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National Water Research Institute

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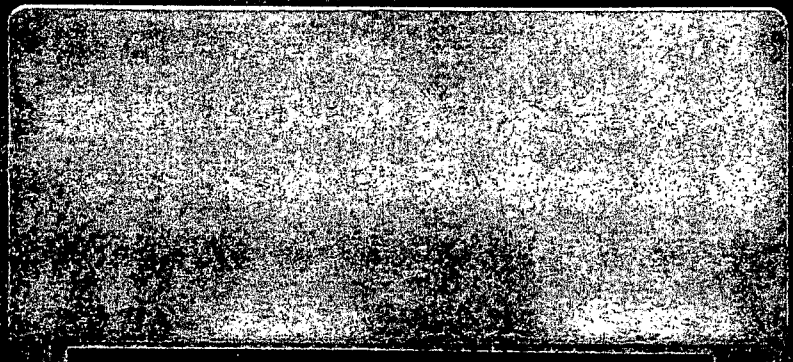
Services De Génie



Handbook
Manuel

Study No. 1540
(APO-40)

HANDBOOK NOTES FOR PORTABLE MULTIBAND TRANSMITTANCE PROFILER ES-1107

G. Dolanjski
Engineering Services Section
Hydraulics Division
National Water Research Institute
Canada Centre for Inland Waters

April 1981

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1. INTRODUCTION

The system is designed to produce a profile of the transmission characteristics of water in four distinct bands of light. Three of the bands correspond to satellite imagry filtering.

This Portable Multiband Transmittance Profiler is an adaptation of the wide field-of-view, portable system, and the large ship multiband prototype system. This results in an improved dynamic range, accuracy, stability and ease of operation for the new profiler. The newly developed barometric compensation circuitry (as used in OPIA ES-1094) is also employed to give better accuracy in depth readings for the profiler.

2. CIRCUIT DESCRIPTION

The Profiler consists of transmittance sensor, depth sensor, interconnecting cable and surface control enclosure (Fig. 1). From the block diagram, Fig. 2, it is visible that transmittance sensor contains tungsten iodide source, optics which produces a cylindrically limited beam, narrow field of view receiving optics, filter wheel followed by a silicon photodiode. The radiation is then sensed by the diode, amplified and presented as an output voltage. This voltage is linearly proportional to the transmittance of the medium in the optical path.

The optics were mostly parts salvaged from Martek transmittance sensors. New electronics and light source were incorporated. The filter wheel, containing five filters is the same one previously used, to preserve continuation of parameters that might affect data.

The depth sensor is a 100 m device made by Teledyne Taber. Both of these sensors are protected by newly designed shock absorbing protective cage.

The surface control enclosure contains X-Y recorder, 28 V power supply, barometric compensation card and filter position meter, all housed in splash and weather-proof case.

Profiler signals are processed by barometric comp. card. The transmittance sensor output is amplified by gain of 2.12 (to enable full scale deflection of X-Y recorder on non-variable range) and buffered, (see Fig. 12). The depth signal is going to three amplifiers, each having gain of 1.3, 2.6 and 5.2, corresponding to full scale depths of 100, 50 and 25 metres respectively. After the selector switch, inverting buffer stage introduces front panel adjustable offset to nullify barometric pressure differences. All of the gains, signal polarities etc., are presetable allowing match of sensor output voltages to any range on any X-Y recorder, thus removing the need for recorder with special ranges as was the case in the past. At the same time recording is done on non-adjustable range position of recorder attenuator, removing the uncertainty of operator F.S. (non)

calibration.

The filter selection is done by pushing "filter advance" button and its position is displayed on a meter.

3. SPECIFICATIONS

TRANSMITTANCE:

Power Transmittance Range	99% → 1% 20 db dynamic range
Equivalent attenuation coefficient range	0.04 - 18.4 m^{-1} (1/4 meter path length)
Filter center wavelengths	430, 480, 530, 580, 630 nm ±5 nm
Spectral bandwidth (full width at half maximum)	30 nm (nom.)
Receiver field of view	0.9° (in water)
Accuracy + linearity	±3% F.S. (does not inherent errors due to field of view)
Precision	±1% F.S.
Drift	±2% F.S. after 1/2 hr. warmup at room temperature
Temp. drift	<±0.3%/°C for Wratten 45 filter <±0.15%/°C for F.S. for interference filters
Temperature time constant	>1 hr.
Sample dimensions	5 mm ø x 260 mm
Flow speed of response	<400 ms to 63% final value <2 s to 98% final value
Temp. range	0 - 30° C
Output	0 - 3V F.S. (100% transmittance in water)
Input power at sensor head	28 V nom. 350 mA
Sensor head mass (including cage)	25 kg (in air)
Cable mass	10 kg (in air)
Sensor head size (including cage)	750 x 450 x 400 mm

DEPTH

Range	0 - 100 m F.S.
Output	0 - 5 V F.S.
Accuracy + Linearity	0.3% F.S.
Power	28 VDC + 8 VDC 4 VDC - 35 mA

SURFACE CONTROL ENCLOSURE

1. X-Y Recorder
   X-axis transmittance
   Y-axis depth
2. Filter Position Meter
3. Barometric Compensation Control
4. Depth Range Switch

Power	110 VAC, 70 W
Size	510 x 390 x 300 mm
Mass	15 kg

4. OPERATING INSTRUCTIONS

1. Plug in sensor cable, make sure sensors are plugged in on other end of cable.
2. Make sure power is turned "off".
3. Plug in "110 VAC power" cable.
4. Turn sensor power to "on", recorder power to "on - servo off", pen "up". Allow 30 min. for warm-up. Note that "filter position" meter will indicate "#5". This does not mean #5 filter is selected. It only indicates indecisive state after power turn on. Always push "filter advance" after power up, to get desired filter in position.
5. Insert chart paper. Turn "chart" to "hold".
6. Turn X & Y "range" controls to "1V/DIV". (marked with yellow sticker "A")
7. Turn recorder power to "on - servo on".
8. Turn "depth range" to "zero".
9. Adjust X & Y "zero" controls to bring pen into "zero cal." position on chart paper.
10. Make sure that transmissometer optical faces are clean and dry.
11. Turn "depth range" to desired full scale depth selection "25, 50 or 100 m".
12. The pen moves to 85.5% which is F.S. air transmittance. If there is any offset on either side of depth zero line, it is due to barometric difference. Adjust "barometric pressure compensation" to bring pen to zero (Y direction only).
13. Lower the pen. (Remove protective plastic cap)
14. Do your profile. (Down-welling)
15. If up-welling trace isn't desired, turn "pen" to "up".
16. Replace chart paper, mark required data.
17. Push "filter advance" to next filter. (If desired)
18. Repeat from #12 on. Note that 85.5% reading in air will not be attained now, unless transmissometer optical faces are clean and dry of water droplets.

19. If 85.5% reading in air can't be attained (more than ±1% of reading) turn "X-range" to position marked with yellow sticker "B". Use "X vernier" to set pen to 85.5%. Note that vernier is only active in "B" position.

REFERENCES

Desrosiers, R., and J. Fourdraine, 1975. "Handbook Notes on the CCIW Transmittance Depth System". NWRI ES-1053.

Desrosiers, R., and G. Dolanjski. "NWRI Portable Multiband Transmittance Profiler". NWRI ES-1074.

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Pashley, A.E., and P. Ward-Whate, 1978. "O-Ring Manual". NWRI ES-1076.

Pashley, A.E., 1978. "Testing Procedure Underwater Power and Electronic Packages". NWRI ES-2002.

Martek Inc., Newport Beach California, U.S.A. "Martek Model XMS in situ Transmissometer Manual".

FIGURES

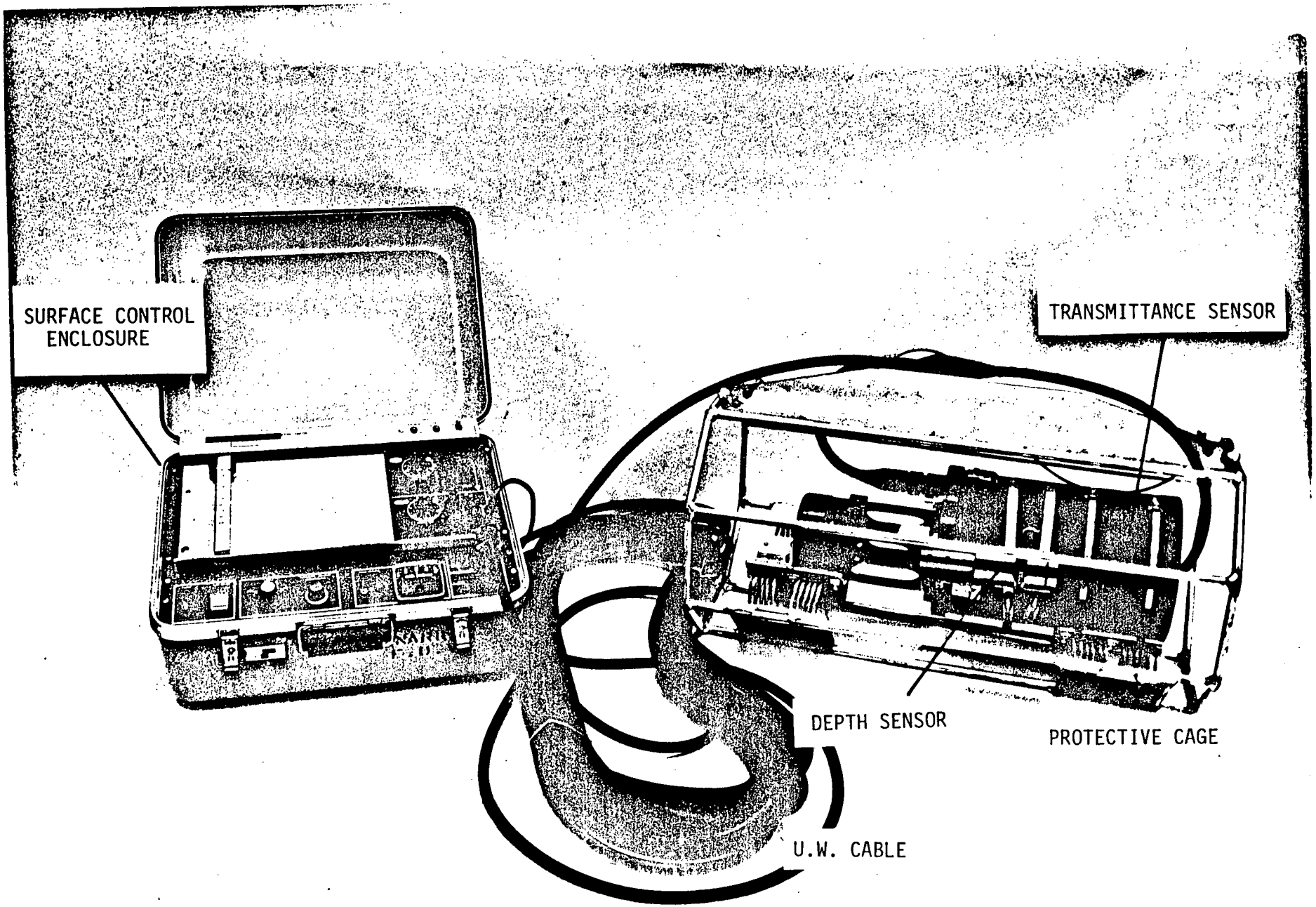
SURFACE CONTROL ENCLOSURE
TRANSMITTANCE SENSOR
DEPTH SENSOR
PROTECTIVE CAGE
U.W. CABLE

