

Ref: CS96/501/F510(IES)

24 SEP. 1996

16 September 1996

Madame R. Petch
Export Manager
SERPE - IESM
Z.I. des Cinq-Chemins
56620 Guidel
France

Dear Madame Petch

Subject: Cospas-Sarsat Type Approval

Thank you for your letter of 28 August 1996 requesting amendments to your Cospas-Sarsat Type Approval Certificate numbers 039 and 041.

Based on your confirmation that the modifications to your beacons (i.e. the addition of a separate self-test switch and a water sensor) do not affect the Cospas-Sarsat performance requirements, and with the concurrence of the CNES beacon test facility, we have amended the certificates to include the WH and SW models as requested.

In this respect, please find enclosed amended original Cospas-Sarsat Type Approval Certificate nos. 039 and 041 in English, French and Russian, together with three certified copies of each.

The Secretariat remains at your disposal for any further assistance you may require.

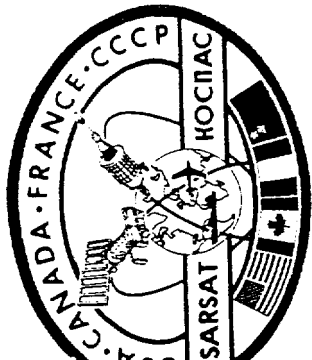
Yours sincerely



J. V. KING
Deputy Head of Secretariat,
System Engineering

Encls: - Original Certificate Nos. 039 and 041 plus three certified copies.

cc: - The Cospas-Sarsat Parties (Canada, France, Russia & USA)
- Beacon Test Facility, CNES/Intespace



COSPAS-SARSAT

TYPE APPROVAL CERTIFICATE

For a 406 Megahertz Distress Beacon

For Use With The COSPAS-SARSAT Satellite System

WHEREAS, l'Institut National de l'Information et de la Communication Electronique (INIE), the manufacturer of a 406 Megahertz distress Beacon packaged as a maritime float-free beacon, identified as Model Kannad 406 FH, PH or WH or Rescuer 406 P, is submitted test data and had said beacon tested in August 1990 at a facility accepted by COSPAS-SARSAT at CNES, Toulouse, France, demonstrate that said beacon meets the applicable technical requirements for use with the COSPAS-SARSAT Satellite System, as defined in documents /S T.001, Specification for COSPAS-SARSAT 406 MHz Distress Beacons and C/S T.007, COSPAS-SARSAT 406 MHz Distress Beacon Type Approval standard;

WHEREAS, the COSPAS-SARSAT Council has determined, following a review of the test results, that the said beacon meets the COSPAS-SARSAT Class 2 requirements and is rated for operating over the temperature range of: -20°C to +55°C with battery: Hoppecke LSC 3460M (4 D-cells) Saft LSH 20 (4 D-cells) Lithium Manganese Dioxide Lithium Thionyl Chloride (LiMnO₂) (LiSOCl₂) and

WHEREAS, said manufacturer has certified that all other units of the same type will meet said technical requirements in a similar manner to the unit subjected to test, which incorporated the following features:

- 121.5 MHz homer (25 mw, continuous)
- Automatic activation mechanism
- Strobe light (>0.75 candela, >20 flashes/min.)
- Self-test mode
- Water sensor on model WH

NOW, THEREFORE, in reliance upon the following, the COSPAS-SARSAT Council does hereby certify that the 406 MHz Distress Beacon Model identified herein is compatible with the COSPAS-SARSAT System as of the date of this Certificate.

COSPAS-SARSAT Secretariat

By:

Name: D. Levesque

Title: Head of COSPAS-SARSAT Secretariat

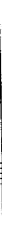
Date: first issued 5 Nov 90, amended 5 Mar 92 and 9 Sep 96

NOTE, HOWEVER:

1. This certificate does not authorize the operation or sale of any 406 MHz distress beacon. Such authorization may require type acceptance by national administrations in countries where the beacon will be distributed, and may also be subject to national licensing requirements.
2. This certificate is intended only as a formal notification to the above identified manufacturer that the COSPAS-SARSAT Council has determined, on the basis of test data of a beacon submitted by the manufacturer, that 406 MHz distress beacons of the type identified herein meet the standards for use with the COSPAS-SARSAT System. This certificate is not a warranty and COSPAS-SARSAT hereby expressly disclaims any and all liability arising out of or in connection with issuance, use, or misuse of this Certificate.
3. This certificate is subject to revocation by the COSPAS-SARSAT Council should the beacon type for which it is issued cease to meet the COSPAS-SARSAT specification. A new certificate may be issued after satisfactory corrective action has been demonstrated according to the COSPAS-SARSAT Type Approval Standard.



EN FOI DE QUOI, le Conseil COSPAS-SARSAT atteste par le présent Certificat que le modèle de balise de détresse à 406 MHz identifié ci-dessus est, à la date de ce Certificat, compatible avec le Système à Satellites COSPAS-SARSAT.

Signature: 

Nom: D. Lévesque
Titre: Chef du Secrétariat COSPAS-SARSAT

Date: délivré 5 nov 90, amendé les 5 mars 92, 9 sept 96 et 11 mars 98

1. Le présent Certificat ne constitue pas autorisation d'usage ou de commercialisation d'aucune balise de détresse à 406 MHz. De telles autorisations peuvent nécessiter l'acceptation du type par les autorités compétentes des pays où la balise est distribuée et peuvent également être soumises à la délivrance de licences d'exploitation nationales.

2. Le présent Certificat a pour seul but de notifier au constructeur identifié que, sur la base des résultats des essais du modèle fourni, le Conseil COSPAS-SARSAT a établi que les balises de détresse à 406 MHz du type identifié ci-dessus satisfont aux spécifications d'utilisation avec le Système COSPAS-SARSAT. Le présent Certificat n'est pas une garantie et COSPAS-SARSAT décline expressément toutes responsabilités résultant ou liées à la délivrance, l'usage ou les abus d'utilisation de ce Certificat.

3. Le présent Certificat peut être révoqué par le Conseil COSPAS-SARSAT s'il est établi que le type de balise pour lequel il est délivré ne satisfait plus aux spécifications COSPAS-SARSAT. Un nouveau Certificat pourra être délivré après que les actions correctives auront été effectuées et démontrées conformément à la procédure d'approbation de type COSPAS-SARSAT.

TENDU QUE, le constructeur Informatique Sécurité Maritime (IESM) a confié à Guidel, France, fabricant d'une balise de détresse conditionnée pour un usage maritime survie

et identifiée par le type **Kannad 406S**, ou **SW**; ou **Rescuer 406 S**

ournis des résultats d'essais obtenus en août 1990, lors d'essais effectués par l'installation CNES, Toulouse, France, agréée par COSPAR-RRSAT, afin de démontrer que la dite balise satisfait aux spécifications techniques applicables pour son utilisation dans le système COSPAR-SARSAT.

les applicables pour son utilisation dans le système SPAS-SARSAT, et C/S T.007, Standard de type pour les balises de détresse à 406 MHz du Système SPAS-SARSAT.

TENDU QUE, le Conseil COSPAS-SARSAT a établi, à la suite de l'examen des résultats d'essais, que la dite balise satisfait aux spécifications SPAS-SARSAT pour la classe 2 et peut être en conséquence utilisée dans la gamme de températures suivante:

-20°C à +55°C

ATTENDU QUE, le dit Constructeur a certifié que toutes les unités du même type ont été soumises aux essais suivants :

- émetteur 121, 5 MHz (25 mw, continu)
- lumière clignotante stroboscopique (>0.75 candela, >20 flashes/min.)
- mode test
- mécanisme d'activation par immersion: Kannad SW

039
rtificat No.

COMMISSION CENTRALE DE SECURITE

:0:6:7:9:MAT :1:3:

:9:6:0:2:0:6:

NUMERO D'APPROBATION

:9:6:0:2:1:1:6:2:S:N:

REAPPROBATION (R) CREATION (C) MODIFICATION (M) ANNULATION (A) :C:

DATE LIMITE DE VALIDITE :0:1:0:2:

DESIGNATION DU MATERIEL

:R:L:S: :C:O:S:P:A:S:/:S:A:R:S:A:T: :K:A:N:N:A:D: :4:0:6: :W:H

CATEGORIE : Radiobalises :2:0:5:0:

FABRICANT : SERPE-IESM :F:2:0:2:9:
Z.I. des 5 chemins
5652 GUIDEL

REPRESENTANT : :R: : : : :

REFERENCES : - Demande du fabricant ref 95-5114 du 20/12/1995
- Rapport d'essais d'activation à l'eau de mer et
d'environnement DOC 96053 du 12/01/1996

OBSERVATIONS :

- Approbation conforme aux normes CEI 1097-2 et ETSI 300 066
- Développement de la RLS KANNAD 406 PH approuvé sous le n° 93100794 SN (radiobalise de pont)
- Adjonction d'un dispositif d'activation à l'eau de mer pour limitation des fausses alarmes
- Autres caractéristiques identiques au type KANNAD 406 PH

AVIS DE LA COMMISSION

La radiobalise de pont modèle KANNAD 406 WH peut être approuvée.

DESTINATAIRES :
Diffusion interne MM et CCS
SERPE-IESM
C.A.A.M.

DATE D'ENVOI : 17/02/1996
N° 54 SN2/CCS

Certificate of Type Approval

Telecommunications Act 1984 (c.12): Section 84

Radiocommunications Agency

Page 1 of 2

APPROVAL No. : 12228
ISSUE No. : 1

ORIGINAL CERTIFICATE DATE : 05 November 96

SUBMITTED BY :
SULLIVAN MARINE
THE INDUSTRIAL ESTATE
STATION ROAD
HARRIETSHAM
KENT
ME17 1JA

MANUFACTURED BY :
SERPE-IESM
ZONE INDUSTRIELLE DES 5 CHEMINS
56520 GUIDEL
FRANCE

EQUIPMENT TYPE : APPROVED EQUIPMENT
EQUIPMENT CATEGORY : MARINE EPIRB
TRADE NAME : KANNAD 406 WH
TYPE No. : KANNAD 406 WH

TEMPERATURE RANGE : -40°C to +55°C

SPECIFICATION(S)
MPT1259:AUG1986

EMISSION CODE(S)
3K20A3N

CHANNEL SEPARATION(S)

TOTAL UNITS : 2

UNIT No. 1 TYPE : TRANSMITTER PORTABLE

POWER CHARACTERISTICS -
R.F. POWER : 5W e.i.r.p.
RADIATED FIXED

FREQUENCY CHARACTERISTICS - TRANSMITTER : 406.023MHz to 406.027MHz

UNIT No. 2 TYPE : TRANSMITTER PORTABLE

POWER CHARACTERISTICS -
R.F. POWER : 25mW e.i.r.p.
RADIATED FIXED

FREQUENCY CHARACTERISTICS - TRANSMITTER : 121.5MHz

COMMENTS : RA FILE NUMBER: QR 2913
TEST REPORT NUMBER: KS0009
THIS CERTIFICATE CONFIRMS THAT THE EQUIPMENT MEETS THE
QUOTED RADIO STANDARD.
IT DOES NOT COVER OTHER ASPECTS THAT MAY BE RELEVANT SUCH
AS LICENSING, SAFETY OR FITNESS FOR PURPOSE.

BUNDESAMT FÜR POST UND TELEKOMMUNIKATION



ZULASSUNGSURKUNDE

Zulassungsnummer: A131088J

Zus. Kennzeichen: BI

Objektbezeichnung: KANNAD 406 WH

Zulassungsinhaber: STN ATLAS Elektronik GmbH

D-22763 Hamburg

Zulassungsart: Allgemeinzulassung

Befristung: Unbefristet

Verwendungszweck: Einsatz auf Schiffen unter der Flagge der Bundesrepublik Deutschland (siehe Anlage)

COSPAS-SARSAT hat die Satelliten-Seenotfunkbake mit dem Type Approval Certificat No. 035 zugelassen

Die Funkanlage wurde nach folgender Vorschrift geprüft (siehe Anlage):
FTZ 171 R 34A, Ausgabe 03/1986

Saarbrücken, den 11.04.1997



Im Auftrag

Blümel

1 Anlage

SYSTEMBESCHREIBUNG

Bestandteile der Anlage

Satelliten-Seenotfunkbake mit Freischwimmbehälter:

Objektbezeichnung: KANNAD 406 WH

Technische Daten

Stromversorgung: eingebaute Batterie

Sendefrequenz: 406.025 MHz und 121.5 MHz

Die Satelliten-Seenotfunkbake:

KANNAD 406 WH

wurde nach folgenden technischen Vorschriften geprüft:

FTZ 171 R 34A Satelliten-Seenotfunkbaken, 406.025 MHz
- Ausgabe 03/1986

Die Funkanlage wird für folgenden Einsatz zugelassen:

Als Satelliten-Seenotfunkbake, auf der Frequenz 406,025 MHz, zur
Kennzeichnung der Notposition und der Alarmierung über das
Satellitensystem COSPAS/SARSAT

Bedingungen und Auflagen:

Die Bedingungen und Auflagen sind der "Verordnung über die Zulassung von Telekommunikations-einrichtungen (TKZulV)" zu entnehmen.

Außerdem gilt:

1. Das Zulassungsobjekt muß vom Zulassungsinhaber wie folgt gekennzeichnet werden:

- Zulassungszeichen des BAPT
- zusätzliche Kennzeichen
- Objektbezeichnung
- Zulassungsinhaber
- Seriennummer/Gerätenummer

Die zusätzlichen Kennzeichen sind dem Zulassungszeichen außerhalb der Umrandung rechts unten in gleicher Schrift und in Höhe der Jahresangabe anzufügen.

2. Es dürfen nur solche Objekte mit dem Zulassungszeichen gekennzeichnet werden, die mit dem zugelassenen Objekt elektrisch und mechanisch übereinstimmen, d.h. bau- und funktionsgleich sind.

3. Der Zulassungsinhaber ist verpflichtet, jedem mit dem Zulassungszeichen gekennzeichneten Objekt einen Nachdruck dieser Zulassungsurkunde beizufügen.

