RX/TX, no parity, 8 data bits, and 1 stop bit.

If this signal is pulled "high," the port configuration parameters are accessed in the following priority:

1. If SRAM checksums are valid, the communication parameters and initialization data parameters will be read from SRAM.

(*) Binary message data, 9600 bps, receiver reporting valid navigation solution

C320
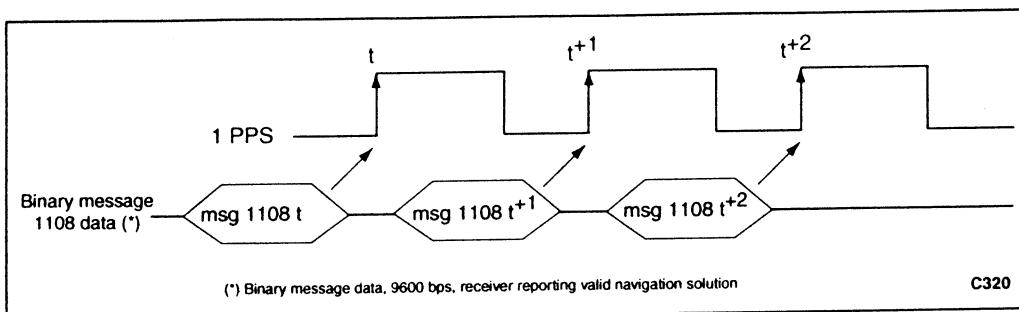
Figure 9. UTC Time Mark Pulse Output Message/UTC TMARK Pulse Relationship

2. If SRAM checksums are invalid and EEPROM checksums are valid, the communication parameters and initialization data parameters will be read from EEPROM.

3. If SRAM checksums are invalid and EEPROM checksums are invalid, the default values in ROM will be used.

The relationship between the user-selectable functions (GPIO2 and GPIO3) is shown in Table 6.

Pin J1-9: Reserved (GPIO4)

This signal is reserved and **NO** electrical connections should be made to the OEM application.

Pin J1-14: Reserved

This signal is reserved and **NO** electrical connections should be made to the OEM application.

Pin J1-19: UTC Time Mark Pulse (TMARK)

The Time Mark output provides a one pulse-per-second (1 pps) signal to the OEM application processor. When the receiver provides a valid navigation solution, the rising edge of each TMARK pulse is synchronized with the UTC one second epochs to within ±300 µsec (3σ).

The receiver software produces a binary format data message containing the UTC time associated with each time mark pulse. The relationship between the UTC Time Mark Pulse Output message and the TMARK pulse is shown in Figure 9. When the receiver's serial data communication port is set to 9600 bps, the UTC Time Mark Pulse Output message precedes the TMARK pulse by 400 to 500 msec (typically).

The TMARK pulse waveform is shown in Figure 10. This signal is a positive logic, buffered CMOS level output pulse that transitions from a logic "low" condition to a logic "high" at
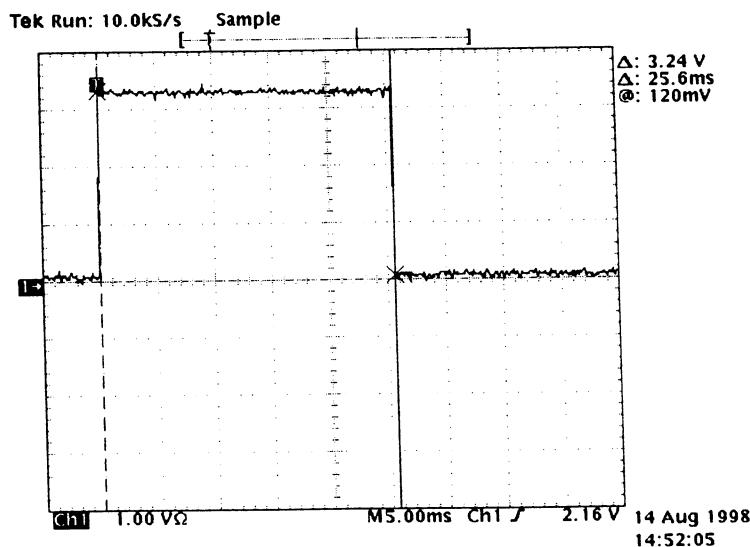

**Figure 10. Jupiter LP GPS Receiver Time Mark Pulse Waveform**

Tek **Stop** 2.50MS/s   32 Acqs

```
                                          Δ: 3.20 V
                                          Δ: 100.4µs
                                          @: 3.28 V
```