FIG. 1

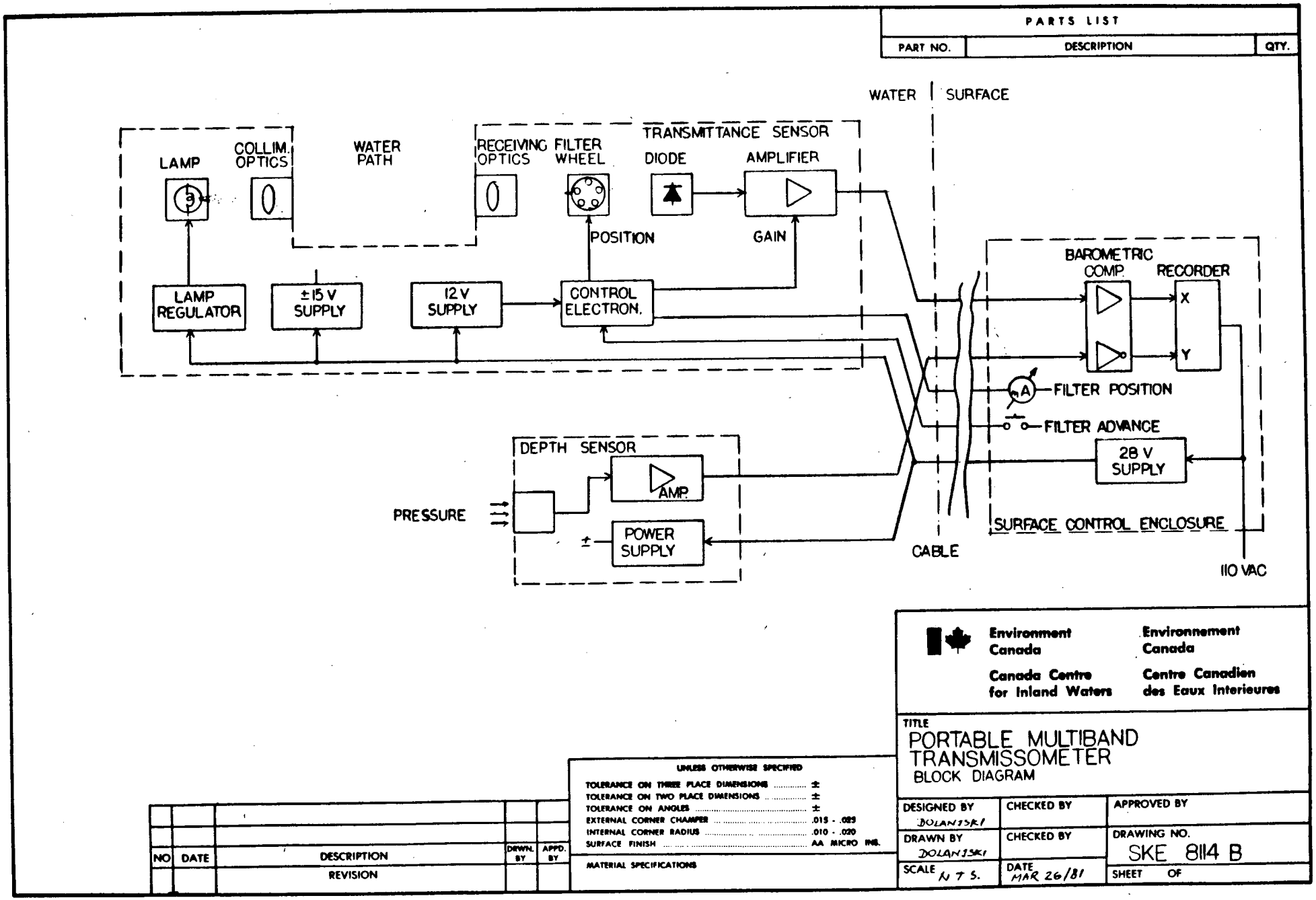
PARTS LIST
PART NO.
DESCRIPTION
QTY.
WATER
SURFACE
TRANSMITTANCE SENSOR
LAMP
COLLIM. OPTICS
WATER PATH
RECEIVING OPTICS
FILTER WHEEL
DIODE
AMPLIFIER
POSITION
GAIN
LAMP REGULATOR
±15 V SUPPLY
12 V SUPPLY
CONTROL ELECTRON.
BAROMETRIC COMP.
RECORDER
X
Y
FILTER POSITION
FILTER ADVANCE
28 V SUPPLY
DEPTH SENSOR
AMP.
PRESSURE
POWER SUPPLY
SURFACE CONTROL ENCLOSURE
CABLE
110 VAC
Environment Canada
Environnement Canada
Canada Centre for Inland Waters
Centre Canadien des Eaux Interieures
TITLE
PORTABLE MULTIBAND TRANSMISSOMETER
BLOCK DIAGRAM
DESIGNED BY DOLANISKI
CHECKED BY
APPROVED BY
DRAWN BY DOLANISKI
CHECKED BY
DRAWING NO. SKE 8114 B
SCALE N.T.S.
DATE MAR 26/81
SHEET OF
UNLESS OTHERWISE SPECIFIED
TOLERANCE ON THREE PLACE DIMENSIONS ±
TOLERANCE ON TWO PLACE DIMENSIONS ±
TOLERANCE ON ANGLES ±
EXTERNAL CORNER CHAMFER .015 - .025
INTERNAL CORNER RADIUS .010 - .020
SURFACE FINISH AA MICRO INS.
MATERIAL SPECIFICATIONS
NO
DATE
DESCRIPTION
REVISION
DRWN. BY
APPD. BY

FIG. 2

PARTS LIST		
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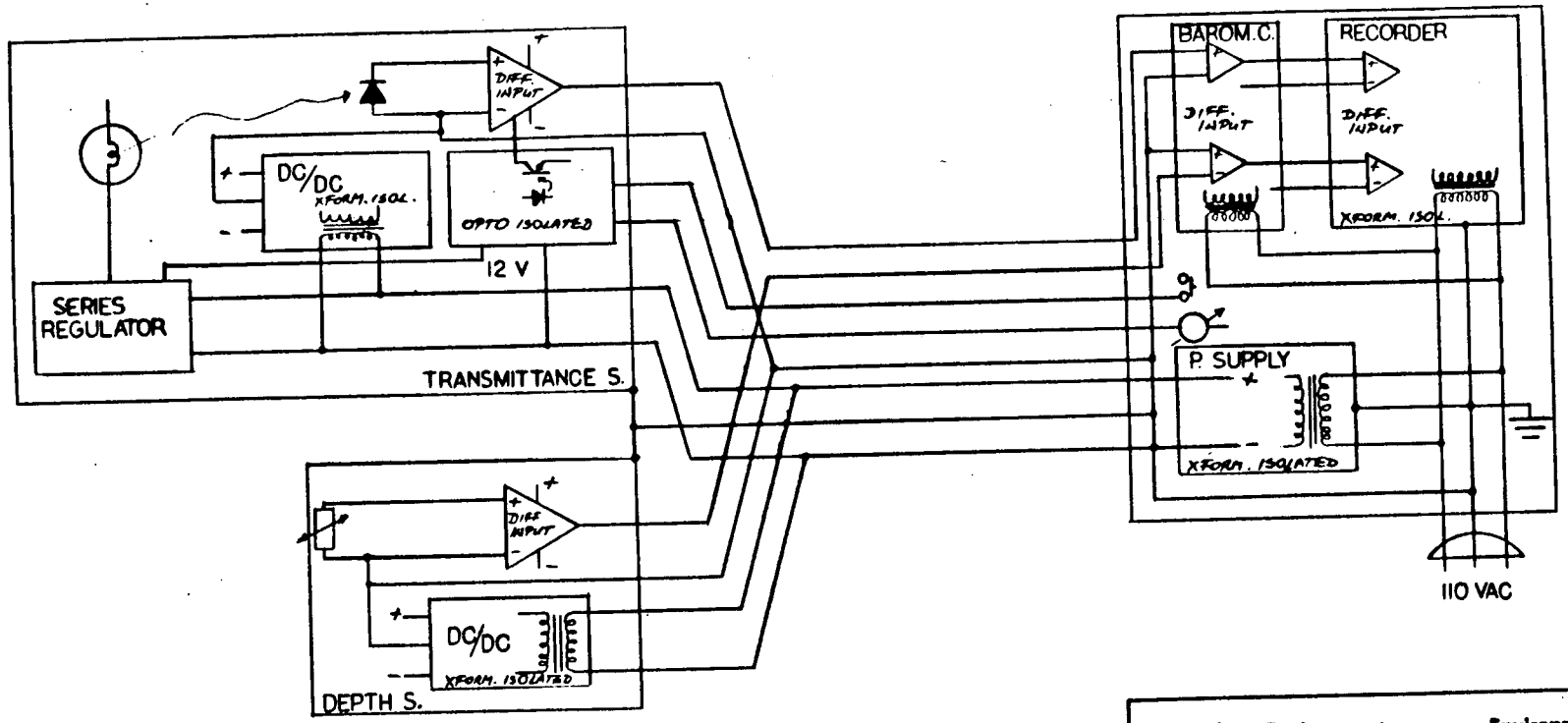

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		REVISION		

UNLESS OTHERWISE SPECIFIED

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TOLERANCE ON TWO PLACE DIMENSIONS	±
TOLERANCE ON ANGLES	±
EXTERNAL CORNER CHAMFER	.015 - .025
INTERNAL CORNER RADIUS	.010 - .020
SURFACE FINISH	AA MICRO INS.