4. Dem Zulassungsinhaber ist es untersagt, für einen Betrieb des Zulassungsobjektes zu werben, der nicht in Übereinstimmung mit den technischen Vorschriften und dem Verwendungszweck steht.

Hinweis

Diese Zulassung ist keine Frequenzuteilung gemäß § 47 TKG

Die Frequenzuteilung ist beim Bundesamt für Post und Telekommunikation, Außenstelle Hamburg, Sachsenstr. 12 + 14, 20097 Hamburg, zu beantragen.



AUSTRALIAN MARITIME SAFETY AUTHORITY

CERTIFICATE OF APPROVAL

No. 4689

I, the undersigned TREVOR GEORGE ROSE, hereby approve in accordance with:

- a) Regulation IV/7.1.6 of the International Convention for the Safety of Life at Sea 1974, as amended for the Global Maritime Distress and Safety System; and
- b) Provision 17 of Marine Orders, Part 27, Issue 1 (GMDSS Radio Equipment)

the equipment specified herein.

This approval does not extend to any modification of the specified equipment. Such modification shall, if approved, be the subject of a separate certificate of approval.

EQUIPMENT: KANNAD 406 WH Satellite EPIRB (406/121.5)

MANUFACTURER: SERPE IESM
Zone Industrielle des Cinq-Chemins
56520 GUIDEL
FRANCE

IDENTIFICATION: KANNAD 406 WH 406 MHz EPIRB complying with the model indicated on the Australian Spectrum Management Agency Compliance Certificate dated 10 January 1997, and COSPAS/SARSAT Type Approval Certificate, number 041, dated 5 November 1990.

LIMITATIONS ON USAGE: Vertically mounted, float-free satellite 406/121.5 MHz EPIRB. This EPIRB does not have the heater option.

CONDITIONS:

- 1. the specified equipment is to be manufactured in accordance with the prototype tested by the Australian Spectrum Management Agency and COSPAS/SARSAT, and accepted by Compliance Certificate dated 10 January 1997 and Type Approval Certificate number 041 dated 5 November 1990 respectively.
- 2. Servicing is to be carried out in accordance with the IESM servicing handbook for this model.
- 3. The equipment is to remain satisfactory in service.

This approval shall remain valid for the period specified in the Schedule to this certificate unless suspended or cancelled before the expiry date.



T G Rose
T G Rose
Manager
Survey Operations



AUSTRALIAN MARITIME SAFETY AUTHORITY

CERTIFICATE OF APPROVAL

No. 4689

THE SCHEDULE

The Certificate of Approval No. 4689 is valid until July 3, 2002 unless suspended or cancelled before the expiry date.



T G Rose
Manager
Survey Operations



Radiocommunications Act 1992

Compliance Certificate

I, Jim Karamalakis, delegate of the Spectrum Manager, for the purposes of subsection 184(1) of the Radiocommunications Act 1992 issue this certificate of compliance to:

Safety At Sea (Australasia) Ltd

79-81 Gaunt St

Westhaven Auckland NZ

certifying that the

Kannad 406 WH

complies with the

requirements for 406MHz Satellite Distress Beacons

in accordance with the

Spectrum Management Agency

Radiocommunications Standard (406MHz Satellite Distress Beacons)

No. 1 of 1996

Dated this Tenth day of January 1997

J. Karamalakis

Delegate of the Spectrum Manager

SMA



**Spectrum
Management
Agency**

This certificate is issued under the authority of the
Government of the PEOPLE'S REPUBLIC OF CHINA

格式 CP202
Form



中 国 船 级 社
CHINA CLASSIFICATION SOCIETY

编号 HBT96430014
No. _____

船用产品型式认可证书

CERTIFICATE OF TYPE APPROVAL FOR MARINE PRODUCT

产品名称 Satellite Emergency Position

制造厂名

Description Indicating Radio Beacon

Manufacturer

SERPE - IESM SA, FRANCE

产品型号 KANNAD 406 WH

Model _____

厂 址 Zone Industrielle des

图纸批准号 HBA96430033

Cing - Chemins 56520 GUIDEL FRANCE

Address _____

Approval No. of drawing _____

产 品 明 细

Particulars

406 MHz Satellite Transmission

Frequency:

406.025 MHz $\pm$ 0.002 MHz

UHF Power Output:

5 W $\pm$ 2 dB

Phase Modulation:

1.1 $\pm$ 0.1 Radians Peak

Repetition Period:

50 secs $\pm$ 5%

Transmission Time:

440 ms $\pm$ 1%

121.5 MHz Homing Transmission

Frequency:

121.5 MHz

Output Power:

25 mW

Modulation:

3K20A3N

Float-free type, Automatic Water Activation EPIRB of COSPAS-SARSAT system with battery Hoppecke LSC 3460M (4 D - Cells) LiMnO₂, or Saft LSH 20 (4 D - Cells) LiSOCl₂,

兹证明本社验船师根据本社规范和有关规则, 对上述产品的图纸和技术文件进行了审查, 并于_____年__月__日
产品图纸和试验结果均符合本社规范和

现予认可。

型式认可后, 该产品仍需按本社规定进行检验和发证。

THIS IS TO CERTIFY that the Surveyor to this Society has, in accordance with the Rules and relevant Regulations of this Society, examined the drawings and technical documents of the a.m. product, and type tests have been
carried out at SERPE - IESM SA, FRANCE on

Jan. 6-12, 1996, and that both the drawings and test results are found to be in compliance with ~~the Rules and Regulations of the Society~~

****** . The Type Approval for the subject product is hereby granted.

After the Type Approval, the subject product is also required to be surveyed and certified in accordance with the requirements of this Society.

本证书有效期限至

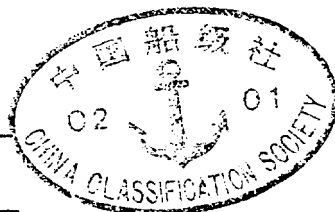
This Cert. is valid until

May 9, 2000

发证日期

May 10, 1996

Date of issue



****** the Technical Regulations for Statutory Survey of Sea-going Ships promulgated by the Register of Shipping of P.R.China and IMO Res. A.763(18) and 814(19).



POTVRDA O TIPNOM ODOBRENJU
TYPE APPROVAL CERTIFICATE

Br / No 03-000219/030117

Potvrđuje se da je ovaj proizvod, u skladu s Pravilima za tehnički nadzor pomorskih brodova - Dio 1. - Opći propisi - Odjeljak 3. - Tipno odobrenje proizvoda, odobren za ugradnju na brodove i postrojenja pod nadzorom Hrvatskog registra brodova.

This is to certify that this product on the basis of the Rules for technical supervision of sea-going ships - Part 1 - General requirements - Chapter 3 - Type approval of products, is approved for use on board ships and installations under supervision of the Croatian Register of Shipping.

TIP I OPIS PROIZVODA:

TYPE AND DESCRIPTION OF PRODUCT:

SAT EPIRB KANAD 406 WH
SAT EPIRB KANAD 406 WH

PROIZVOĐAČ:
MANUFACTURER:

SERPE-IESM
Zone Industrielle des Cinq-Chemins
56520 GUIDEL
FRANCE

PROIZVOD UDOVOLJAVA SLIJEDEĆIM PRAVILIMA/PROPISIMA:
THE PRODUCT MEETS FOLLOWING RULES/REGULATIONS:

HRVATSKI REGISTAR BRODOVA: PRAVILA ZA TEHNIČKI NADZOR POMORSKIH BRODOVA
DIO 14

CROATIAN REGISTER OF SHIPPING: RULES FOR THE TECHNICAL SUPERVISION OF SEA-
GOING SHIPS, PART 14

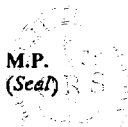
IMO RESOLUTION A.810(19)

PODRUČJE PRIMJENE/POSEBNI GRANIČNI UVJETI:
FIELD OF APPLICATION/SPECIAL OPERATIONAL LIMITS:

ODOBRENJE VRIJEDI DO:
APPROVAL IS VALID UNTIL: 15. srpnja 2001.
15th July 2001

UZ UVJETE NAVEDENE NA POLEDINI
SUBJECT TO CONDITION OVERLEAF

Mjesto i datum Split, 15. srpnja 1997.
Place and date Split 15th July 1997



.....
Direktor - Director



Ministerio de Fomento
Secretaría de Estado de Infraestructuras
y Transportes

Dirección General de la Marina Mercante

Ruiz de Alarcón, 1
28071 Madrid
Tel. 597 80 00
527 80 03

COMUNICACIÓN NUMERO 193

ASUNTO: MODIFICACIÓN DE LA RADIOBALIZA KANNAD 406 PH.

La firma SERPE-IESM, fabricantes de 1 Radiobaliza del asunto, ha realizado en la misma una modificación mecánica que no afecta a las especificaciones técnicas ni físicas de la misma. Esta modificación, consiste en la adición de un circuito detector de agua dispuesto de tal forma que la radiobaliza se activará de forma automática únicamente cuando se encuentre fuera del contenedor, flotando en el agua, de cualquier modo, la baliza, también se podrá activar de forma manual utilizando el interruptor dispuesto a ese efecto.

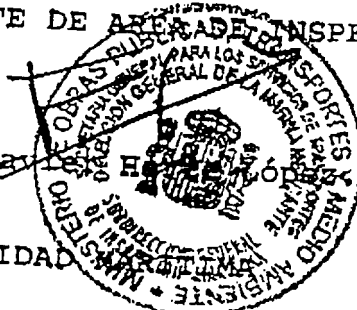
Visto por esta Inspección que se trata de la misma Radiobaliza, pero mejorada, no se le ha exigido la realización de nuevas pruebas, teniendo en cuenta además que se encuentra homologada en Francia, se acepta esta variación con el mismo numero de homologación que la radiobaliza KANNAD 406 PH con la denominación KANNAD 406 WH.

Los inspectores radiomarítimos, deberán comprobar que el etiquetado e instrucciones corresponden a la radiobaliza que se instala.

Madrid 28 de Junio de 1.996

EL JEFE DE INSPECCIÓN RADIOMARITIMA

Fdo. J. J. J.



SRES. ELECTRONICA Y SEGURIDAD

APARTADO 1733

VIGO (PONTEVEDRA)



ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
ΥΠΟΥΡΓΕΙΟ ΕΜΠΟΡΙΚΗΣ ΝΑΥΤΙΑΙΑΣ
ΔΙΕΥΘΥΝΣΗ ΕΛΕΓΧΟΥ ΕΜΠΟΡΙΚΩΝ ΠΛΟΙΩΝ

HELLENIC REPUBLIC
MINISTRY OF MERCHANT MARINE
MERCHANT SHIPS INSPECTORATE

ΠΙΣΤΟΠΟΙΗΤΙΚΟ ΕΓΚΡΙΣΗΣ ΤΥΠΟΥ
CERTIFICATE OF TYPE APPROVAL

Αριθ. πρωτ. :
Ref. no.: 1423BNTA/ 110/96

Σύμφωνα με τις διατάξεις του Κανον. IV/14 της Δ.Σ. Π.Α.Α.Ζ.Ε.Θ. 74/88 η παρακάτω συσκευή εγκρίνεται για χρήση στα Ελληνικά εμπορικά πλοία ως συσκευή του GMDSS και πληρεί το πρότυπο απόδοσης ETS 300 066 του ETSI.
In accordance with Reg. IV/14 of Solas 74/88 Convention the undernoted equipment is approved for use on board Hellenic merchant ships as a GMDSS equipment and complies with the ETS 300 066 performance standard of ETSI.

ΣΥΣΚΕΥΗ : 406 MHZ EPIRB
EQUIPMENT :

ΤΥΠΟΣ : KANNAD 406 WH
TYPE :

ΚΑΤΑΣΚΕΥΑΣΤΗΣ : SERPE-IESM
MANUFACTURER :

ΓΕΝΙΚΑ ΤΕΧΝΙΚΑ ΣΤΟΙΧΕΙΑ
GENERAL TECHNICAL DATA

ΙΣΧΥΣ :
POWER 5 W / 25 mW

ΤΑΞΗ ΕΚΠΟΜΠΗΣ
EMISSION CLASS : G1B /A3X

ΣΥΧΝΟΤΗΤΕΣ ΕΚΠΟΜΠΗΣ
TRANSMITTING FREQUENCIES
ΣΥΧΝΟΤΗΤΕΣ ΛΗΨΗΣ
RECEIVING FREQUENCIES

406,025 MHZ/121,5 MHZ

Η έγκριση βασίσθηκε σε : (α) Αριθ. 96021162SN /23-2-1996 εγκριτική απόφαση της
Commission Centrale de Securite, France
Basis of approval : 96021162SN/23-2-1996 type approval certificate of
Commission Centrale de Securite, France
(β) Αριθ. 96.053/11-01-96 εγχειρίδιο αποτελεσμάτων
δοκιμών της SERPE-IESM.
No 96.053/11-01-96 test results of SERPE-IESM.

Η ΕΓΚΡΙΣΗ ΙΣΧΥΕΙ ΜΕΧΡΙ :
THE APPROVAL IS VALID UNTIL : 21-10-99

ΠΡΟΣΘΕΤΕΣ ΠΡΟΫΠΟΘΕΣΕΙΣ ΚΑΙ ΠΑΡΑΤΗΡΗΣΕΙΣ
ADDITIONAL CONDITIONS AND REMARKS

1. Το σύστημα πρέπει απαραίτητα να συνοδεύεται από οδηγίες χρήσης στην Ελληνική ή Αγγλική γλώσσα και να φέρει ανεξίτηλη πινακίδα στην οποία να αναγράφονται ο τύπος, η κατασκευάστρια εταιρεία, η τάση λειτουργίας, ο αριθμός σειράς παραγωγής και ο αριθμός εγκριτικής απόφασης.

The system should be accompanied by operating instructions in Greek or English language and a label should be attached indicating equipment type, manufacturer, operating voltage, serial production number and the no. of this approval certificate.