Ch1 1.00 VΩ   **Ch2** 2.00 VΩ M 20.0µs Ch1 ⌐   2.16 V 14 Aug 1998
                                                            14:49:25
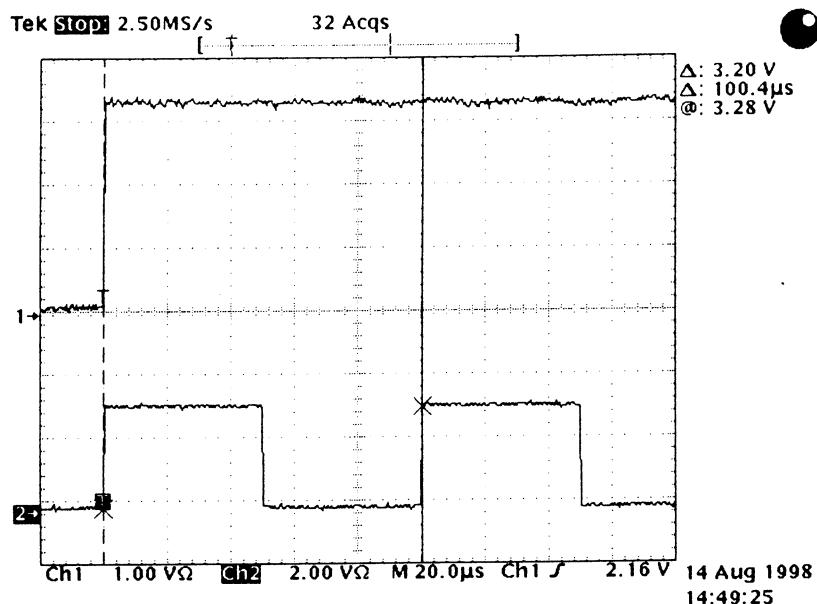
Figure 11. 10 kHz Clock/UTC TMARK Pulse Relationship

a 1 Hz rate. The TMARK output pulse rise time is typically less than 2 nsec and the pulse duration is typically 25.6 msec.

Pin J1-20: 10 kHz UTC Synchronized Clock

This is a 10 kHz clock waveform that is synchronized to the UTC TMARK pulse. The relationship between the 10 kHz clock and the TMARK UTC pulse is shown in Figure 11. This clock signal is a positive logic, buffered CMOS level output.

Serial Communication Signals _____

Note: both the Configuration and Timing signals, described in the previous section, and the Serial Communication signals described below must be applied according to the limits shown in Table 7.

Pins J1-11 and 12: Host Port Serial Data Output And Input (SDO1 and SDI1)

The host port consists of a full-duplex asynchronous serial data interface. Both binary and NMEA initialization and configuration data messages are transmitted and received across this port.

The OEM application must provide any Line Driver/Line Receiver (LD/LR) circuitry to extend the range of the interface. Port Idle is nominally a CMOS logical high (+3.3 VDC).

Pin J1-15: Auxiliary Port Serial Data Input (SDI2)

The auxiliary port consists of a second half-duplex asynchronous serial data interface. This port is configured to receive RTCM DGPS correction data messages.

When the NMEA Protocol Select pin (J1-7) is "low" during reset initialization, the Auxiliary Port Serial Data input defaults to 9600 baud, no parity, 8 data bits, and 1 stop bit. Otherwise, the last saved settings are used.

The OEM application must provide any LD/LR circuitry to extend the range of the interface. Port Idle is nominally a CMOS logical high (+3.3 VDC).

DC Input Signals _____

Pin J1-1: Preamp Power Input (PREAMP)

The OEM may optionally supply power to a preamplifier using the antenna cable center conductor. The maximum voltage is +12 VDC and the current must not exceed 100 mA.

WARNING: DO NOT APPLY POWER TO A PASSIVE ANTENNA OR DAMAGE TO THE RECEIVER WILL OCCUR.

Pin J1-4: Power Input (PWRIN_3)

This signal is the main power input to the Jupiter LP receiver. Regulated DC power requirements are shown in Table 4.

Pin J1-3: Battery Backup Power Input (VBATT)

This signal is used to provide a DC power input to the SRAM and RTC devices only. The receiver automatically switches to the VBATT input signal when primary DC power (PWRIN) is removed from the board.

This feature is intended to provide the receiver with a "warm start" capability by maintaining an accurate time source and

Table 7. Jupiter LP GPS Receiver Digital Signal Requirements

Symbol	Parameter	Limits (Note 1)	Units
PWRIN_3	Main Power Input to the Jupiter LP (+3.3 VDC)	3.135 to 3.465	V
VIH (min)	Minimum High-Level Input Voltage	0.7 x PWRIN	V
VIH (max)	Maximum High-Level Input Voltage	PWRIN	V
VIL (min)	Minimum Low-Level Input Voltage	-0.3	V
VIL (max)	Maximum Low-Level Input Voltage	0.3 x PWRIN	V
VOH (min)	Minimum High-Level Output Voltage	0.8 x PWRIN	V
VOH (max)	Maximum High-Level Output Voltage	PWRIN	V
VOL (min)	Minimum Low-Level Output Voltage	0	V
VOL (max)	Maximum Low-Level Output Voltage	0.2 x PWRIN	V
tr, tf	Input Rise and Fall Time	50	nsec
C out	Maximum Output Load Capacitance	25	pF

Note 1: PWRIN refers to a +3.3 VDC power input (PWRIN_3).

using position and satellite data stored in SRAM after prime input power (PWRIN) has been removed from the receiver.

Pin J1-2: Reserved
This signal is reserved and no electrical connections should be made to the OEM application.