MATERIAL SPECIFICATIONS

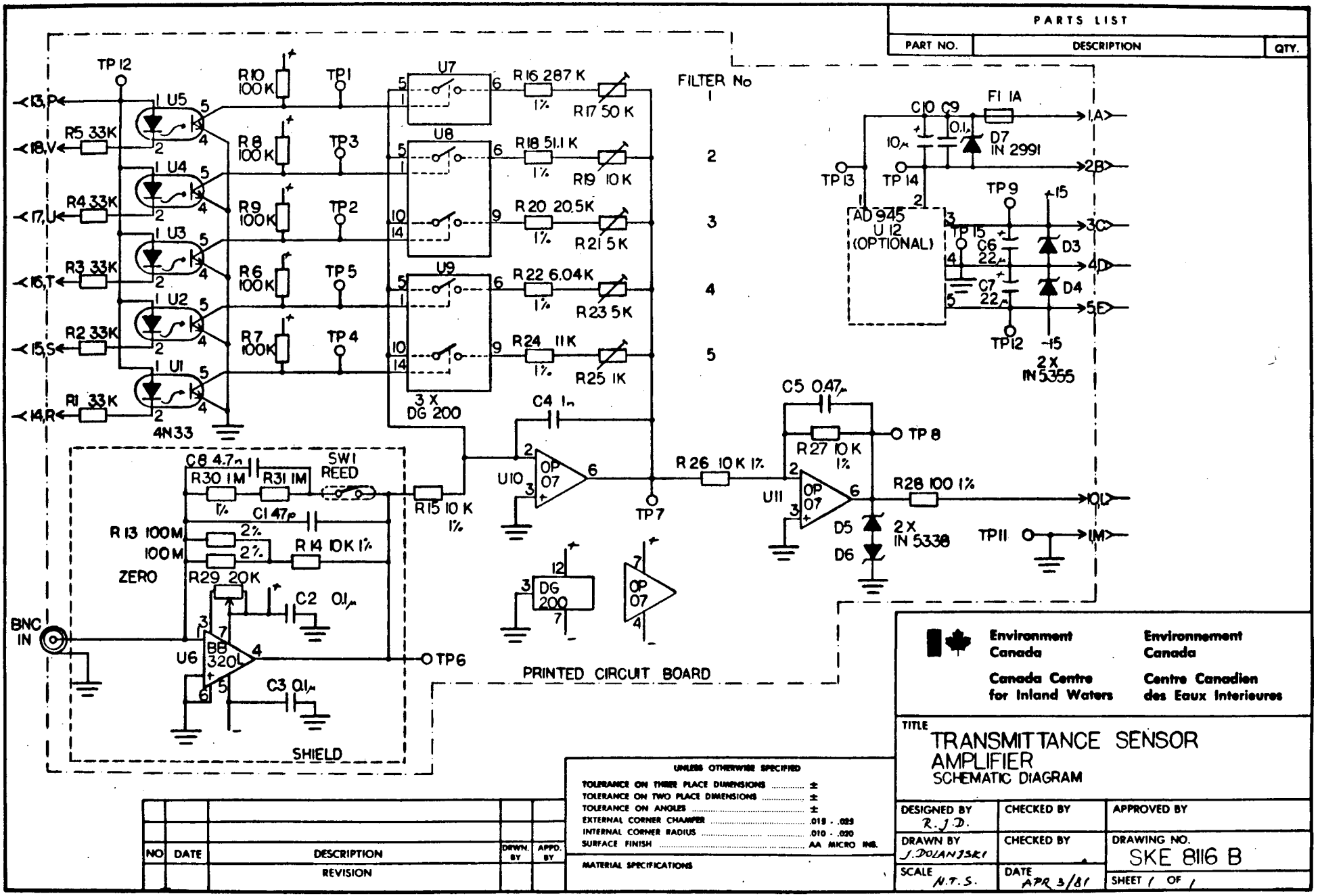
Environment Canada / Environnement Canada

Canada Centre for Inland Waters / Centre Canadien des Eaux Interieures

TITLE
PORTABLE MULTIBAND TRANSMISSOMETER GROUNDING DIAGRAM

DESIGNED BY J. DOLANJSKI	CHECKED BY	APPROVED BY
DRAWN BY J. DOLANJSKI	CHECKED BY	DRAWING NO. SKE 8115 B
SCALE N.T.S.	DATE MAR 26/81	SHEET 1 OF 1

FIG. 3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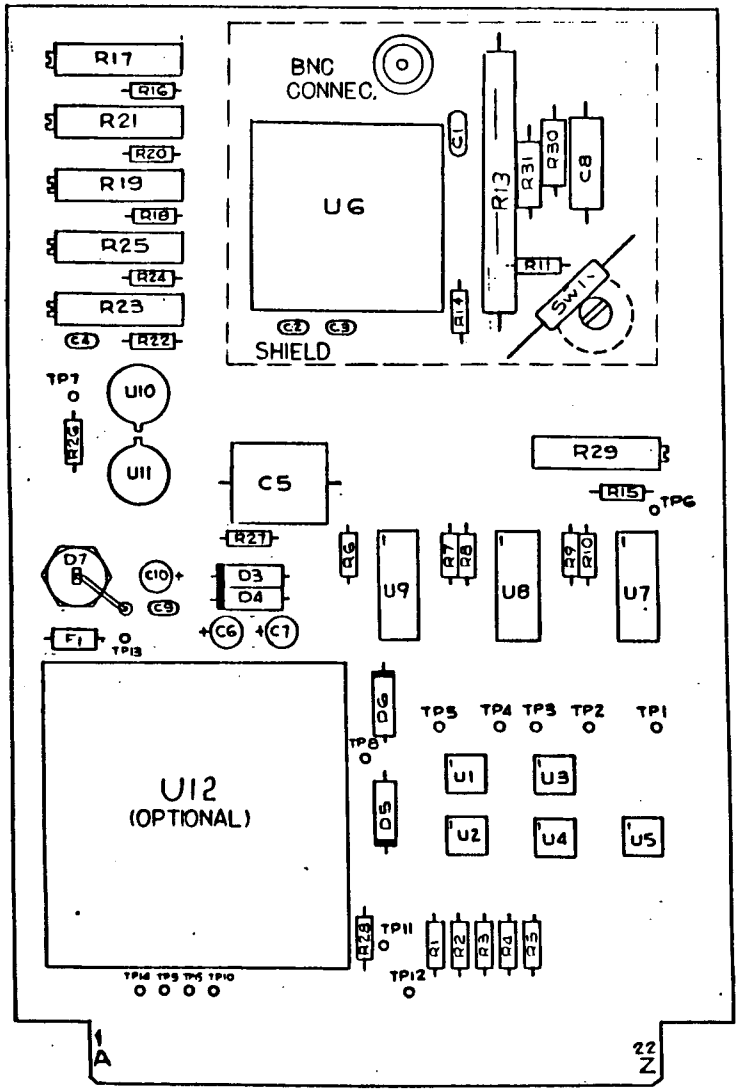
PART NO.
DESCRIPTION
QTY.
TP12
R10 100K
TP1
U7
R16 287 K 1%
R17 50 K
FILTER No
1
2
3
4
5
U8
R18 51.1 K 1%
R19 10K
U9
R20 20.5K 1%
R21 5K
R22 6.04K 1%
R23 5K
R24 11K 1%
R25 1K
3 X DG 200
C4 1n
U5
U4
U3
U2
U1
4N33
R5 33K
R4 33K
R3 33K
R2 33K
R1 33K
R8 100K
R9 100K
R6 100K
R7 100K
TP3
TP2
TP5
TP4
13,P
18,V
17,U
16,T
15,S
14,R
C10 C9
F1 1A
0.1µ
10µ
D7 IN 2991
1,A
2B
TP13
TP14
TP9
15
AD 945 U12 (OPTIONAL)
TP15
C6 22µ
C7 22µ
D3
D4
3C
4D
5E
TP12
-15
2 X IN 5355
C5 0.47µ
R27 10K 1%
TP8
C8 4.7n
R30 1M 1%
R31 1M
SW1 REED
C1 47p
R13 100M 2%
100M 2%
ZERO
R14 10K 1%
R29 20K
C2 0.1µ
R15 10K 1%
U10 OP 07
TP7
R26 10K 1%
U11 OP 07
R28 100 1%
10L
D5
D6
2 X IN 5338
TP11
1M
DG 200
OP 07
BNC IN
U6 BB 3206
C3 0.1µ
TP6
SHIELD
PRINTED CIRCUIT BOARD
Environment Canada
Canada Centre for Inland Waters
Environnement Canada
Centre Canadien des Eaux Interieures
TITLE
TRANSMITTANCE SENSOR AMPLIFIER
SCHEMATIC DIAGRAM
UNLESS OTHERWISE SPECIFIED
TOLERANCE ON THREE PLACE DIMENSIONS ±
TOLERANCE ON TWO PLACE DIMENSIONS ±
TOLERANCE ON ANGLES ±
EXTERNAL CORNER CHAMFER .015 - .025
INTERNAL CORNER RADIUS .010 - .020
SURFACE FINISH AA MICRO INS.
MATERIAL SPECIFICATIONS
NO
DATE
DESCRIPTION
REVISION
DRWN. BY
APPD. BY
DESIGNED BY R.J.D.
CHECKED BY
APPROVED BY
DRAWN BY J.DOLANJSKI
CHECKED BY
DRAWING NO. SKE 8116 B
SCALE N.T.S.
DATE APR 3/81
SHEET 1 OF 1

FIG. 4



PARTS LIST		
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NO	DATE	DESCRIPTION	DRWN. BY	APPD. BY
		REVISION		

UNLESS OTHERWISE SPECIFIED

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TOLERANCE ON TWO PLACE DIMENSIONS	±
TOLERANCE ON ANGLES	±
EXTERNAL CORNER CHAMFER	.015 - .025
INTERNAL CORNER RADIUS	.010 - .020
SURFACE FINISH	AA MICRO INS.