Η ΕΓΚΡΙΣΗ ΑΥΤΗ ΜΠΟΡΕΙ ΝΑ ΑΝΑΚΛΗΘΕΙ ΕΦΟΣΟΝ :
THE APPROVAL MAY BE WITHDRAWN IN CASE OF :

1. Διαπιστωθούν αποκλίσεις σε σχέση με το πρότυπο απόδοσης
Equipment performance deficiencies
2. Επέλθουν αλλαγές στο πρότυπο απόδοσης ή τη διαδικασία έγκρισης
Alteration of rules or approval procedure
3. Λήξει η προθεσμία ισχύος
Expiration term of validity

ΠΛΗΡΟΦΟΡΙΕΣ
ADDRESS FOR INFORMATION

Για κάθε πληροφορία που αφορά την εγκριτική απόφαση μπορείτε να απευθύνεσθε σε :
 Any query regarding this approval certificate to be addressed to :

ΤΜΗΜΑ ΤΗΛΕΠΙΚΟΙΝΩΝΙΩΝ - Β' ΥΚ (TELECOMMUNICATIONS - B' YK DEPARTMENTS)

Ταχ. Διεύθυνση (Address) : Κ. Παλαιολόγου 1 (1, K. Paleologou str)

Ταχ. Κώδικας (Zip Code) : 18535 Πειραιάς (18535 Piraeus)

Τηλέφωνο (Telephone) : +(301) 4112314

Τηλέτυπο (Telex) : +(601) 212885

Τηλεομοιότυπο (FAX) : +(301) 4137997

ΗΜΕΡΟΜΗΝΙΑ : Πειραιάς 21/10/96

DATE : Piraeus 21/10/96

Ο ΔΙΕΥΘΥΝΤΗΣ
THE DIRECTOR

ΑΡΧΙΠΛΟΙΑΡΧΟΣ ΛΣ ΜΠΟΥΡΛΙΑΣΚΟΣ Σ.
COMMODORE (HCG) BOURLIASKOS S.



GOEDKEURING Epirb 406 Mhz
Fabr.: SERPE - IESM, Frankrijk
Type : Kannad 406 WH

SI/248/96-2.2.6
SIKN/MV

VERKLARING VAN GOEDKEURING

DE MINISTER VAN VERKEER EN WATERSTAAT

HET HOOFD VAN DE NEDERLANDSE SCHEEPVAARTINSPECTIE

Gelet op:

de artikels C.5.1 and F.4.3 van het Besluit Radio-electrische Inrichtingen (Stb.1988, 552) en artikel 101 van het Schepenbesluit 1965 (Stb.367);

Verklaart:

dat de hieronder aangegeven zend- en ontvanginrichting:

Produktomschrijving : 406 Mhz Noodradiobaken
Fabrikant : SERPE - IESM, Frankrijk
Type : Kannad 406 WH

Op basis van:

de de overlegde certificaten en bijbehorende testrapporten, afgegeven door Frankrijk met de identificatie nummers 96021162 van 2 februari 1996 en 96.053 van 11 januari 1996;

En is toegelaten voor gebruik als:

406 Mhz Noodradiobaken aan boord van schepen waarop de Schepenwet van toepassing is, onder de voorwaarden genoemd in de bijlage van deze goedkeuring.

Deze Verklaring van Goedkeuring is verleend aan:

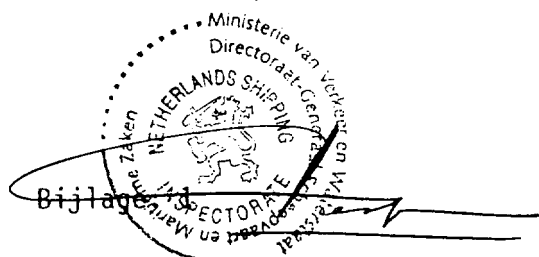
Naam : Holland Nautic Benelux B.V.
Adres : Nagelpoelweg 16
Postcode/Plaats : 7302 HB Apeldoorn
Land : Nederland

en is geregistreerd onder nummer:

SI/248/96-2.2.6

ROTTERDAM, 16 januari 1997

HET HOOFD VAN DE SCHEEPVAARTINSPECTIE,
namens deze,
HET HOOFD VAN DE AFDELING KOOPVAARDIJ (b.o.),



AAN: HOLLAND NAUTIC BENELUX B.V.
Nagelpoelweg 16
7302 HB APELDOORN

P.A.M. Dessens

Inspecteur

voor de scheepvaart



ENCLOSURE TO "DECLARATION OF APPROVAL" NO. SI/248/96-2.2.6

The 406 Mhz Emergency Radiobeacon (EPIRB), Kannad 406 WH with a built-in 121.5 Mhz. radiobeacon, manufactured by SERPE-IESM, 56520 Guidel, France has been tested in accordance with IEC 1097.2 and found to be in compliance with IMO Resolution A.810(19).

The EPIRB has been approved as a float-free 406 Mhz EPIRB for use on board of ships to which the Netherlands Shipping Act is applicable under the following conditions:

1. The 406 Mhz EPIRB shall be encoded with the vessels MMSI number by the manufacturer or an authorized service station. The Epirb shall be installed on board and shall be annually inspected by an authorized servicestation.
2. Each appliance shall be accompanied by a manufacturer's statement to the effect that the equipment meets the requirements and that its construction is identical, without restrictions, to that of the equipment submitted for type-testing.
3. Each appliance shall be clearly marked with:
type and serial number, MMSI number, operating- and test instructions in the English and Dutch language, lifespan of battery (4 years), replacement date of hydrostatic release unit, minimum safe distance for the equipment from magnetic compass. This text shall be written in an indelible way. The EPIRB shall be provided with retroreflective tape and a tag showing the type approval number.
4. The EPIRB shall be provided with a CAL 89(1) automatic release container. This container shall be fitted with a HAMMAR type H20 hydrostatic release unit. The container shall be clearly marked with type and serial number, MMSI number and operating- and test instructions in the English and Dutch language. This text shall be written in an indelible way.
5. Each appliance shall be accompanied by an Instruction and Operational Manual (with amendments) in the English and Dutch language and a Quick Reference Card together with a copy of this "Declaration of Approval".

This approval remains valid, as long as the French approval remains valid, provided that no changes in the composition and construction of the appliance are made, but not longer than February 23rd, 2001.

ROTTERDAM, January 16th, 1997

THE HEAD OF THE SHIPPING INSPECTION,
on his behalf,

THE HEAD OF THE ~~MERCHANT~~ SHIPPING DEPARTMENT (dep),

R.A.M. Dessens

FJARSKIPTAEFTIRLIT RÍKISINS

NATIONAL TELECOM INPECTORATE

Malarhöfða 2, IS-112 Reykjavík, ICELAND

Sími/Tel: (+354) 587 2424, Fax: (+354) 587 2429

GERÐARSAMÞYKKI

Icelandic Type Approval Certificate

Samþykkisnúmer Type approval number	IS-2343-00
Rétthafi Issued to	Skiparadió hf. Fiskislóð 94, 101 Reykjavík. Kt. 6703730379
Tegund og gerð Type designations	Kannad 406 WH
Lýsing Category	Neyðarbauja á 406 MHz. 406 MHz EPIRB
Framleiðandi Manufacturer	SERPE-IESM, France
Tæknistaðlar Technical Standards	ETS 300 066
Reglugerðir Regulations	Nr 493/1988, 322/1985

Dags: 28.06.96



Gerðarsamþykkið getur hvenær sem er verið dregið til baka vegna sérstakra ástæðna, svo sem ef búnaður sem settur er á markað er ekki í samræmi við þann búnað sem lá til grundvallar gerðarsamþykkinu eða ef þær tæknilegu kröfur sem lágu til grundvallar gerðarsamþykkinu séu breyttar þ.e. búnaðurinn uppfylli ekki lengur þær tæknilegu kröfur sem gerðar eru.

This type approval may at any time be withdrawn due to specific reasons such as if equipment introduced on the market does not conform to the equipment submitted for the test laboratory for type approval tests or if the technical regulations are changed, so that the equipment no longer fulfills the requirements for approval.



INTERNATIONAL REGISTRIES, INC.

11495 Commerce Park Drive

Reston, VA 20191-1507

Tel: (703) 620-4880

Fax: (703) 476-8522

Telex: 275501 IRI UR

FAX TRANSMISSION FORM

TO: R. PETCH
EXPORT MANAGER
SERPE - IESM

FAX NO: 33 2 97 65 00 20

FROM: CECIL D. GEIGER
CHIEF, RADIO DIVISION

CC:

DATE: DECEMBER 3, 1996

SUBJECT: KANNAD 406 WH (WITH WATER ACTIVATION) SATELLITE EPIRB

PAGES: 1 You should receive page(s), including this cover sheet. If you do not receive all the pages, please call 703-620-4880.

This facsimile transmission (and/or the documents accompanying it) are confidential and is intended for the use of the recipient named above. If you are not the intended recipient, you are hereby notified that any disclosure, copying, distribution or taking of any action in reliance on the contents of this information is strictly prohibited. If you have received this transmission in error, please immediately notify us by telephone to arrange for return of the documents.

THIS IS TO CERTIFY THAT SUBJECT EPIRB IS APPROVED FOR USE ABOARD
ALL VESSELS REGISTERED IN THE REPUBLIC OF LIBERIA AND THE REPUBLIC
OF THE MARSHALL ISLANDS.

BEST REGARDS,

-affiliated with-
Liberian Services, Inc.
Liberian Corporation Services, Inc.
Marshall Islands Maritime & Corporate Administrators



MARITIME SAFETY AUTHORITY
OF NEW ZEALAND

Te Mana Ārai Hauata Moana o Aotearoa

18 October 1996.

53/10/5

Cert No. LSA/EPIRB/1996/1

CERTIFICATE OF ACCEPTANCE

EMERGENCY POSITION INDICATOR BEACON TYPE 406 Mhz

Model: KANNAD 406 WH
Accepted under type approval of Cospas-Sarsat.

Manufacturer: IESM
Guide
France.

Marketed by: Safety at Sea (Australia) Ltd, Auckland, New Zealand..

Construction Constructed and tested in accordance with IMO regulations 814(19)
and IEC 1097-2 specifications. Satellite coherent Cospas-Sarsat system.

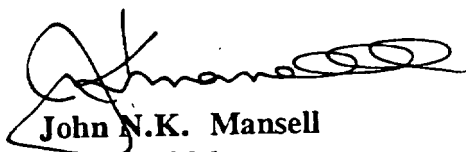
Notations Float free.

Conditions: None.

Application: Accepted for GMDSS and non GMDSS vessels of all classes in all sea
areas.

Expiry date: 1 November 2001.

Issued subject to the beacon remaining in a satisfactory working order
and condition, serviced in accordance with manufacturers instructions
and in compliance with any future international/national regulations
adopted by the New Zealand Administration.



John N.K. Mansell
Divisional Manager
Maritime Operations.

11.1

Polski Rejestr Statków



COPY

ŚWIADECTWO UZNANIA TYPU WYROBU TYPE APPROVAL CERTIFICATE

NR TC/1492/880725/98
No.WAŻNE DO 2003-11-25
Valid until

ZAŚWIADCZA SIĘ, ŻE NIŻEJ WYMIENIONY PRODUKT UZNAJE SIĘ ZA SPEŁNIAJĄCY ODPOWIEDNIE WYMAGANIA MIĘDZY-
NARODOWEJ KONWENCJI O BEZPIECZEŃSTWIE ŻYCIA NA MORZU – SOLAS 1974 ŁĄCZNIE Z POPRAWKAMI.
POLSKI REJESTR STATKÓW JEST NALEŻYCIĘ UPOWAŻNIONY PRZEZ RZĄD RZECZYPOSPOLITEJ POLSKIEJ DO OCENY
PRODUKTU ORAZ WYDANIA ODPOWIEDNIEGO ŚWIADECTWA.

This is to certify that the underneted product complies with the relevant requirements of the International Convention for the Safety of Life at Sea,
SOLAS 1974 with Amendments.
Polski Rejestr Statków is duly authorized by the Government of the Republic of Poland to perform surveys and to issue the relevant certificates.

WYRÓB: Satellite Emergency Position Indicating Radio Beacon
Product:TYP: KANNAD 406 WH
Type:WYTWÓRNIA: SERPE IESM
Manufacturer: Z.I. des Cinq Chemins
56520 GUIDEL - FRANCE

r/b: SMART Co. Ltd., Czechosłowacka 3, 81-963 Gdynia, Poland

OGÓLNE DANE TECHNICZNE: General technical data:

406 MHz satellite transmission

Frequency: 406.025 Hz $\pm$ 0.002 MHz,
Output power: 5W $\pm$ 2 dB
Modulation type: phase; 1.1 $\pm$ 0.1 radians peak,
Transmission type: 440 m sec $\pm$ 1 %,
Activation: water activation, automatical and manual, float free,

Homing transmission

121.5/243 MHz,
25 mW,
3K20A3N,
continuous transmission,

PODSTAWA UZNANIA:
Basis of approval:

1. Examinations carried out at SERPE IESM laboratory in Guidel, November 18th, 1998.
2. Final report dated November 24th, 1998.
3. Technical documentation approved by PRS on November 10th, 1998.

WARUNKI OGÓLNE:
General conditions:

UZNANIE JEST WAŻNE TYLKO WÓWCZAS, KIEDY WYRÓB JEST UŻYTY ZGODNIE Z WARUNKAMI WYTWÓRNI.
The approval is valid only when the product is used in accordance with the manufacturer's conditions.

ZMIANY KONSTRUKCJI I MATERIAŁÓW CZĘŚCI MAJĄCYCH WPŁYW NA JAKOŚĆ WYROBU POWINNY BYĆ UZGODNIONE
Z P
Changes of design of product and materials used which influence its quality, are to be agreed with PRS.

UZNANIE MOŻE BYĆ COFNIĘTE W PRZYPADKU:
The approval may be withdrawn in case of:

- NIEZADOWALAJĄCYCH WYNIKÓW EKSPLOATACYJNYCH;
dissatisfactory service results;
- ZMIANY W KONSTRUKCJI I MATERIAŁACH BEZ UZGODNIENIA Z PRS;
changes to design and materials without PRS consent;
- ZMIANY W PRZEPISACH LUB TRYBIE UZNAWANIA.
alterations of rules and approval practice.