Pins J1-10, 13, 16, 17, and 18: Ground (GND)
DC grounds for the board. All grounds are tied together through the receiver's printed wiring board (PWB) ground plane and should all be grounded externally to the receiver.

Software Interface

The host serial I/O port of the Jupiter's serial data interface supports full duplex communication between the receiver and the OEM application. Data messages can be in the Conexant binary format or NMEA-0183 format. The receiver also contains an auxiliary port dedicated to direct processing of the RTCM SC-104 messages for DGPS corrections.

Binary Data Messages. All of the output and input binary messages for the Jupiter LP receiver are listed in Table 8, along with their corresponding message IDs. A complete description of each binary message is contained in the Conexant document, *Zodiac GPS Receiver Family Designer's Guide.*

NMEA Data Messages. All of the output and input NMEA messages for the Jupiter LP receiver are listed in Table 9 along with their corresponding message IDs. A complete description of each NMEA message is contained in the Conexant document, *Zodiac GPS Receiver Family Designer's Guide.*

RTCM SC-104 Data Messages. Table 10 lists those messages defined in the RTCM SC-104 standard that are used by the Jupiter LP receiver to form a DGPS position solution (not all DGPS messages are necessary for DGPS operation).

Table 8. Jupiter LP Receiver Binary Data Messages

Output Message Name	Message ID	Input Message Name	Message ID
Geodetic Position Status Output (*)	1000	Geodetic Position and Velocity Initialization	1200
Channel Summary (*)	1002	User-Defined Datum Definition	1210
Visible Satellites (*)	1003	Map Datum Select	1211
Differential GPS Status	1005	Satellite Elevation Mask Control	1212
Channel Measurement	1007	Satellite Candidate Select	1213
ECEF Position Output	1009	Differential GPS Control	1214
Receiver ID (**)	1011	Cold Start Control	1216
User-Settings Output	1012	Solution Validity Criteria	1217
Built-In Test Results	1100	User-Entered Altitude Input	1219
UTC Time Mark Pulse Output (*)	1108	Application Platform Control	1220
Frequency Standard Parameters In Use	1110	Nav Configuration	1221
Power Management Duty Cycle In Use	1117	Perform Built-In Test Command	1300
Serial Port Communication Parameters In Use	1130	Restart Command	1303
EEPROM Update	1135	Frequency Standard Input Parameters	1310
EEPROM Status	1136	Power Management Control	1317
Frequency Standard Table Output Data	1160	Serial Port Communication Parameters	1330
Error/Status	1190	Message Protocol Control	1331
		Factory Calibration Input	1350
		Raw DGPS RTCM SC-104 Data	1351
		Frequency Standard Table Input Data	1360

(*) Enabled by default at power-up.
(**) Once at power-up/reset.

Table 9. Jupiter LP Receiver NMEA v2.01 Data Messages

Output Message Name	Message ID	Input Message Name	Message ID
Conexant Proprietary Built-In Test (BIT) Results	BIT	Conexant Proprietary Built-In Test (BIT) Command	IBIT
Conexant Proprietary Error/Status	ERR	Conexant Proprietary Log Control Message	ILOG
GPS Fix Data (*)	GGA	Conexant Proprietary Receiver Initialization	INIT
GPS DOP and Active Satellites (*)	GSA	Conexant Proprietary Protocol Message	IPRO
GPS Satellites in View (*)	GSV	Standard Query Message	Q
Conexant Proprietary Receiver ID (**)	RID		
Recommended Minimum Specific GPS Data (*)	RMC		
Track Made Good and Ground Speed	VTG		
Conexant Proprietary Zodiac Channel Status (*)	ZCH		

(*) Default power-up message.
(**) Once at power-up/reset.

Table 10. Jupiter LP Receiver RTCM SC-104 Data Messages

Message ID	Status (Note 1)	Title	Used For DGPS Corrections?
1	F	Differential GPS Corrections	Y
2	F	Delta DGPS Corrections	Y
3	F	Reference Station Parameters	N
4	R	Surveying (message retired)	N
5	F	Constellation Health	N
6	F	Null Frame	N
7	F	Beacon Almanacs	N
8	T	Pseudolite Almanacs	N
9	F	Partial Satellite Set Differential Corrections	Y
10	R	P-Code Differential Corrections	N
11	R	CA Code L1/L2 Delta Corrections	N
12	R	Pseudolite Station Parameters	N
13	T	Ground Transmitter Parameters	N
14	R	Surveying Auxiliary Message	N
15	R	Ionosphere (Troposphere) Message	N
16	F	Special Message	N
17	T	Ephemeris Almanac	N
18	T	Uncorrected Carrier Phase Measurements	N
19	T	Uncorrected Pseudorange Measurements	N
20	T	RTK Carrier Phase Corrections	N
21	T	RTK Pseudo-Range Corrections	N
22-58		Undefined	N
59	T	Proprietary Message	N
60-63	R	Multi-Purpose Usage	N

Note 1: "F" = Fixed, "T" = Tentative, and "R" = Reserved. Status types are defined in Table 4.3 of the RTCM SC-104 version 2.1 standard.

Ordering Information

Model Name	Manufacturing Part Number	Product Revision
Jupiter LP	TU30-D160	-001 -011

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