MATERIAL SPECIFICATIONS

Environment Canada / Environnement Canada

Canada Centre for Inland Waters / Centre Canadien des Eaux Interieures

TITLE
TRANSMITTANCE SENSOR AMPLIFIER
COMPONENT PLACEMENT

DESIGNED BY TENSOR	CHECKED BY	APPROVED BY
DRAWN BY J.DOLANSKI	CHECKED BY	DRAWING NO. SKE 8118 B
SCALE N.T.S.	DATE MAR 26/81	SHEET 1 OF 1

FIG. 5

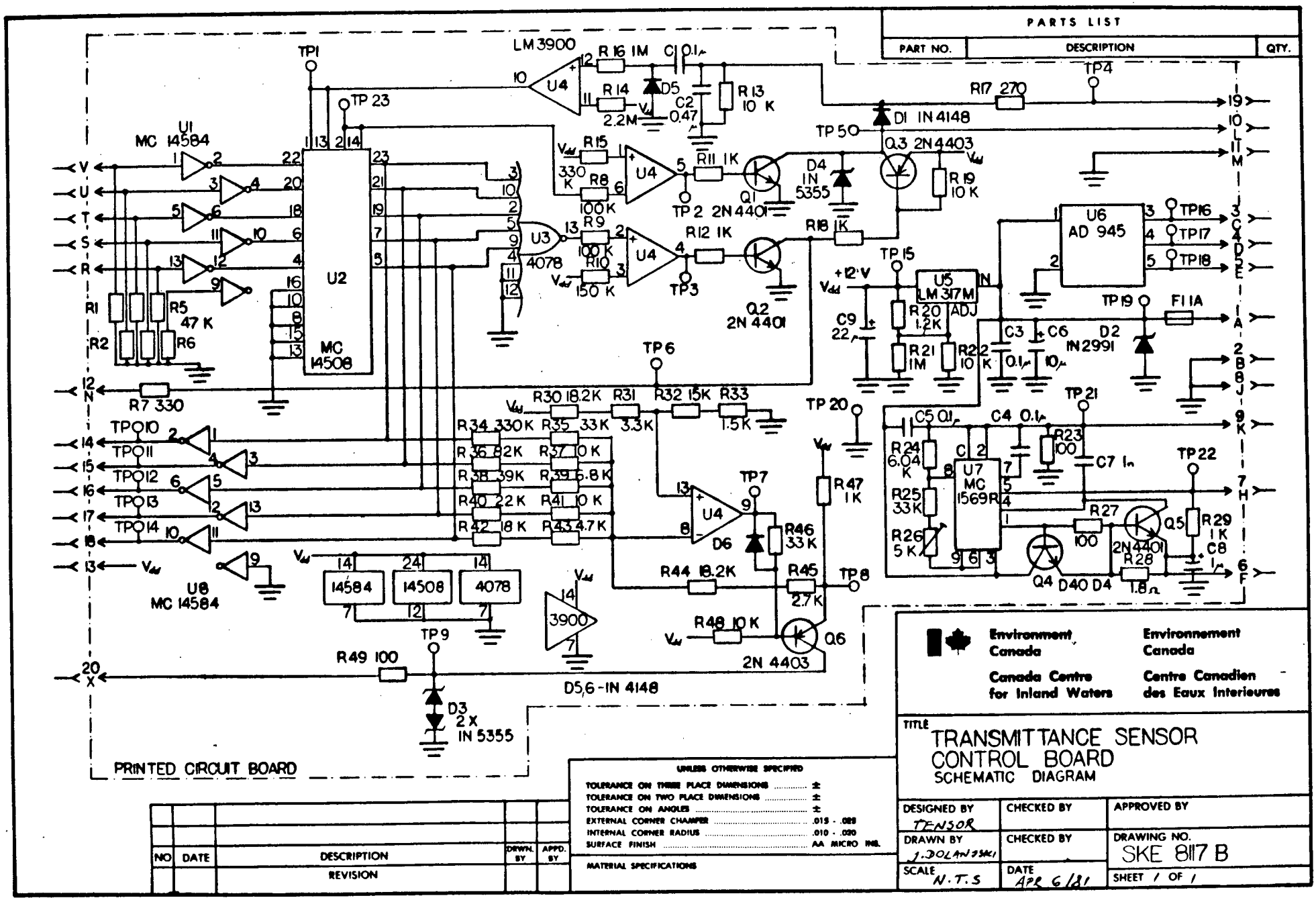
PARTS LIST
PART NO.
DESCRIPTION
QTY.
LM 3900
U4
R16 1M
C1 0.1µ
R14 2.2M
D5
C2 0.47µ
R13 10 K
TP1
TP 23
U1 MC 14584
U2 MC 14508
U3 4078
R15 330 K
R8 100K
R11 1K
Q1
TP 2 2N4401
D4 IN 5355
Q3 2N4403
R19 10 K
R17 270
TP4
D1 IN 4148
TP 50
R9 100 K
R10 150 K
R12 1K
TP3
Q2 2N4401
R18 1K
TP 15
+12 V
U5 LM 317M ADJ
R20 1.2K
R21 1M
R22 10 K
C9 22µ
C3
C6 0.1µ 10µ
D2 IN 2991
U6 AD 945
TP16
TP17
TP18
TP19
F1 1A
TP6
R7 330
R30 18.2K
R31
R32 15K
R33 1.5K
R34 330K
R35 33K
3.3K
R36 82K
R37 10 K
R38 39K
R39 6.8 K
R40 22K
R41 10 K
R42 18 K
R43 4.7K
TP20
TP21
C5 0.1µ
C4 0.1µ
R24 6.04 K
R25 33K
R26 5 K
U7 MC 1569R
R23 100
C7 1n
R27 100
Q5 2N4401
R29 1K
C8 1µ
R28 1.8Ω
TP22
Q4 D40 D4
TP7
U4
D6
R46 33K
R47 1K
R44 18.2K
R45 2.7K
TP8
R48 10 K
Q6 2N 4403
U8 MC 14584
14584
14508
4078
3900
TP9
R49 100
D5,6 - IN 4148
D3 2 X IN 5355
PRINTED CIRCUIT BOARD
V
U
T
S
R
N
X
R1
R2
R5 47 K
R6
TPO10
TPO11
TPO12
TPO13
TPO14
Environment Canada
Canada Centre for Inland Waters
Environnement Canada
Centre Canadien des Eaux Interieures
TITLE
TRANSMITTANCE SENSOR CONTROL BOARD
SCHEMATIC DIAGRAM
DESIGNED BY TENSOR
CHECKED BY
APPROVED BY
DRAWN BY J. DOLANSKI
CHECKED BY
DRAWING NO. SKE 817 B
SCALE N.T.S
DATE APR 6/81
SHEET 1 OF 1
UNLESS OTHERWISE SPECIFIED
TOLERANCE ON THREE PLACE DIMENSIONS ±
TOLERANCE ON TWO PLACE DIMENSIONS ±
TOLERANCE ON ANGLES ±
EXTERNAL CORNER CHAMFER .015 - .025
INTERNAL CORNER RADIUS .010 - .020
SURFACE FINISH AA MICRO INS.
MATERIAL SPECIFICATIONS
NO
DATE
DESCRIPTION
REVISION
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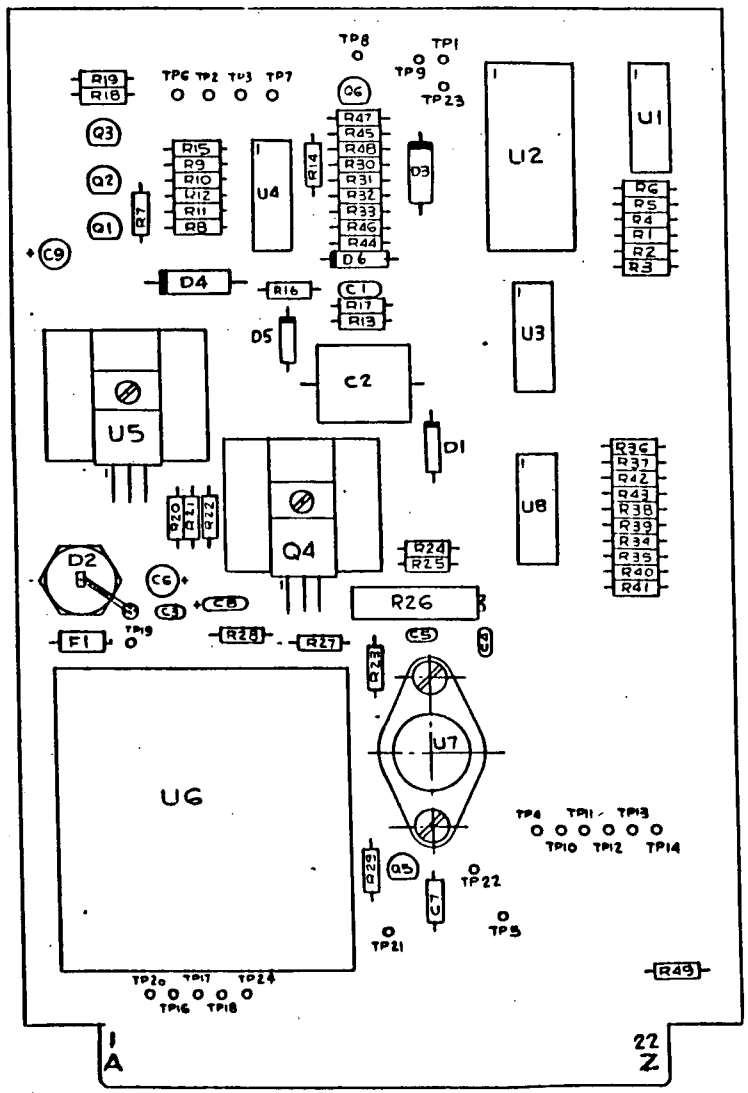
FIG. 6



PARTS LIST		
PART NO.	DESCRIPTION	QTY.