NIEROWNIK INSPEKTORATU
Manager of Department

GDANSK. DNIA 1998-11-25
On



DYREKTOR TECHNICZNY
Technical Director



MINISTÉRIO DO EQUIPAMENTO, DO PLANEAMENTO E DA ADMINISTRAÇÃO DO
TERRITÓRIO
DIRECÇÃO-GERAL DE PORTOS, NAVEGAÇÃO E TRANSPORTES MARÍTIMOS

CERTIFICADO DE APROVAÇÃO DE EQUIPAMENTO

Nº 96029

Certifica-se que,

o equipamento **RADIOBALIZA DE LOCALIZAÇÃO DE SINISTROS**

marca **IESM**

tipo **KANNAD- 406WH**

está aprovado para montagem até **23 DE JUNHO DE 2001**

nas embarcações nacionais, nas condições impostas pela legislação e normas em vigor.

Nota: **SATISFAZ RESOLUÇÃO A. 810(19) DA IMO.**

Lisboa, **24 DE JUNHO DE 1996**

O Inspector de Navios



TYPE APPROVAL CERTIFICATE

Manufacturer:

SERPE-IESM

Zone Industrielle des Cinq Chemins, 56520 Guidel, France.

Product: **Satellite Emergency Position Indicating Radio Beacon (EPIRB)**
of "KANNAD 406 WH" and "KANNAD 406 FW" types.

Technical data :
Transmission frequency - 406,025 MHz and 121,5 MHz.
Temperature range: -40 °C +55 °C, Watertight at 1 bar,
Prescribed battery type: SAFT LSH-20 (4 D-Cells),
Autonomy of operation: 48 hours minimum at -40 °C.

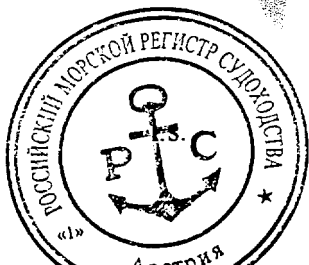
This is to certify that on the basis of the survey and of tests carried out the above mentioned item(s) complies with the requirements of the Russian Maritime Register of Shipping.

Applications/Limitations: Complies with the requirements of SOLAS 74/78 with Amendments 1988/1989 and IMO Resolutions A.763 (18), A.810(19) and A.814(19).

This Approval with Annex is valid until: 05.11.2001

Date of issue: 05.11.1996

No. 96.064.250



RUSSIAN MARITIME REGISTER OF SHIPPING

ANNEX

to Agreement of Supervision No. 96.034.250

Name of products	Name and No. of technical documentation. Date of approval and/or No. of Type Approval Certificate
1. Satellite Emergency Position Indicating Radio Beacon (EPIRB) of "KANNAD 406 WH" and "KANNAD 406 FW" types.	96.064.250 is valid until 05.11.2001
2. Marine Search and Rescue Radar Transponder (SART) of "RESCUER" type.	95.043.250 is valid until 13.02.2000



RUSSIAN MARITIME REGISTER OF SHIPPING

RUSSIAN MARITIME REGISTER OF SHIPPING

6.8.4-1



Annex to Type Approval Certificate № 96.064.250

Product Description: Float free Satellite Emergency Position Indicating Radio Beacon (EPIRB) supply with water activation system and installed in the container fitted with a hydrostatic release mechanism.

Technical documentation and date of approval by the Russian Maritime Register of Shipping :
The technical documentation is approved by the letter No.11-6.5MK4-2691U of 09.09.1996

Prototype specimen was tested under supervision of the Russian Maritime Register of Shipping. Survey Report: 96.3047.250 of 31.10.1996.

Product certification conditions: The products shall be delivered with the RUSSIAN MARITIME REGISTER OF SHIPPING Certificate.

Code of nomenclature: 04030300MK



RUSSIAN MARITIME REGISTER OF SHIPPING

A handwritten signature in black ink, appearing to be 'A. G. ...', is written over the printed name of the Russian Maritime Register of Shipping.

Part 2

EVOLUTIONS



SERPE-IESM

SUMMARY

- 1 - OVERVIEW OF MODIFICATION
- 2 - MECHANICAL ASPECT
- 3 - ELECTRONICAL MODIFICATION
 - 3-1 COMPARATIVE VIEWS
 - 3-2 OSCILLATOR
 - 3-3 MODIFICATION ON UHF AMPLIFIER STAGES
- 4 - BATTERY PACK
 - 4-1 ENERGY / ELECTRONICAL ADEQUATION
 - 4-2 PACK OF 3 CELLS LSH 20

1 - OVERVIEW OF MODIFICATION

The **KANNAD 406 WH-97** beacon is a COSPAS-SARSAT beacon that complies with latest IMO requirements. The requirements are described in IEC 1097-2 et ETSI 300 666 specifications.

The evolution of electronics components, mainly HF transistors, is such that power voltage decreases and that it is necessary to modify the battery pack supplying power.

DESCRIPTION OF MODIFICATIONS

- EXTERNAL MODIFICATION - STRENGTHENING OF LASHING RINGS TAMPER PROOF SEAL

The outside aspect of the beacon is preserved, however the cut-outs on the cover to tie the beacon have been strengthened to take into account remarks made by end-users.

The diameter of the rope necessary for lashing has increased from Ø 1,5 mm to Ø 2,5 mm. To increase resistance, a groove has been made inside the floating collar for a better integration of the rope and to avoid entangling.

The tamper proof seal is now located under the cap of the manual switch transparent. At this place the tamper proof seal is protected against bad operation and is reliable

- MODIFICATION OF THE ELECTRONICS

The electronic board has been modified to take into account the obsolescence of certain electronic components and to integrate the water activation functions and self test on the main board.

The water activation and self test functions were on a secondary board in the previous version.

- BATTERY PACK FOR SUPPLY

The new electronic board, referenced as I 264 , accepts a power voltage from 7 volts to 15 volts, it has a device to regulate the UHF power at 37 dBm whatever the power voltage. With a voltage under but over 5,5 Volts, the frequency stability is preserved and the power decreases to 35 dBm.

Possibilities with 3 lithium technologies can be used, with identical mechanics and connections. The connector is different from the previous model to stop any inversion with older packs.

The battery pack is composed of 3 or 4 D size cells of the lithium technology in spirale to deliver the 406 Mhz transmission pulse current.

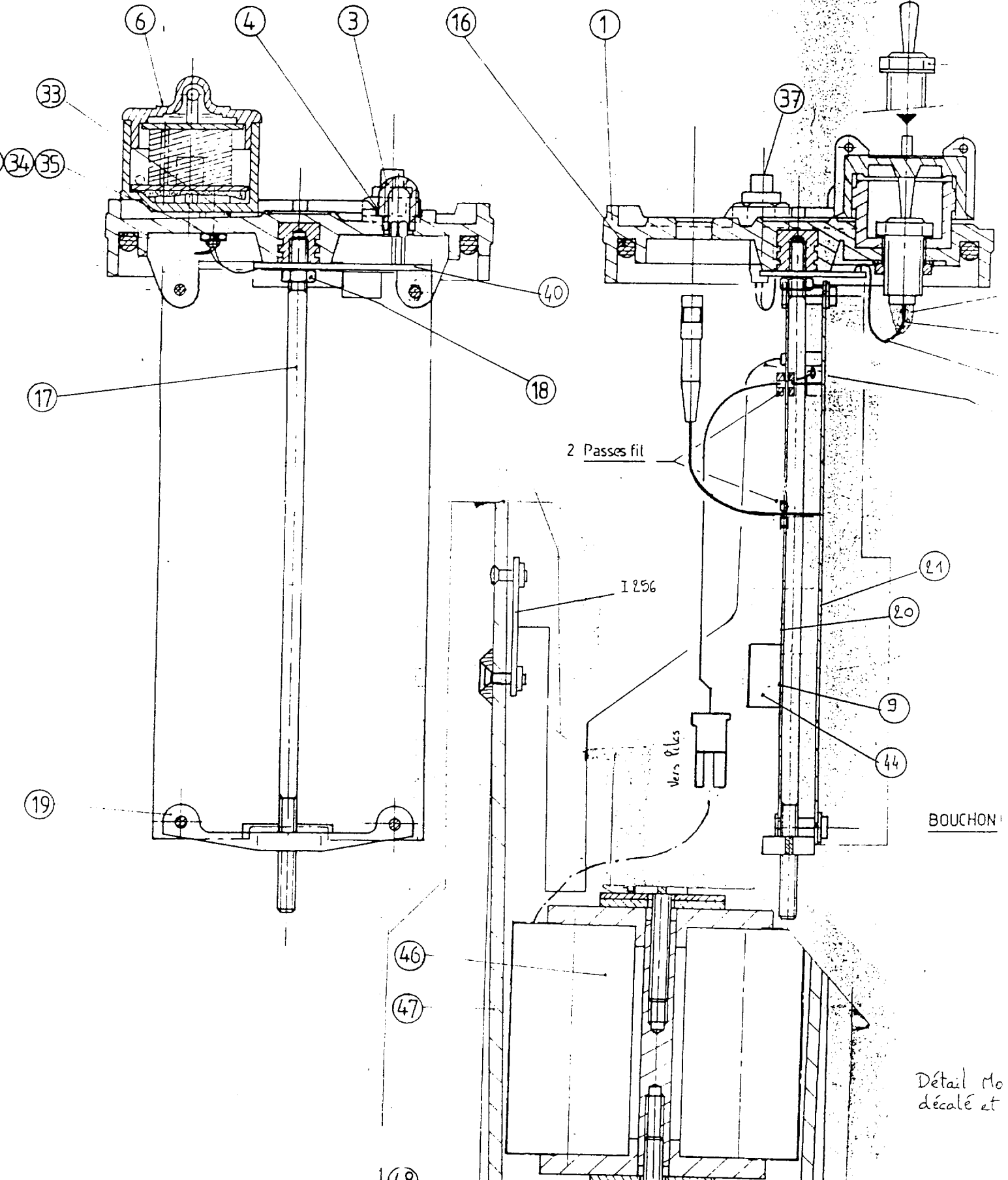


SERPE-IESM

MECHANICAL SECTION VIEW

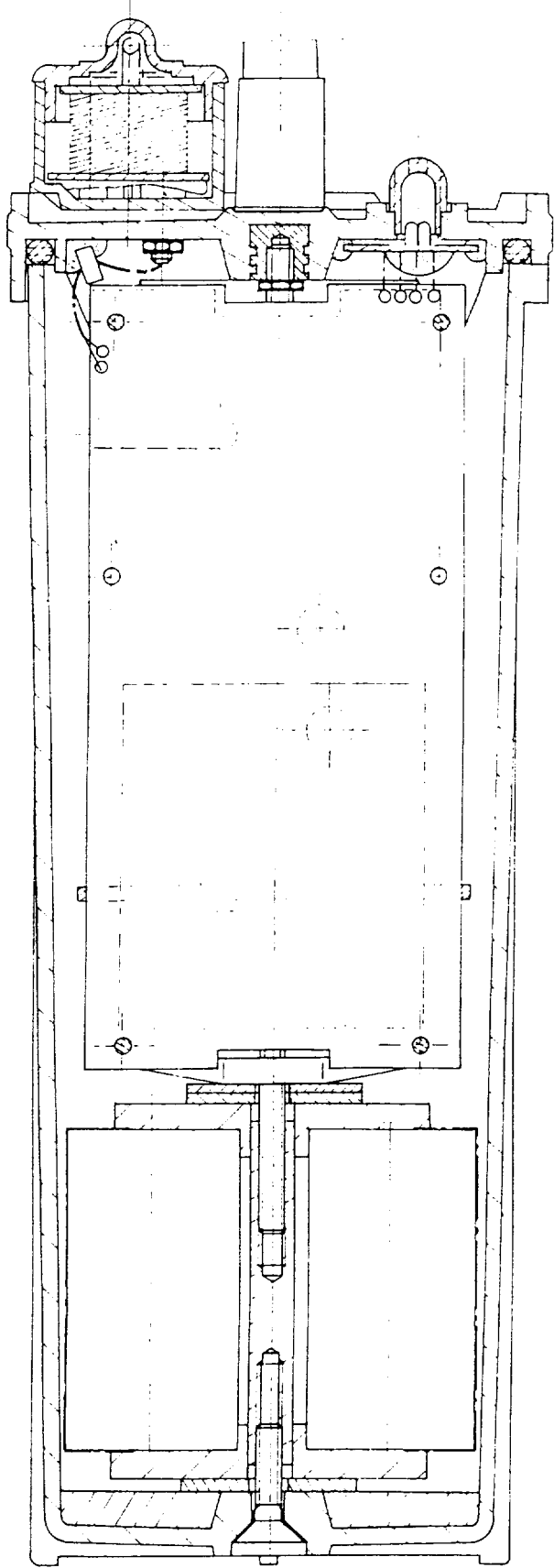
COUPE BB

COUPE AA



COUPE BB

A



A

COUPE AA

(40)

B

(41)

(42)

(43)

(44)

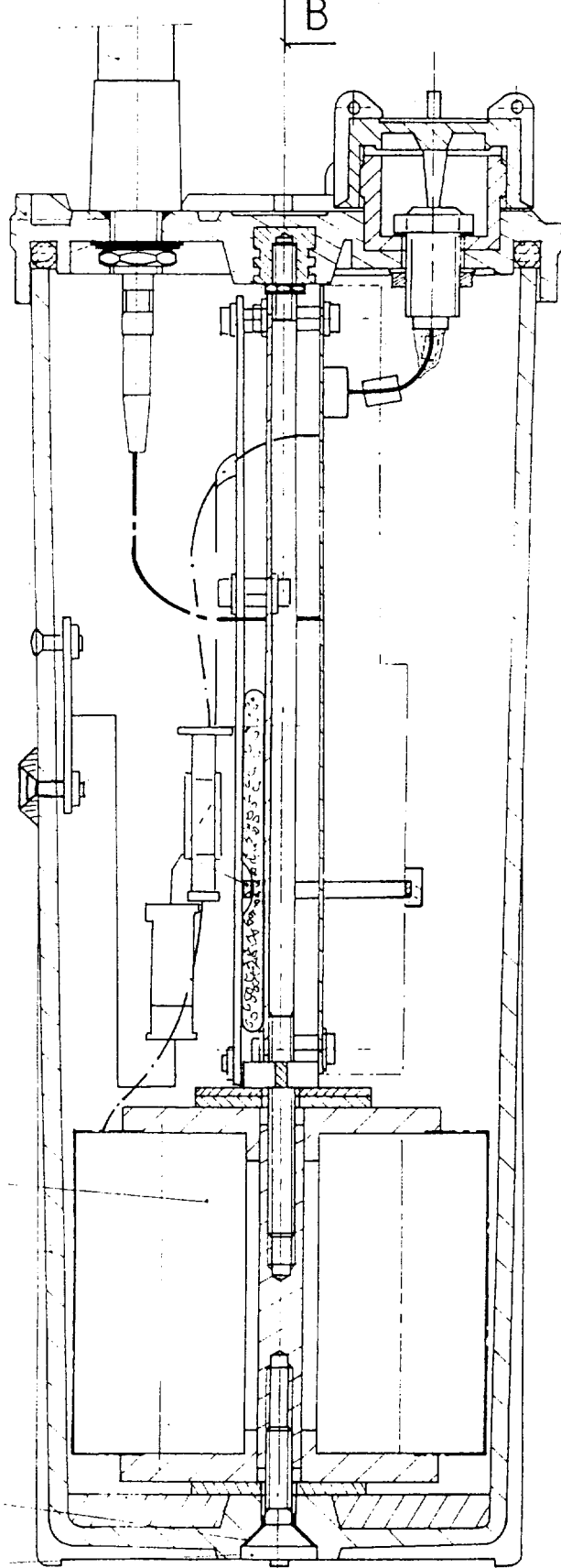
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B



SERPE-IESM

3 - ELECTRONICAL MODIFICATION

3-1 COMPARATIVE VIEW

EXPLANATION

Photos # 1,2,3,4 show both versions as internal view:

KANNAD 406 WH (#1and 2) and **KANNAD 406 WH-97** (#3 and 4)

Main view # 1 and 3

. The electronical boards I 144 and I 264 (#3) are identical in dimensions, volume and SMD technology

. The battery pack is mechanically identical

The oscillators are from SOREP EWOS 400 for **KANNAD 406 WH** and EWOS 051 for **KANNAD 406 WH-97**.

There is no external changes on the cover

BACK VIEW

KANNAD 406 WH-97 #2 Board I 228 carries the additional functions required in the 1996 IMO resolution for water activation and separated test push button.

#4 **KANNAD 406 WH-97**

The I228 board has disappeared and all functions are carried out by I 264

#2 and 4

Modification of the battery pack connector to avoid the use of unsuitable batteries for battery replacement.



SERPE-IESM

3-2 MODIFICATION OF REFERENCE OSCILLATOR

SERPE-IESM has been using the Eurowave Sorep oscillator for many years.

The new model EW OS 501 , in production since 96, is better in term of stability, consumption sturdiness to hard vibrations compared with the previous model EWOS 4xx.

The EWSO 501 is also smaller and is able to operate at 5 Volts. SERPE-IESM uses this type of oscillator in other models : aircrafts (ELTs), ground applications (PLBs)

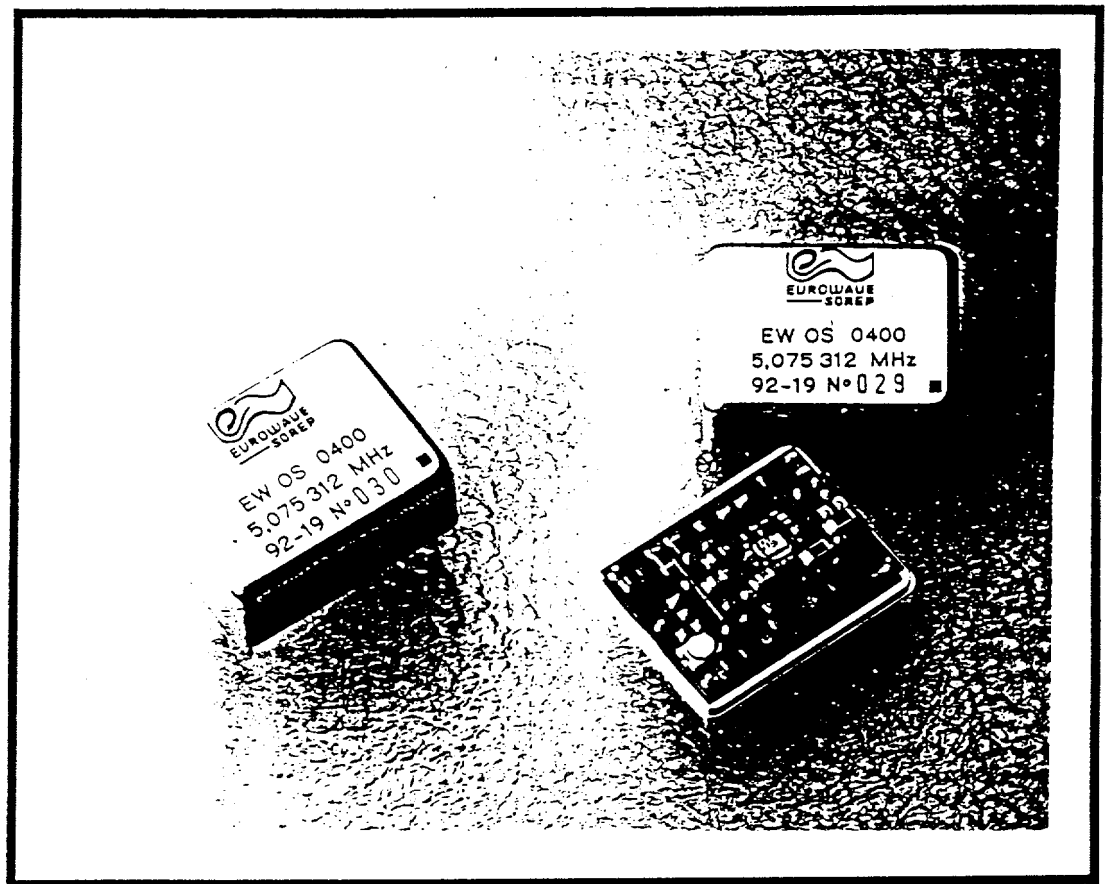
Until end of 97	EW OS 400
Since end of 97	EW OS 501



SERPE-IESM

Until end of 97 : EW OS 400

O.C.X.O.s



September 1993 Edition

CONTACTS : M. YAKER / I. FERRON

OCXO

(Oven Controlled Crystal Oscillators)

■ MAIN FEATURES

- Low power consumption
- Full-custom monolithic integration

■ FREQUENCY RANGE

: 4 to 100 MHz

■ TEMPERATURE RANGE

- **Operating** : -40/+70°C
- **Storage** : -55/+125°C

■ STABILITY VERSUS TEMPERATURE

: Up to $\pm 1.10^{-8}$

■ STABILITY VERSUS SUPPLY : $\pm 1.10^{-7}$ for $9\text{ V} \leq V \leq 18\text{ V}$

■ SHORT-TERM STABILITY : Up to 2.10^{-11} T = 100 ms

■ AGEING : $\pm 10^{-9}$ per month

■ WARM-UP TIME : 45 seconds

POWER SUPPLY

1. **Voltage** : +5 V $\pm 5\%$
9 V to 18 V
2. **Current** : 10 mA (12 V) @ 25°C
20 mA (5 V) @ 25°C
3. **Warm-up** : 1.2 Watts

■ OUTPUT LEVEL : Upon request (TTL, HCMOS, Sine, ...)

■ FREQUENCY ADJUSTMENT : Upon request

■ PHASE-NOISE : -120 dBc/Hz at 100 Hz

■ PACKAGE

- 30.2 x 24.2 x 12.5 in mm
- 1.2 x 0.95 x 0.49 in inch
- For other package size see table



OCXO
OVEN CONTROLLED
CRYSTAL
OSCILLATOR

EW OS 04XX

EW OS 0400, -1
EW OS 0410,
EW OS 0420,
EW OS 0430.

EUROWAVE Oven Control Crystal Oscillators widens with the introduction of EW OS 04XX.

Four new products for SARSAT BEACON applications are now available.

EW OS 0400 : 12 V Supply	Frequency : 5.075312 MHz,
EW OS 0410 : 12 V supply	Frequency : 10.150625 MHz,
EW OS 0420 : 5 V Supply	Frequency : 5.075312 MHz,
EW OS 0430 : 5 V supply	Frequency : 10.150625 MHz.

Other frequencies are available upon request.

TECHNICAL PROGRESS
COMPARED TO EW OS 0305

- The power consumption is lowered from 600 mW to 250 mW at $\theta = -40^{\circ}\text{C}$.
- The height of the package is reduced to 12.5 mm (Volume = 9 cm³).
- The stability in frequency is further improved.
- Frequency trim with an external potentiometer is removed.
- Large voltage supply range (8 to 18 V) for EW OS 0400 / 0410.

ELECTRICAL SPECIFICATIONS



	Unit	EW OS 0400-1	EW OS 0400	EW OS 0410	EW OS 0420	EW OS 0430
OUTPUT FREQUENCY	MHz	5.075312	5.075312	10.150625	5.075312	10.150625
POWER SUPPLY	V	7 to 15 V	8 to 18 V	8 to 18 V	5 V $\pm$ 5 %	5 V $\pm$ 5 %

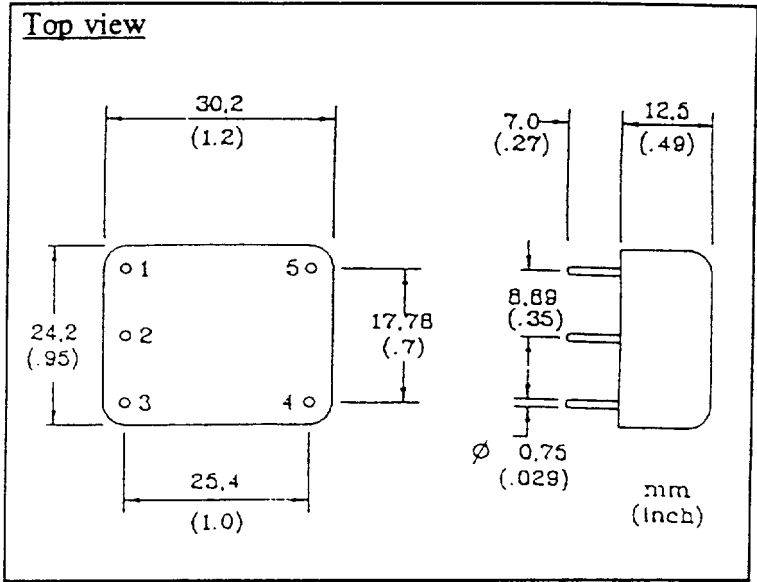


		Unit	EW OS 0400-1	EW OS 0400, 0410	EW OS 0420, 0430
FREQUENCY TOLERANCE		ppm	± 2 (25°C)	± 2 (25°C)	± 2 (25°C)
TEMPERATURE RANGE	Operating	°C	-40, +55	-40, +55	-40, +55
	Storage	°C	-55, +75	-55, +75	-55, +75
SUPPLY VOLTAGE		Volts	+ 5 (pin 2)	+ 5 (pin 2)	+ 5 (pin 2)
			Can be switched off	Can be switched off	Can be switched off
			7 to 15 V (pin 3)	8 to 18 V (pin 3)	5 V $\pm$ 5 % (pin 3)
SUPPLY CURRENT (5V or +12V pin 3)	Warm-up	mA	250	250	250
	Steady state +25°C	mA	10	10	24
	Steady state -40°C	mA	20	20	50
	Steady state +55°C	mA	5	5	12
SUPPLY CURRENT (+5V pin 2)		mA	7	7	7
FREQUENCY STABILITY	Temperature	ppm	± 0.2	± 0.2	± 0.2
	Supply voltage	ppm	± 0.1 (7 to 15 V)	± 0.1 (8 to 18 V)	± 0.3
	Short time		See note	See note	See note
AGING	Day		$\pm 2 \cdot 10^{-9}$ *	$\pm 2 \cdot 10^{-9}$ *	$\pm 2 \cdot 10^{-9}$ *
	Year	ppm	± 0.5	± 0.5	± 0.5
PHASE NOISE (See curve)		dBc/Hz	-120 (100 Hz offset)	-120 (100 Hz offset)	-120 (100 Hz offset)
OUTPUT LEVEL			TTL	TTL	TTL
SIZE			See figure	See figure	See figure

* : Over full temperature range.