NO	DATE	DESCRIPTION	DRWN. BY	APPD. BY
		REVISION		

UNLESS OTHERWISE SPECIFIED

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TOLERANCE ON TWO PLACE DIMENSIONS	±
TOLERANCE ON ANGLES	±
EXTERNAL CORNER CHAMFER	.015 - .025
INTERNAL CORNER RADIUS	.010 - .020
SURFACE FINISH	AA MICRO INS.

MATERIAL SPECIFICATIONS

Environment Canada / Environnement Canada

Canada Centre for Inland Waters / Centre Canadien des Eaux Interieures

TITLE
TRANSMITTANCE SENSOR CONTROL
COMPONENT PLACEMENT

DESIGNED BY TENSOR	CHECKED BY	APPROVED BY
DRAWN BY J. DOLANSKI	CHECKED BY	DRAWING NO. SKE 8119 B
SCALE N.T.S.	DATE MAR 26/81	SHEET 1 OF 1

FIG. 7

PARTS LIST		
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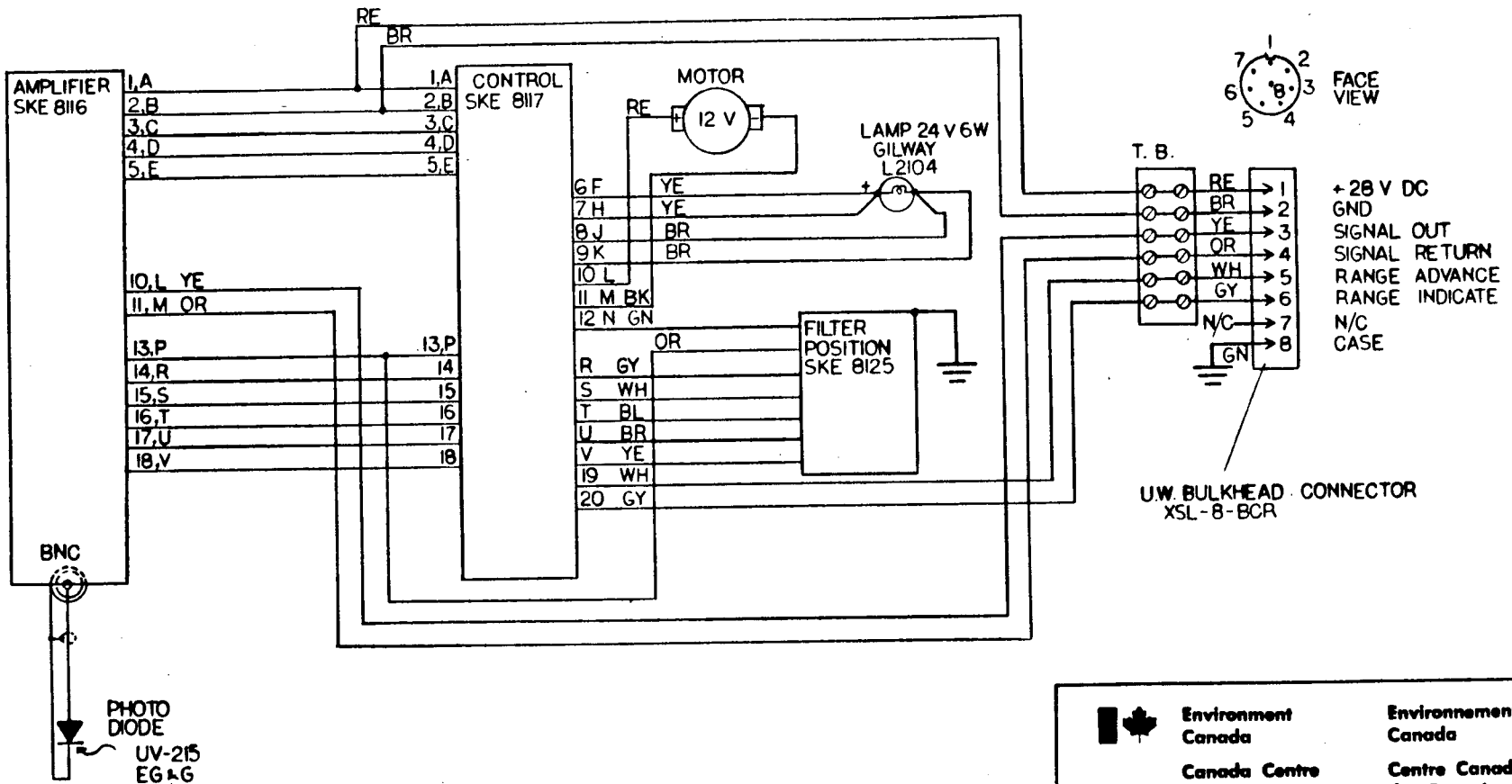

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		REVISION		

UNLESS OTHERWISE SPECIFIED

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TOLERANCE ON TWO PLACE DIMENSIONS	±
TOLERANCE ON ANGLES	±
EXTERNAL CORNER CHAMFER	.015 - .025
INTERNAL CORNER RADIUS	.010 - .020
SURFACE FINISH	AA MICRO INS.

MATERIAL SPECIFICATIONS

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Environnement Canada — Centre Canadien des Eaux Interieures

TITLE
TRANSMITTANCE SENSOR
WIRING DIAGRAM

DESIGNED BY T.ENSOR	CHECKED BY	APPROVED BY
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SCALE N.T.S.	DATE MAR 27/81	SHEET 1 OF 1

FIG. 8

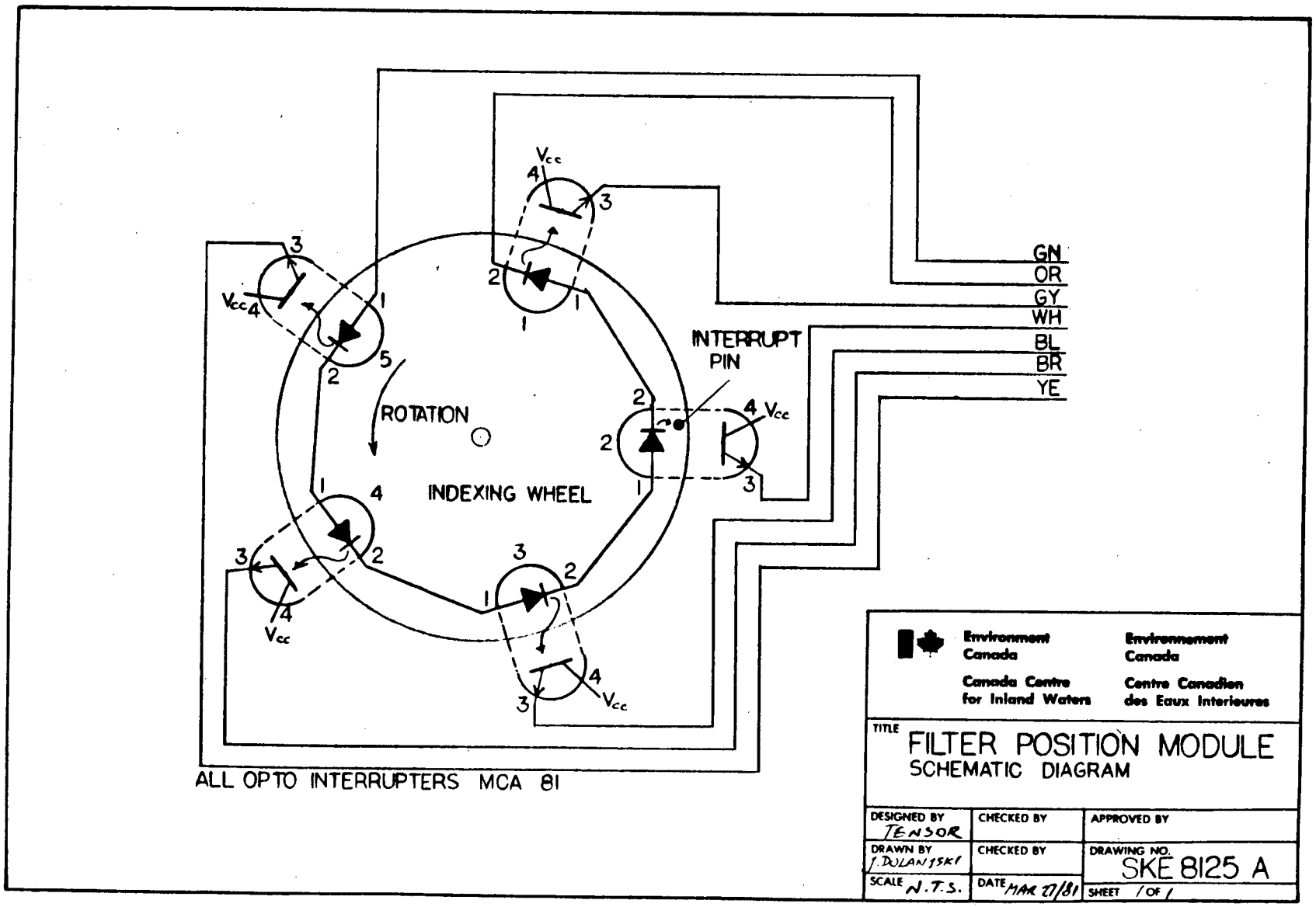

GN
OR
GY
WH
BL
BR
YE
INTERRUPT PIN
ROTATION
INDEXING WHEEL
Vcc
ALL OPTO INTERRUPTERS MCA 81
Environment Canada
Environnement Canada
Canada Centre for Inland Waters
Centre Canadien des Eaux Interieures
TITLE
FILTER POSITION MODULE
SCHEMATIC DIAGRAM
DESIGNED BY TENSOR
CHECKED BY
APPROVED BY
DRAWN BY J. DOLANSKI
CHECKED BY
DRAWING NO. SKE 8125 A
SCALE N.T.S.
DATE MAR 27/81
SHEET 1 OF 1