PACKAGE OUTLINE

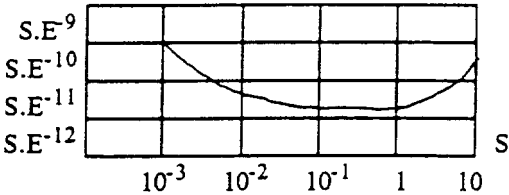
PIN n°	FUNCTION
1	N.C. (internally connected)
2	Supply + 5 V (can be switched off)
3	EW OS 0400, 0410 : Supply + 12 V EW OS 0420, 0430 : Supply + 5 V ± 5 %
4	Output
5	Ground



NOTES

SHORT TIME STABILITY

1 • As ALLAN (over stable 12 V supply)

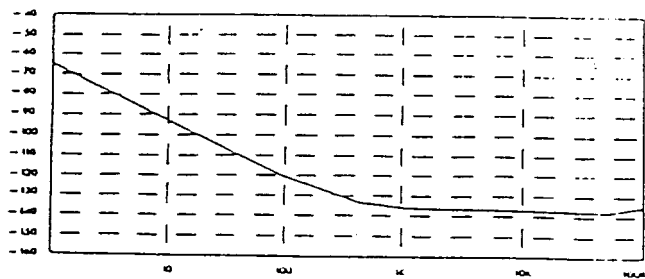


2 • As SARSAT Specifications and over 2 V drop supply : $5 \cdot 10^{-10}$

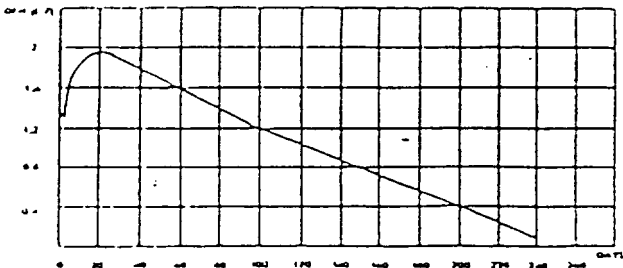
- EW OS 0400: $< 5 \cdot 10^{-10}$ (gate 100 ms over S2/S3)
- EW OS 0410: $< 1 \cdot 10^{-9}$ (gate 100 ms over S2/S3)
- EW OS 0420: $< 5 \cdot 10^{-10}$ (gate 100 ms over S2/S3)
- EW OS 0430: $< 1 \cdot 10^{-9}$ (gate 100 ms over S2/S3)

PHASE NOISE

Typical phase noise



Typical frequency recovery



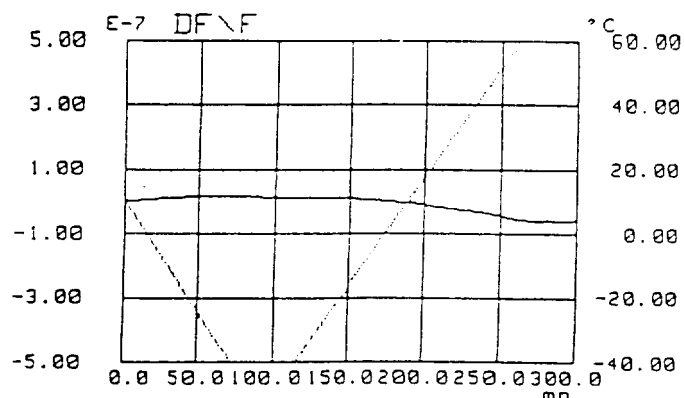
TYPICAL TEST RESULTS

Release : 2.0
Lot : 9219 - Série : 82

Remarks	Unit	Min. Spec.	Min. value	Max. value	Max. Spec.
Freq at 10.0°C	MHz		5.0753126		
Current	mA	0.00	4.10	17.40	150.00
dF/F			-58.99E-09	18.95E-09	
Slope		-20.00E-10	-15.43E-13	37.37E-12	20.00E-10
Average			-29.29E-09	25.12E-10	
Sigma			32.87E-12	65.95E-12	30.00E-10

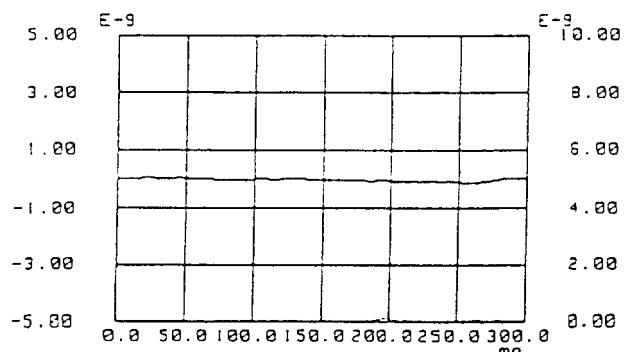
O.K. from -40°C to +60°C

TEMPERATURE

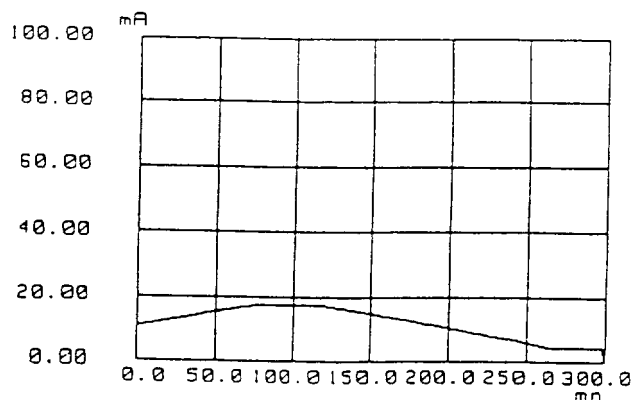


SIGMA

Slope 5°H

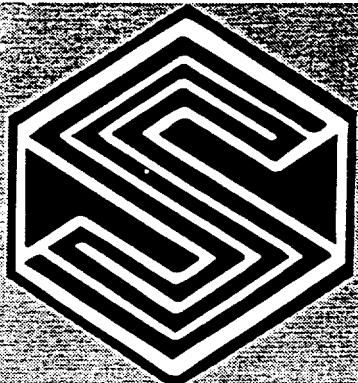


CURRENT





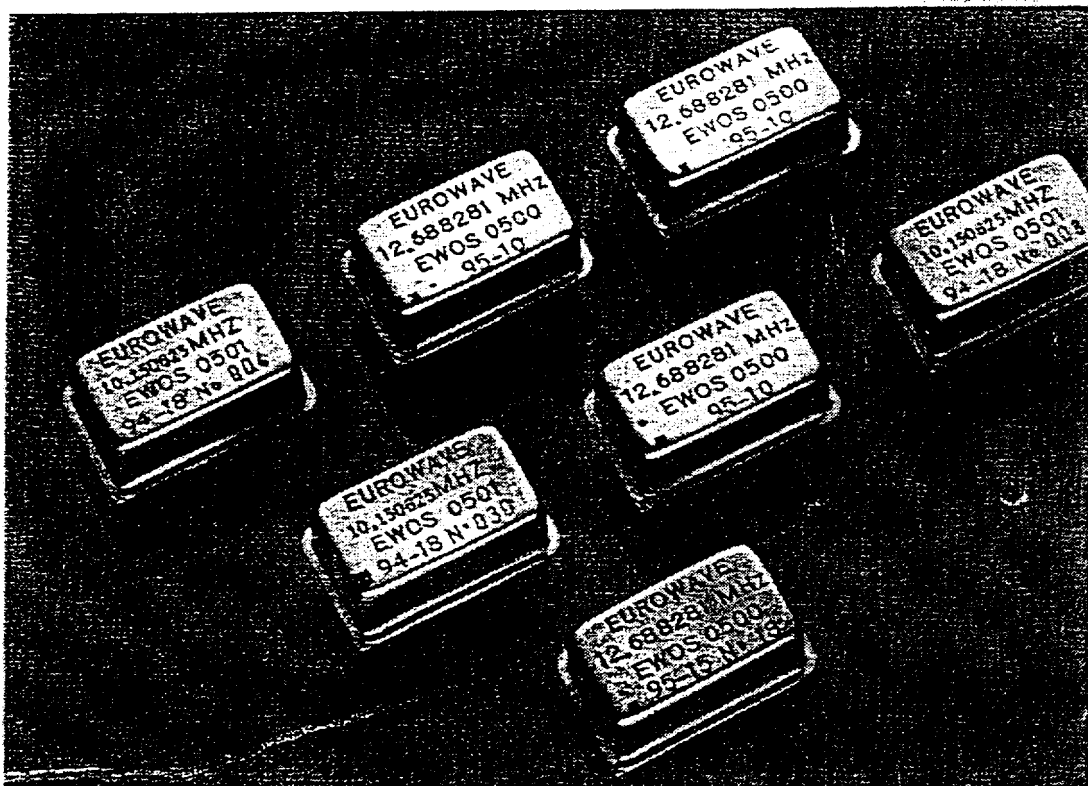
Since end of 97 : EW OS 501



SOREP

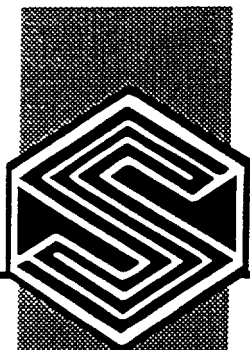
December 1996 Edition

SOREP OCXOs in DIL 4 package



SOREP, Z.I. de Bellevue, B.P. 5, 35221 CHATEAUBOURG CEDEX
(FRANCE),

Tel. : +33 (0)2.99.00.94.70, Fax : +33 (0)2.99.00.94.58



SOREP

EW OS 0500

12.688281 MHz OCXO Oven Controlled Crystal Oscillator

CHARACTERISTICS

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

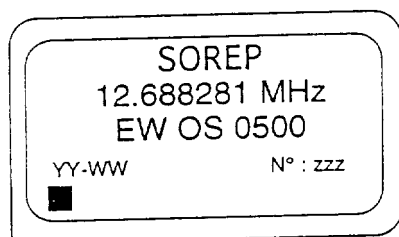
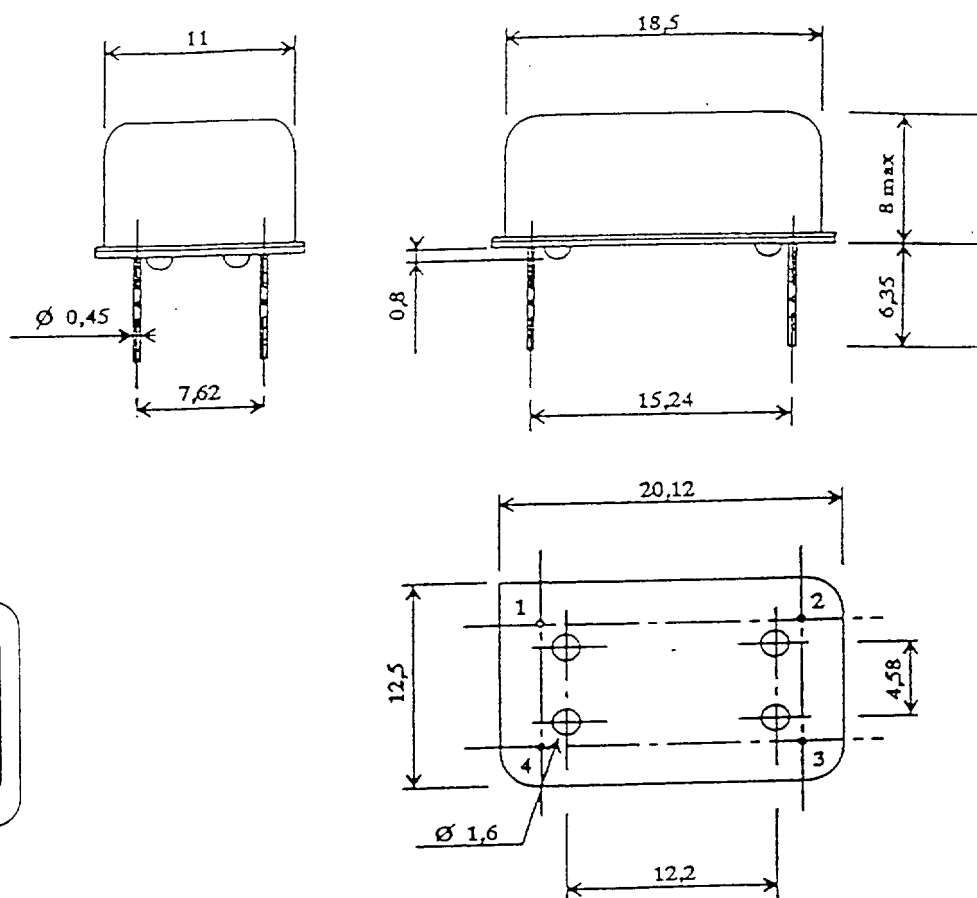
OUTPUT FREQUENCY		MHz	12.688281
FREQUENCY TOLERANCE		ppm	± 2 (25°C)
TEMPERATURE RANGE	Operating	°C	-40, +55
	Storage	°C	-55, +75
SUPPLY VOLTAGE		V	5 ± 5 %
SUPPLY CURRENT (+ 5V pin 4)	Warm-up	mA	250 max.
	Warm-up time	sec.	60
	Steady state +25°C	mA	20 typ.
	Steady state -40°C	mA	50 typ.
	Steady state +55°C	mA	10 typ.
FREQUENCY STABILITY	Temperature	ppm	± 0.2 typ.
	Supply voltage	ppm	± 0.1 typ.
	Short time		1 . 10 ⁻¹⁰ *
AGING	Day		± 2 . 10 ⁻⁹ **
	Year	ppm	± 0.5
PHASE NOISE		dBc/Hz	-110 (100 Hz offset)
OUTPUT LEVEL (Load 10KΩ/10pF)		Vpp	2
SIZE			See figure

* : Allan variance / 100 ms

** : Over full temperature range

PACKAGE OUTLINE

Pin n°	Function
1	CONTROL VOLTAGE
2	GROUND
3	RF OUT
4	POWER SUPPLY



PIN 1

Bottom view

Dimensions in mm.

RELIABILITY TEST

ITEM	TEST	REFERENCE
- Appearance / Marking	Conform to outline and presentation.	-
- Sealing	Qk test (thin leaks) 60 h, 12 h connexion, method 1. Qc test (large leaks), method 2.	IEC 68-2-17
- Shocks	500 G, 1 ms, 5 shocks for each axe (1 axe. in 2 directions)	IEC 68-2-27
- Vibration	10 to 2000 Hz, 0.75 mm until 10G, 90 min. per axe. V = 1 oct/min. 10 cycles per axe.	IEC 68-2-6
- Brasability	According to the standard.	IEC 68-2-20
- Resistance to solvents	Solvents	IEC 68-2-45
- Temperature cycling	25 cycles between -55°C and +85°C, kept for 30 min. at each temperature.	IEC 68-2-14
- Humidity resistance	55°C, 95%, 56 days Measurements at 4, 10, 21 and 56 days.	IEC 68-2-3
- Life test	60°C, 1000 hours, under voltage. Measurements at 168, 500 and 1000 hours at Tambiant and extremes.	-
- Warm storage ageing	+85°C, 1000 hours storage. Measurements at 168, 500 and 1000 hours at Tambiant.	-
- Inspection under components	No projection of reflow paste > 150 µm.	-

Version 2.0



SERPE-IESM

3-3 MODIFICATION ON UHF AMPLIFIER STAGES

These modifications are necessary due to obsolescence of transistors in the amplification initial chain.