FIG. 9

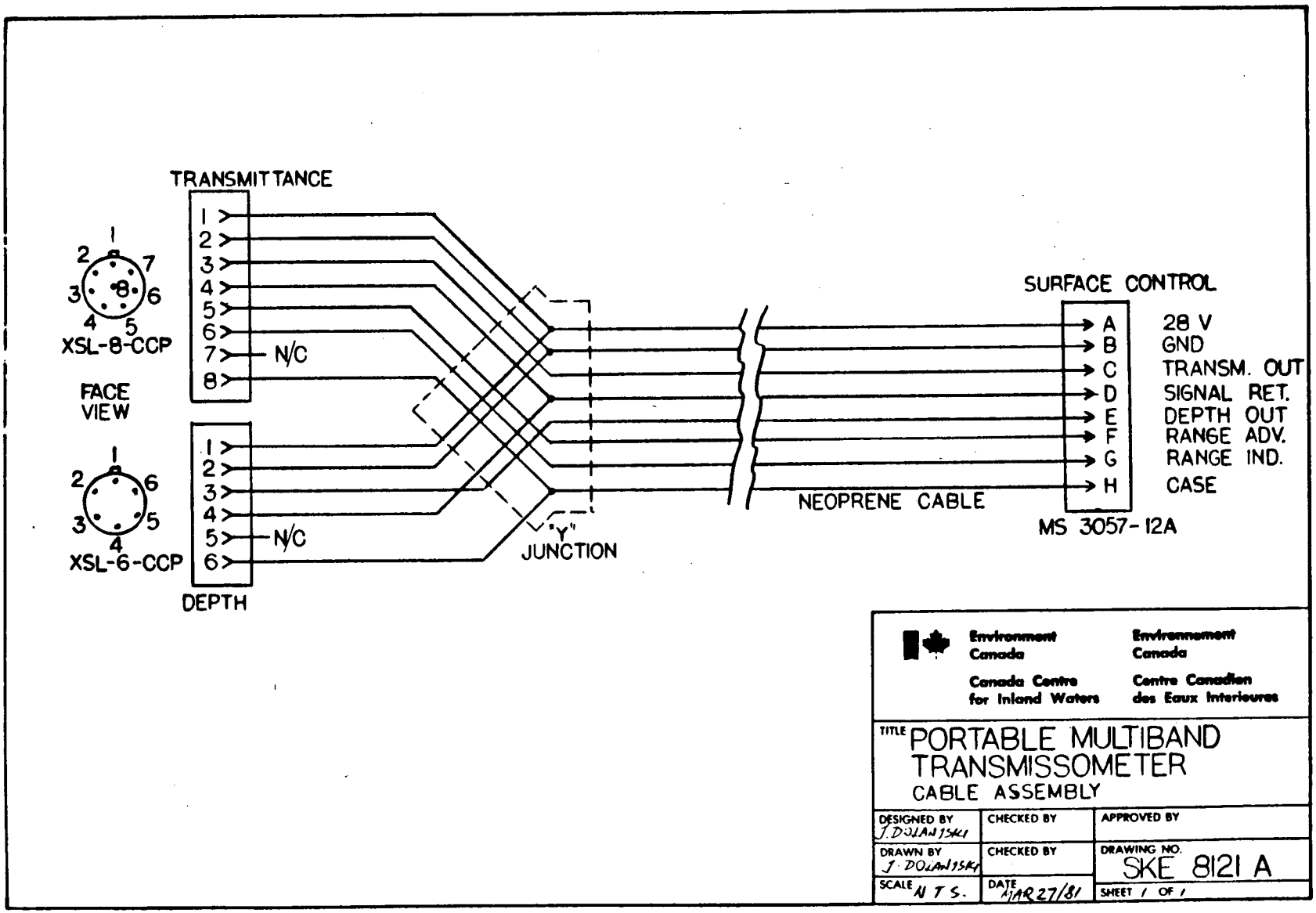

TRANSMITTANCE
1
2
3
4
5
6
7
8
N/C
XSL-8-CCP
FACE VIEW
XSL-6-CCP
N/C
DEPTH
"Y" JUNCTION
NEOPRENE CABLE
SURFACE CONTROL
A 28 V
B GND
C TRANSM. OUT
D SIGNAL RET.
E DEPTH OUT
F RANGE ADV.
G RANGE IND.
H CASE
MS 3057-12A
Environment Canada
Environnement Canada
Canada Centre for Inland Waters
Centre Canadien des Eaux Interieures
TITLE PORTABLE MULTIBAND TRANSMISSOMETER
CABLE ASSEMBLY
DESIGNED BY J. DOLANJSKI
CHECKED BY
APPROVED BY
DRAWN BY J. DOLANJSKI
CHECKED BY
DRAWING NO. SKE 8121 A
SCALE N T S.
DATE MAR 27/81
SHEET 1 OF 1

FIG. 10

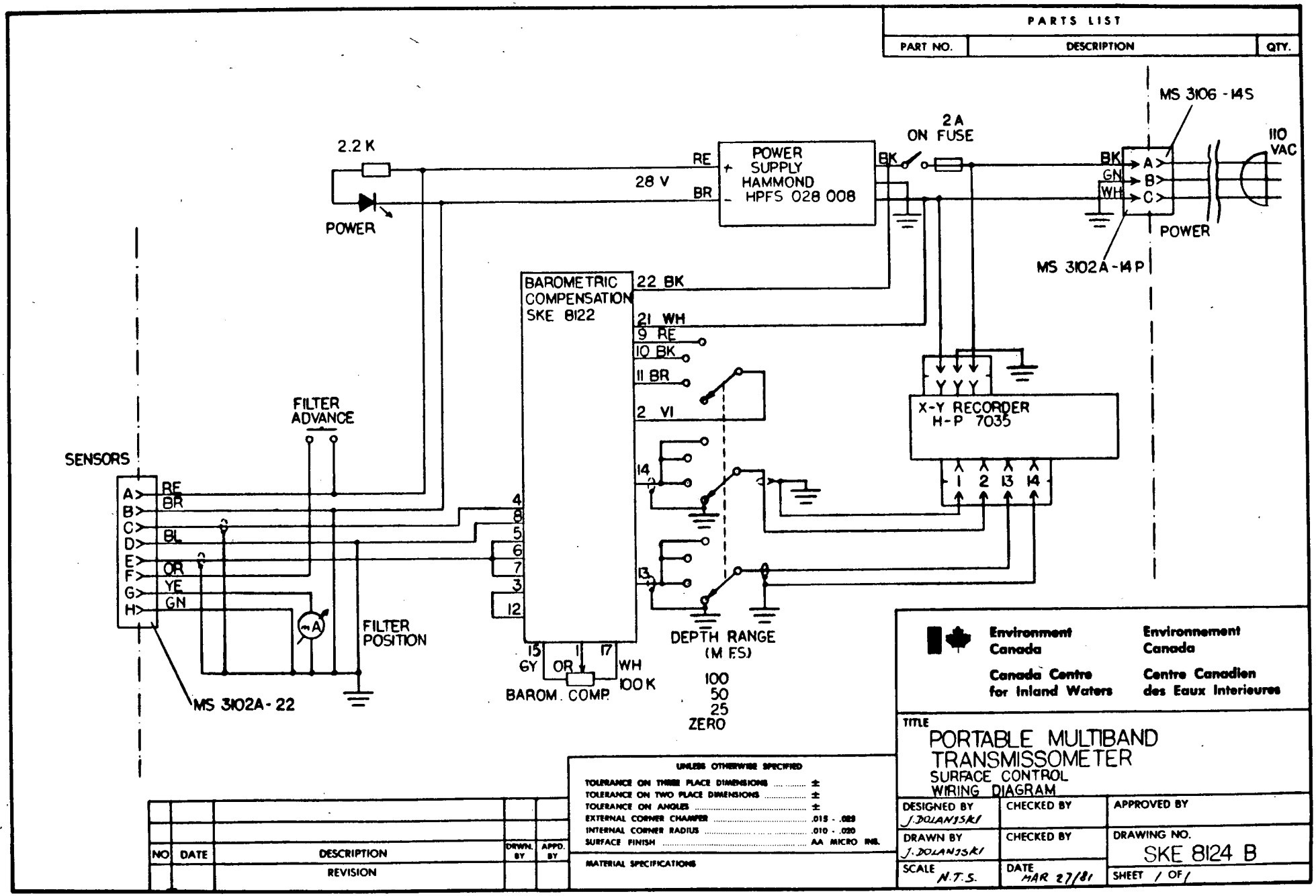

PARTS LIST
PART NO.
DESCRIPTION
QTY.
2.2 K
POWER
28 V
RE
BR
POWER SUPPLY HAMMOND - HPFS 028 008
2A ON FUSE
BK
MS 3106 - 14S
110 VAC
BK
GN
WH
A
B
C
POWER
MS 3102A - 14P
BAROMETRIC COMPENSATION SKE 8122
22 BK
21 WH
9 RE
10 BK
11 BR
2 VI
14
13
4
8
5
6
7
3
12
15 GY
1
17 WH
OR
100 K
BAROM. COMP.
DEPTH RANGE (M F.S.)
100
50
25
ZERO
Y Y Y
X-Y RECORDER H-P 7035
1 2 13 14
FILTER ADVANCE
SENSORS
A
B
C
D
E
F
G
H
RE
BR
BL
OR
YE
GN
mA
FILTER POSITION
MS 3102A - 22
Environment Canada
Canada Centre for Inland Waters
Environnement Canada
Centre Canadien des Eaux Interieures
TITLE
PORTABLE MULTIBAND TRANSMISSOMETER
SURFACE CONTROL
WIRING DIAGRAM
DESIGNED BY J. DOLANJSKI
CHECKED BY
APPROVED BY
DRAWN BY J. DOLANJSKI
CHECKED BY
DRAWING NO. SKE 8124 B
SCALE N.T.S.
DATE MAR 27/81
SHEET 1 OF 1
UNLESS OTHERWISE SPECIFIED
TOLERANCE ON THREE PLACE DIMENSIONS ... ±
TOLERANCE ON TWO PLACE DIMENSIONS ... ±
TOLERANCE ON ANGLES ... ±
EXTERNAL CORNER CHAMFER ... .015 - .020
INTERNAL CORNER RADIUS ... .010 - .020
SURFACE FINISH ... AA MICRO INS.
MATERIAL SPECIFICATIONS
NO.
DATE
DESCRIPTION
REVISION
DRWN. BY
APPD. BY

FIG. 11

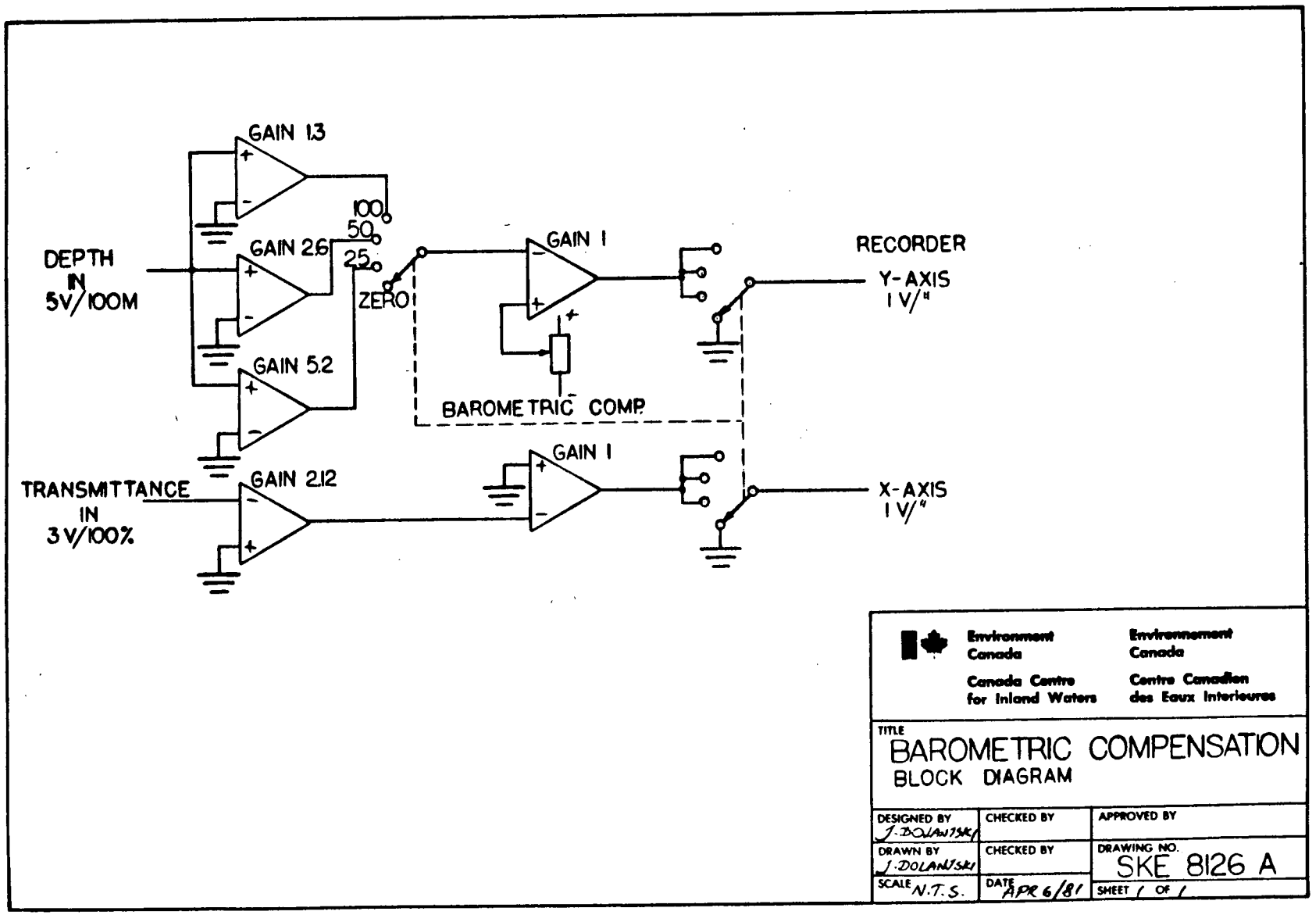

GAIN 1.3
100
50
25
GAIN 2.6
DEPTH
IN
5V/100M
ZERO
GAIN 5.2
GAIN 1
RECORDER
Y-AXIS
1 V/"
BAROMETRIC COMP.
GAIN 1
TRANSMITTANCE
IN
3 V/100%
GAIN 2.12
X-AXIS
1 V/"
Environment Canada
Canada Centre for Inland Waters
Environnement Canada
Centre Canadien des Eaux Interieures
TITLE
BAROMETRIC COMPENSATION
BLOCK DIAGRAM
DESIGNED BY J. DOLANJSKI
CHECKED BY
APPROVED BY
DRAWN BY J. DOLANJSKI
CHECKED BY
DRAWING NO. SKE 8126 A
SCALE N.T.S.
DATE APR 6/81
SHEET 1 OF 1

FIG. 12

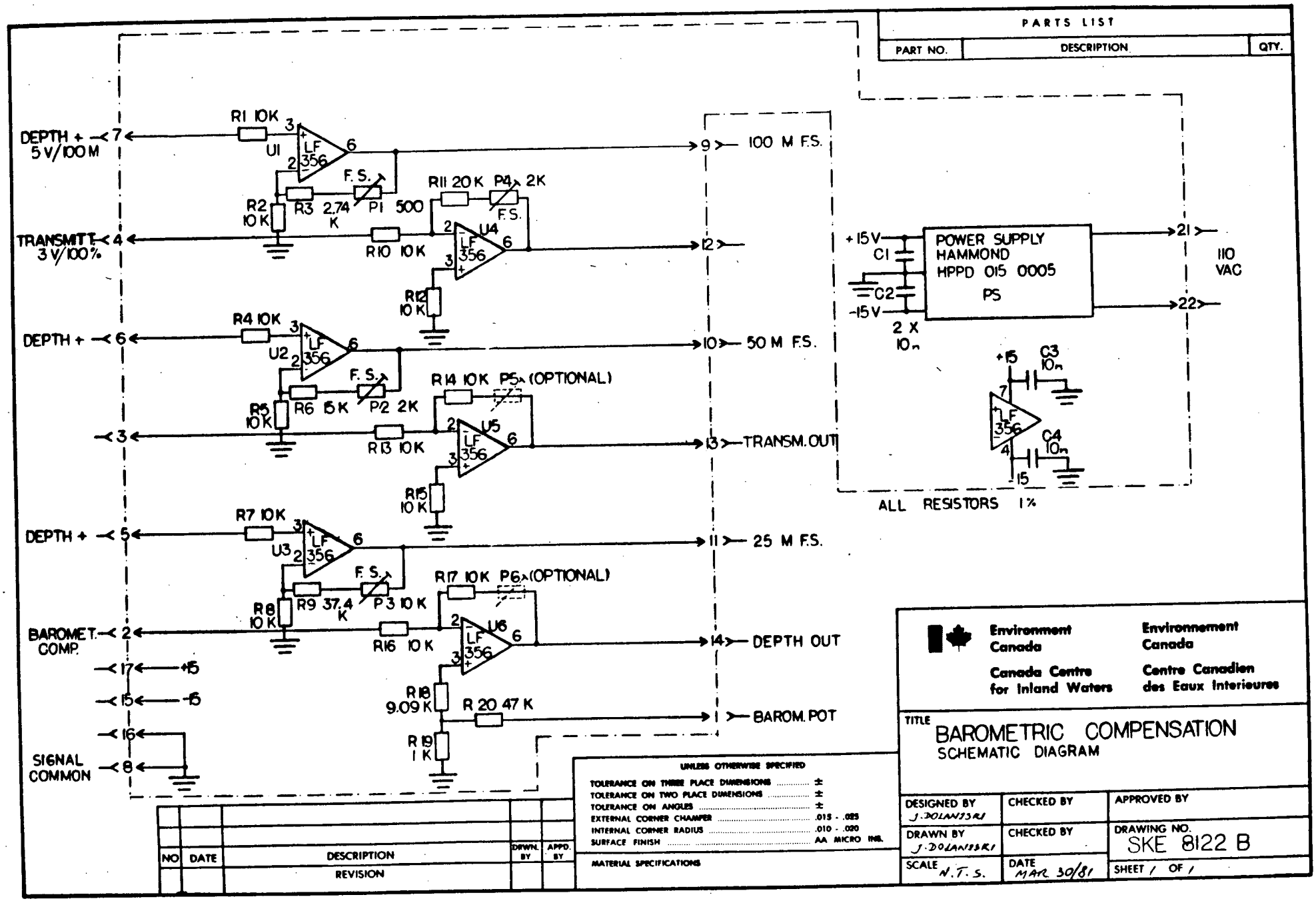
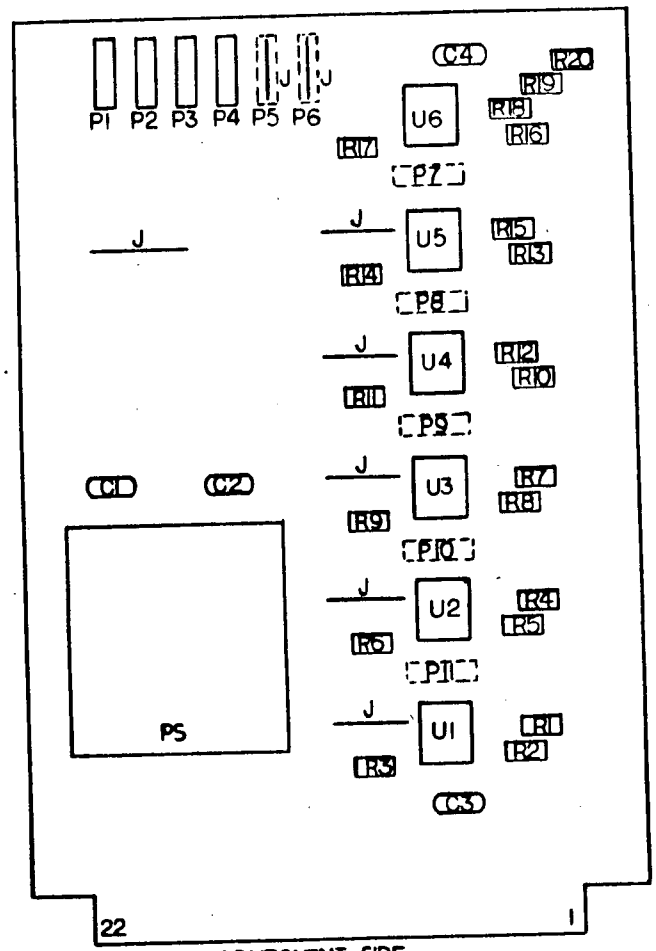