New technologies enable a lower voltage supply.

The first page of each transistor documentation is joigned herewith.

UNTIL END OF 97

PCB I 144

3 stages	Bipolar technology	
	- MRF 5711	Bipolar
	- MRF 5812	Bipolar
	- MRF 652	Bipolar

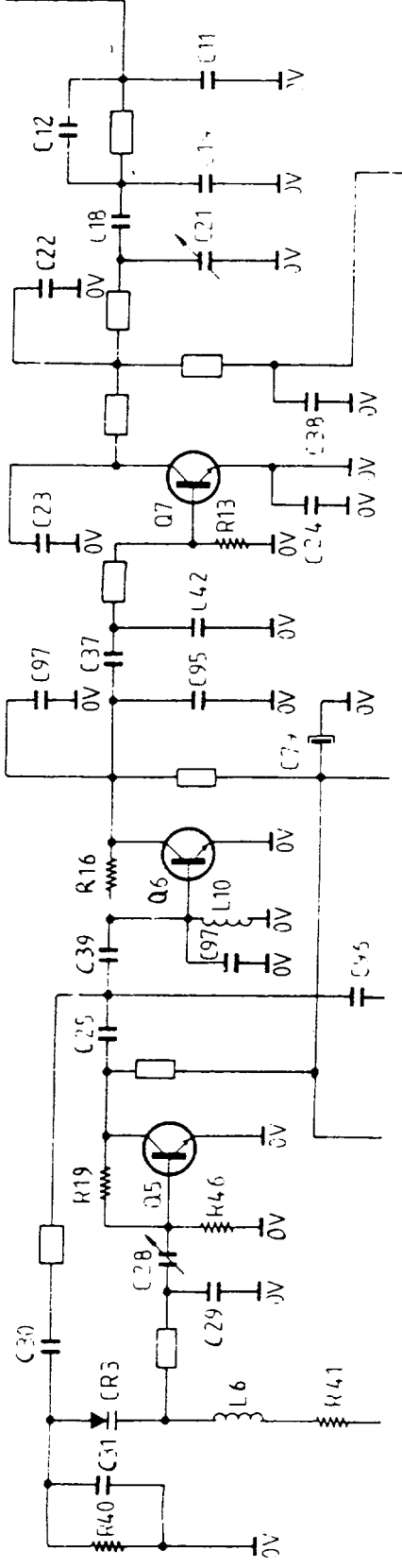
Used at 8,5 volts for 37 dBm

SINCE END OF 97

PCB I 264

3 stages	- BFS 483	Bipolar
	- MRF 9745	MOSFET
	- BLT 52	Bipolar

Used at 7 volts for 37 dBm



KANNAD 406

UHF amplifier stages until end of 97

I 144 pcb

15 / 12 / 97

MOTOROLA
SEMICONDUCTOR TECHNICAL DATA

The RF Line
NPN Silicon
High-Frequency Transistors

Designed for low noise, wide dynamic range front-end amplifiers and low-noise VCO's. Available in a surface-mountable plastic package, as well as the popular TO-226AA (TO-92) package. This Motorola series of small-signal plastic transistors offers superior quality and performance at low cost.

- High Gain-Bandwidth Product
 $f_T = 8.0 \text{ GHz (Typ) @ } 50 \text{ mA}$
- Low Noise Figure
 $NF_{min} = 1.6 \text{ dB (Typ) @ } f = 1.0 \text{ GHz (MRF5711LT1, MRF571)}$
- High Gain
 $GNF = 17 \text{ dB (Typ) @ } 30 \text{ mA/500 MHz (MMBR571LT1)}$
- High Power Gain
 $G_{pe} \text{ (matched)} = 13.5 \text{ dB (Typ) (MRF5711LT1)}$
- State-of-the-Art Technology
Fine Line Geometry
Ion-Implanted Arsenic Emitters
Gold Top Metallization and Wires
Silicon Nitride Passivation
- Available in tape and reel packaging options:
T1 suffix = 3,000 units per reel

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	10	Vdc
Collector-Base Voltage	V_{CBO}	20	Vdc
Emitter-Base Voltage	V_{EBO}	3.0	Vdc
Collector Current — Continuous	I_C	80	mA
Total Device Dissipation @ $T_{case} = 75^\circ\text{C}$ MMBR571LT1, MRF5711LT1	$P_{D(max)}$	0.33	W
Derate linearly above $T_{case} = 75^\circ\text{C}$ @		4.44	mW/°C
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C MPS571	P_D	0.63	Watts
		5.0	mW/°C
Total Device Dissipation (1) @ $T_C = 75^\circ\text{C}$ Derate above 75°C MRF571	P_D	0.58	Watts
		7.73	mW/°C
Operating and Storage Temperature	T_{stg}	-55 to +150	°C

THERMAL CHARACTERISTICS

Rating	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient MPS571	$R_{\theta JA}$	200	°C/W
Thermal Resistance, Junction to Case MRF5711LT1, MMBR571LT1	$R_{\theta JC}$	225	°C/W
Thermal Resistance, Junction to Case MRF571	$R_{\theta JC}$	130	°C/W
Maximum Junction Temperature	T_{Jmax}	150	°C

DEVICE MARKING

MMBR571LT1 = 7X	MRF5711LT1 = 02
-----------------	-----------------

NOTE:

1. Case temperature measured on collector lead immediately adjacent to body of package.

MMBR571LT1
MPS571 MRF571
MRF5711LT1

$I_C = 80 \text{ mA}$
LOW NOISE
HIGH-FREQUENCY
TRANSISTORS



CASE 318-08, STYLE 6
SOT-23
LOW PROFILE
MMBR571LT1



CASE 29-04, STYLE 2
TO-226AA
(TO-92)
MPS571



CASE 317-01, STYLE 2
MACRO-X
MRF571



CASE 318A-05, STYLE 1
SOT-143
LOW PROFILE
MRF5711LT1

MOTOROLA
SEMICONDUCTOR TECHNICAL DATA

The RF Line
NPN Silicon
High-Frequency Transistors

Designed for high current low power amplifiers up to 1.0 GHz.

- Low Noise (2.0 dB @ 500 MHz)
- Low Intermodulation Distortion
- High Gain
- State-of-the-Art Technology
 - Fine Line Geometry
 - Arsenic Emitters
 - Gold Top Metallization
 - Nichrome Thin-Film Ballasting Resistors
- Excellent Dynamic Range
- Fully Characterized
- High Current-Gain Bandwidth Product
- MRF5812 available in tape and reel packaging by adding suffix:
 - R1 suffix = 500 units per reel
 - R2 suffix = 2,500 units per reel

MRF581
MRF581A
MRF5812, R1, R2

$I_C = 200$ mA
LOW NOISE
HIGH-FREQUENCY
TRANSISTORS
NPN SILICON



CASE 317-01, STYLE 2
MRF581,A



CASE 751-05, STYLE 1
SORF (SO-8)
MRF5812

MAXIMUM RATINGS

Rating	Symbol	MRF581	MRF581A	MRF5812	Unit
Collector-Emitter Voltage	V_{CEO}	18	15	15	Vdc
Collector-Base Voltage	V_{CBO}	36	30	30	Vdc
Emitter-Base Voltage	V_{EBO}	2.5			Vdc
Collector Current — Continuous	I_C	200			mA dc
Thermal Resistance θ_{JC} (1)	$R_{\theta JC}$	40			$^{\circ}\text{C}/\text{W}$
Thermal Resistance θ_{JC} (1)	$R_{\theta JC}$	45			$^{\circ}\text{C}/\text{W}$
Total Device Dissipation $\oplus T_C = 75^{\circ}\text{C}$ (1) Derate above $T_C = 75^{\circ}\text{C}$	P_D	1.88 25			Watts $\text{mW}/^{\circ}\text{C}$
Total Device Dissipation $\oplus T_C = 75^{\circ}\text{C}$ (1) Derate above $T_C = 75^{\circ}\text{C}$	P_D	1.67 22.2			Watts $\text{mW}/^{\circ}\text{C}$
Storage Junction Temperature Range	T_{stg}	- 55 to +150			$^{\circ}\text{C}$
Maximum Junction Temperature	T_{Jmax}	150			$^{\circ}\text{C}$

DEVICE MARKING

MRF5812 = 5812

NOTES:

1. Case temperature measured on collector lead immediately adjacent to body of package.

REV 7

MRF581 MRF581A MRF5812, R1, R2
2-542

MOTOROLA RF DEVICE DATA

MOTOROLA
SEMICONDUCTOR TECHNICAL DATA

The RF Line
**NPN Silicon
RF Power Transistors**

Designed for 12.5 Vdc UHF large-signal amplifier applications in industrial and commercial FM equipment operating to 512 MHz.

- Guaranteed 12.5 Volt, 512 MHz Characteristics
Output Power = 5.0 Watts
Minimum Gain = 10 dB
Efficiency = 65% (Typ)
- Typical Performance at 512 MHz, 12.5 V, 5.0 W Output = 6.0 dB
- Series Equivalent Large-Signal Characterization
- Gold Metallized, Emitter Ballasted for Long Life and Reliability
- Capable of 30:1 VSWR Load Mismatch at 15.5 V Supply Voltage
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEO}	16	Vdc
Collector-Base Voltage	V _{CBO}	36	Vdc
Emitter-Base Voltage	V _{EBO}	4.0	Vdc
Collector Current — Continuous	I _C	2.0	Adc
Total Device Dissipation @ T _C = 25°C Derate above 25°C	P _D	25 143	Watts mW/°C
Storage Temperature Range	T _{stg}	-65 to +150	°C
Operating Junction Temperature	T _J	200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	R _{θJC}	7.0	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage (I _C = 25 mAdc, I _B = 0)	V _{(BR)CEO}	16	—	—	Vdc
Collector-Emitter Breakdown Voltage (I _C = 25 mAdc, V _{BE} = 0)	V _{(BR)CES}	36	—	—	Vdc
Collector-Base Breakdown Voltage (I _C = 25 mAdc, I _E = 0)	V _{(BR)CBO}	36	—	—	Vdc
Emitter-Base Breakdown Voltage (I _E = 5.0 mAdc, I _C = 0)	V _{(BR)EBO}	4.0	—	—	Vdc
Collector Cutoff Current (V _{CE} = 15 Vdc, V _{BE} = 0)	I _{CES}	—	—	1.0	mAdc

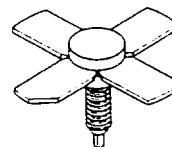
ON CHARACTERISTICS

DC Current Gain (I _C = 200 mAdc, V _{CE} = 5.0 Vdc)	h _{FE}	10	—	150	—
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(continued)

**MRF652
MRF652S**

5.0 W, 512 MHz
RF POWER
TRANSISTORS
NPN SILICON



CASE 244-04, STYLE 1
MRF652



CASE 249-06, STYLE 1
MRF652S

The RF Small Signal Line Silicon Lateral FET N-Channel Enhancement-Mode MOSFET

PRF9745

Designed for use in low voltage, moderate power amplifiers such as portable analog and digital cellular radios and PC RF modems.

- Performance Specifications at 5.8 V, 900 MHz:
Output Power $\geq$ 30 dBm Min
Power Gain $\geq$ 11 dB Typ
Efficiency $\geq$ 50% Min
- Guaranteed Ruggedness at Load VSWR = 20:1
- New Plastic Surface Mount Package

30 dBm, 900 MHz
HIGH FREQUENCY
POWER TRANSISTOR
MOS FET

CASE 449-01, Style 1
(PLD-1)

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	35	Vdc
Drain-Gate Voltage ($R_{GS} = 1 \text{ M}\Omega$)	V_{DGO}	25	Vdc
Gate-Source Voltage	V_{GS}	± 10	Vdc
Drain Current - Continuous	I_D	2	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 60°C	P_D	4 40	W mW/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$
Operating Temperature Range	T_J	150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	25	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

OFF CHARACTERISTICS

Drain-Source Breakdown Voltage ($V_{GS} = 0, I_D = 10 \text{ }\mu\text{A}$)	$V_{(BR)DS}$	35	-	-	Vdc
Drain-Source Leakage Current ($V_{DS} = 5 \text{ V}, V_{GS} = 0$)	I_{DSS}	-	-	10	μAdc
Gate-Source Leakage Current ($V_{GS} = 5 \text{ V}, V_{DS} = 0$)	I_{GSS}	-	-	1	μAdc

NOTE - CAUTION - MOS devices are susceptible to damage from electrostatic charge. Reasonable precautions in handling and packaging MOS devices should be observed.

This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.



UHF power transistor

BLT52

FEATURES

- Emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a ceramic SOT409 (SO8) package.

APPLICATIONS

- Common emitter class-B operation in portable radio transmitters in the 470MHz communications band.