PARTS LIST
PART NO.
DESCRIPTION
QTY.
DEPTH + 5 V/100 M
TRANSMIT. 3 V/100%
DEPTH +
DEPTH +
DEPTH +
BAROMET. COMP.
SIGNAL COMMON
R1 10K
U1
LF 356
F.S.
R2 10K
R3 2.74 K
P1 500
R11 20K
P4 2K
F.S.
U4
R10 10K
R12 10K
R4 10K
U2
F.S.
R5 10K
R6 15K
P2 2K
R14 10K
P5 (OPTIONAL)
U5
R13 10K
R15 10K
R7 10K
U3
F.S.
R8 10K
R9 37.4 K
P3 10K
R17 10K
P6 (OPTIONAL)
U6
R16 10K
R18 9.09 K
R 20 47 K
R 19 1 K
100 M F.S.
50 M F.S.
TRANSM. OUT
25 M F.S.
DEPTH OUT
BAROM. POT
+15 V
C1
C2
-15 V
2 X 10n
POWER SUPPLY
HAMMOND
HPPD 015 0005
PS
110 VAC
C3 10n
C4 10n
ALL RESISTORS 1%
UNLESS OTHERWISE SPECIFIED
TOLERANCE ON THREE PLACE DIMENSIONS ±
TOLERANCE ON TWO PLACE DIMENSIONS ±
TOLERANCE ON ANGLES ±
EXTERNAL CORNER CHAMFER .015 - .025
INTERNAL CORNER RADIUS .010 - .020
SURFACE FINISH AA MICRO INS.
MATERIAL SPECIFICATIONS
NO
DATE
DESCRIPTION
REVISION
DRWN. BY
APPD. BY
Environment Canada
Canada Centre for Inland Waters
Environnement Canada
Centre Canadien des Eaux Interieures
TITLE
BAROMETRIC COMPENSATION
SCHEMATIC DIAGRAM
DESIGNED BY J. DOLANSKI
CHECKED BY
APPROVED BY
DRAWN BY J. DOLANSKI
CHECKED BY
DRAWING NO. SKE 8122 B
SCALE N.T.S.
DATE MAR 30/81
SHEET 1 OF 1

FIG. 13

PARTS LIST		
PART NO.	DESCRIPTION	QTY.



COMPONENT SIDE

P1 - 100 M
P2 - 50 M
P3 - 25 M
P4 TRANSM. } F.S. ADJUSTMENT

J JUMPER
P7 - P11 -OPTIONAL OFFSET

NO	DATE	DESCRIPTION	DRWN. BY	APPD. BY
		REVISION		

UNLESS OTHERWISE SPECIFIED

TOLERANCE ON THREE PLACE DIMENSIONS	±
TOLERANCE ON TWO PLACE DIMENSIONS	±
TOLERANCE ON ANGLES	±
EXTERNAL CORNER CHAMFER	.015 - .025
INTERNAL CORNER RADIUS	.010 - .020
SURFACE FINISH	AA MICRO INS.

MATERIAL SPECIFICATIONS

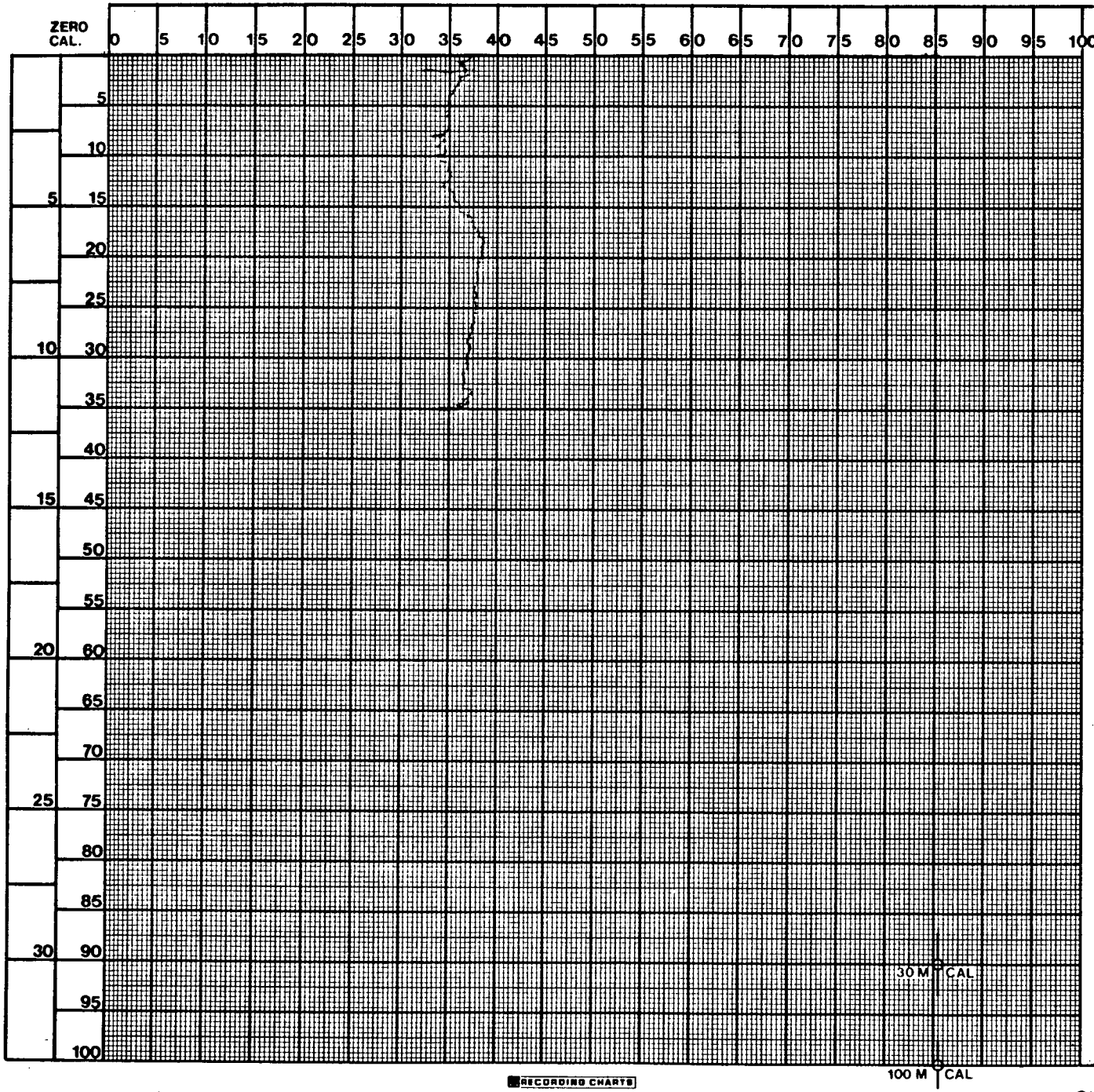
Environment Canada / Environnement Canada
Canada Centre for Inland Waters / Centre Canadien des Eaux Interieures

TITLE
BAROMETRIC COMPENSATION
COMPONENT PLACEMENT

DESIGNED BY J.DOLANSKI	CHECKED BY	APPROVED BY
DRAWN BY J DOLANSKI	CHECKED BY	DRAWING NO. SKE 8123 B
SCALE N.T.S.	DATE MAR 30/81	SHEET 1 OF 1

FIG. 14

PERCENT TRANSMISSION



CANADA CENTRE FOR INLAND WATERS

SHIP CCIW DOCK

DATE-TIME (G.M.T) APR 23/81

CRUISE NO. N.A.

SURVEY STA. N.A.

CONSEC. STA. N.A.

SHEET NO. 1

DEPTH SENSOR 30M 25m F.S. 100M POSITION SENSOR

PATH LENGTH 25CM ✓ 100CM

UNIT SERIAL NO.

SOUNDING DEPTH N.A.

SEA STATE N.A.

FILTER # 5 FILTER

REMARKS

SIGNATURE J. DOLANJSKI

RECORDING CHARTS
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GANANOQUE, ONTARIO

CHART NO. GC10213

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FIG. 15