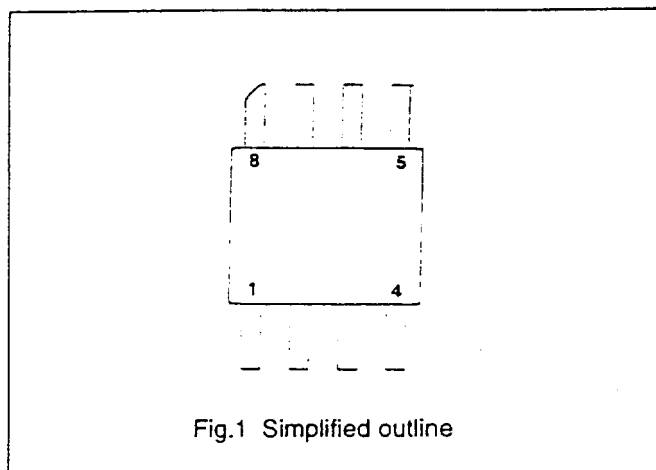
QUICK REFERENCE DATA

RF performance at $T_S \leq 60^\circ\text{C}$ in a common emitter testcircuit

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_c (%)
CW class-B	470	7.5	7	≥ 8 typ. 9.5	≥ 50 typ. 65
		6	3	≥ 8 typ. 9.5	≥ 50 typ. 55

PINNING SOT409

PIN	DESCRIPTION
1, 4, 5, 8	emitter
2, 3	base
6, 7	collector





SERPE-IESM

PACK OF 4 CELLS LM3455

S 05 19 102 B

Manufacture : BLUE STAR 5 (Canada)

Technology : LiMnO_2

Nominal voltage per cell 2,8 volts or 11,2 volts for the pack

Capacity at + 20° C for a new pack : 10 Ah

Shelf life : 10 years

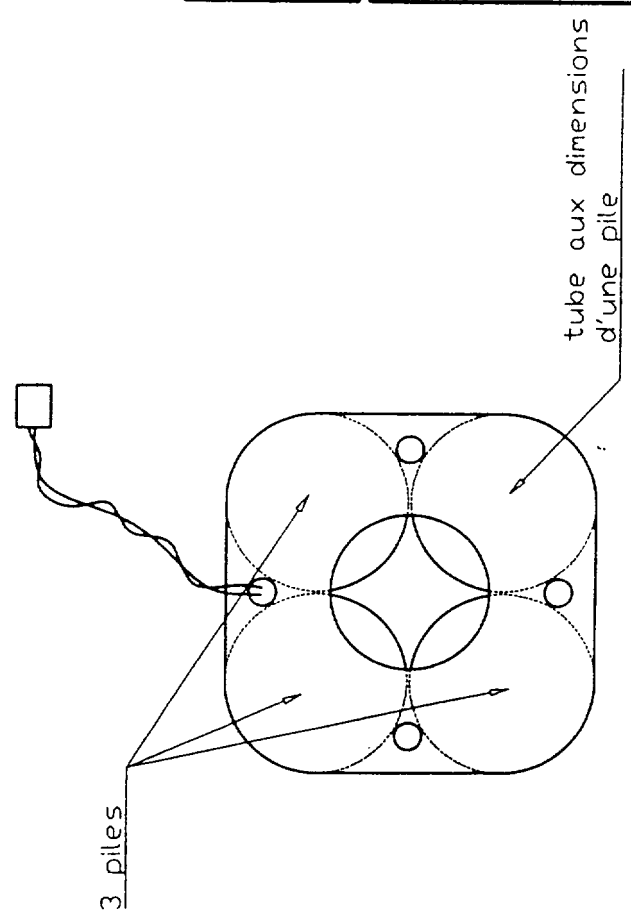
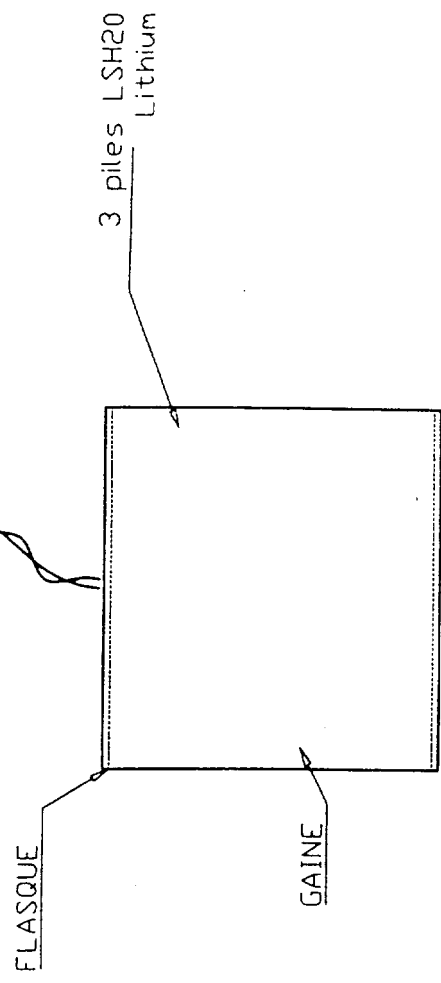
Internal protection against short circuit by integrated polyfuse

Mounting in serie

Fils KY33A-03 0.6mm² noir & rouge lg 10 cm

ergot

connecteur fem. 172233-1 cpts AMP avec contacts fem.170366-1



DATE 10.06.97 DESSINE PAR JL A VERIFIE PAR RG		RESUME P B CODE PRODUIT BBA01400		A Premiere diffusion Ind MODIFICATIONS		Dess. par JK A Verif. par R G Date 10.06.97	
Société d'Etudes et de Réalisation de Protection Electronique Informatique Electronique Sécurité Maritime				Zone Industrielle des Cinq Chemins 54520 GUILLET FRANCE Téléphone: 02 97 65 00 20 Télécopieur : 02 97 65 00 20			
KANNAD		BALISE SURVIE		Ens. batteries		N S05 19 1 02 A	
SERPE-IESM							

Lithium-MnO₂ Type M 20 – 3 Volt

FRIWO

Technical Data:

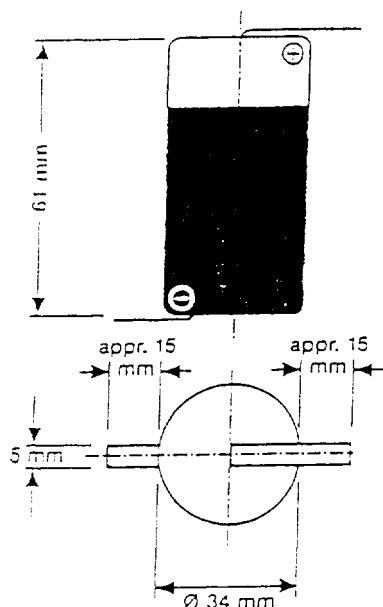
Technische Daten:



Nominal voltage	: 3.0 V
Rated capacity	: 11 Ah at 200 mA
Max. discharge current	: 2.5 A*
Weight	: 115 g
Operating temperature	: -40 °C to +60 °C**
Storage temperature	: -55 °C to +71 °C***
Terminations	: Solder tabs (other variations upon request)
Design	: Hermetically sealed stainless steel case with safety vent
Approved according to	: VG 96915 part 2 and part 154



Nennspannung	: 3,0 V
Nennkapazität	: 11 Ah bei 200 mA
Max. Laststrom	: 2,5 A*
Gewicht	: 115 g
Betriebstemperaturbereich	: -40 °C bis +60 °C**
Lagertemperaturbereich	: -55 °C bis +71 °C***
Anschlußarten	: Lötflächen (andere Anschlußarten auf Anfrage)
Ausführung	: Hermetisch verschlossenes Edelstahlgehäuse mit Sicherheitsventil im Zellendeckel
Qualifiziert nach	: VG 96915 Teil 2 und Teil 154



* Higher rates available under certain circumstances.
höhere Werte sind unter bestimmten Bedingungen möglich.

** Higher operating temperatures can be achieved under certain circumstances.
höhere Betriebstemperaturen sind unter bestimmten Bedingungen möglich.

*** Long time storage at high temperatures may affect the performance.
Lange Lagerung bei hohen Temperaturen kann die Eigenschaften beeinflussen.

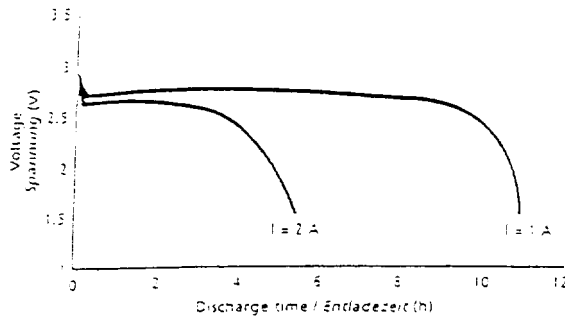
Please pay attention to our handling instructions in case you intend to connect cells to battery packs.

Picture and data in this data sheet are without obligation.

FRIWO BATTERIES

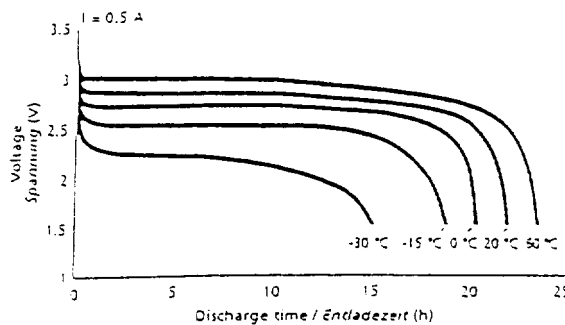
Lithium-MnO₂ Type M 20 – 3 Volt

FRIWO



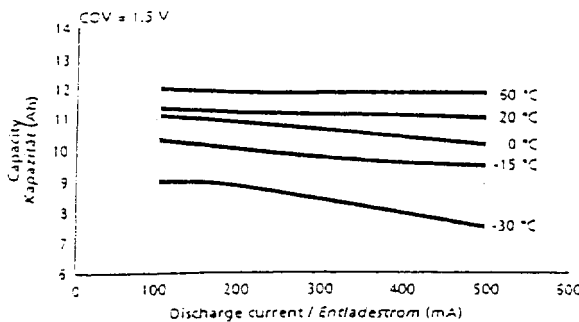
Typical discharge curves
with constant current
at 20 °C

*Typische Entladekurven
mit Konstantstrom
bei 20 °C*



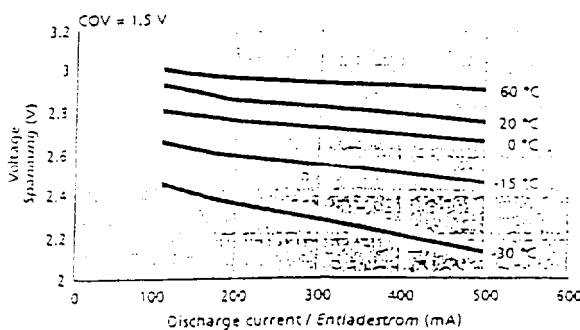
Typical discharge curves
with constant current

*Typische Entladekurven
mit Konstantstrom*



Capacity vs. discharge
current vs. temperature

*Kapazität in Abhängigkeit
von Entladestrom und
Temperatur*



Operating voltage vs.
discharge current vs.
temperature

*Betriebsspannung in
Abhängigkeit von Entlade-
strom und Temperatur*

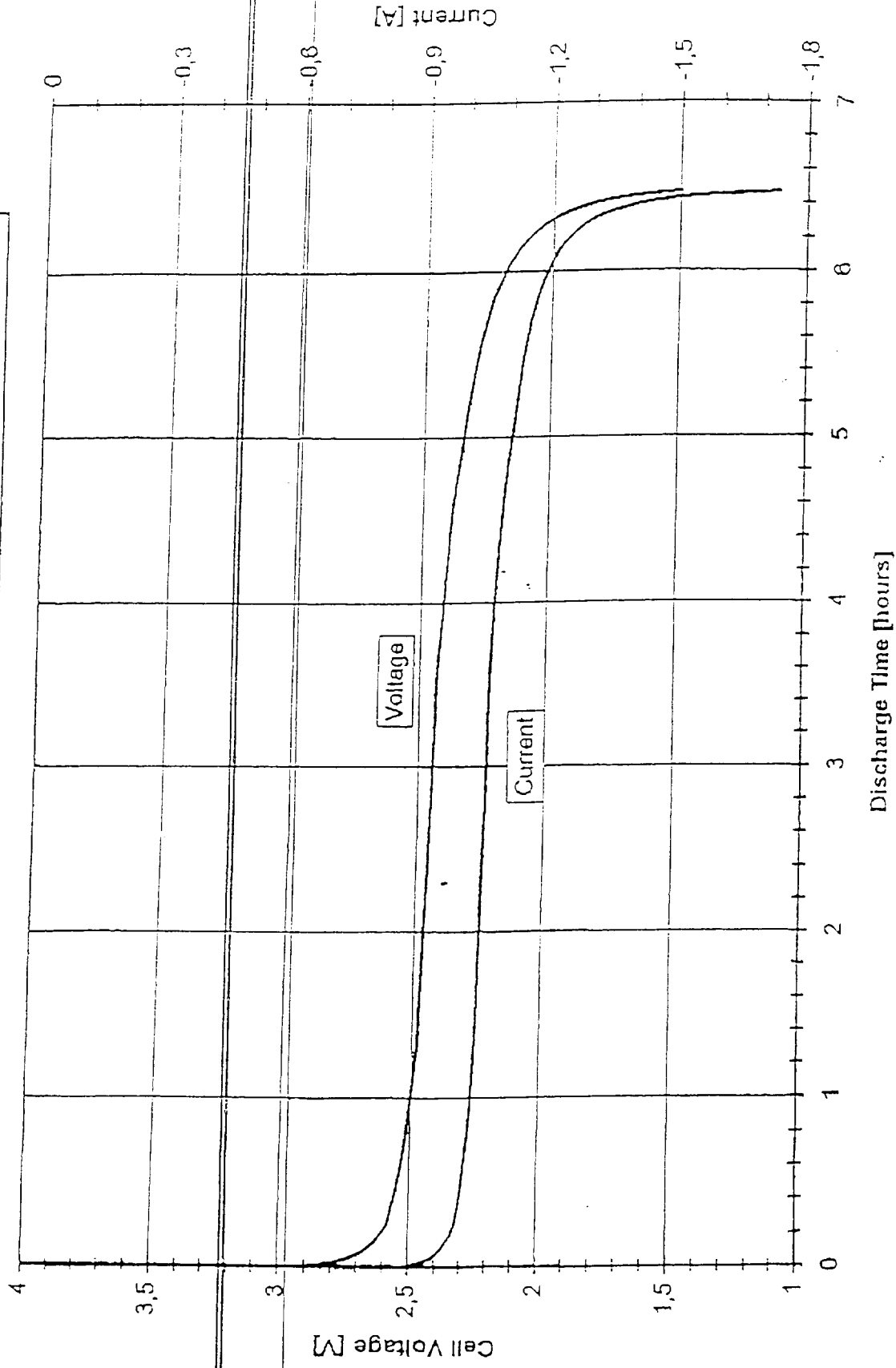
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Für weitere Informa-
tionen wenden Sie sich bitte
an **FRIWO SILBERKRAFT:**
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Fax: 02 03/30 02/241



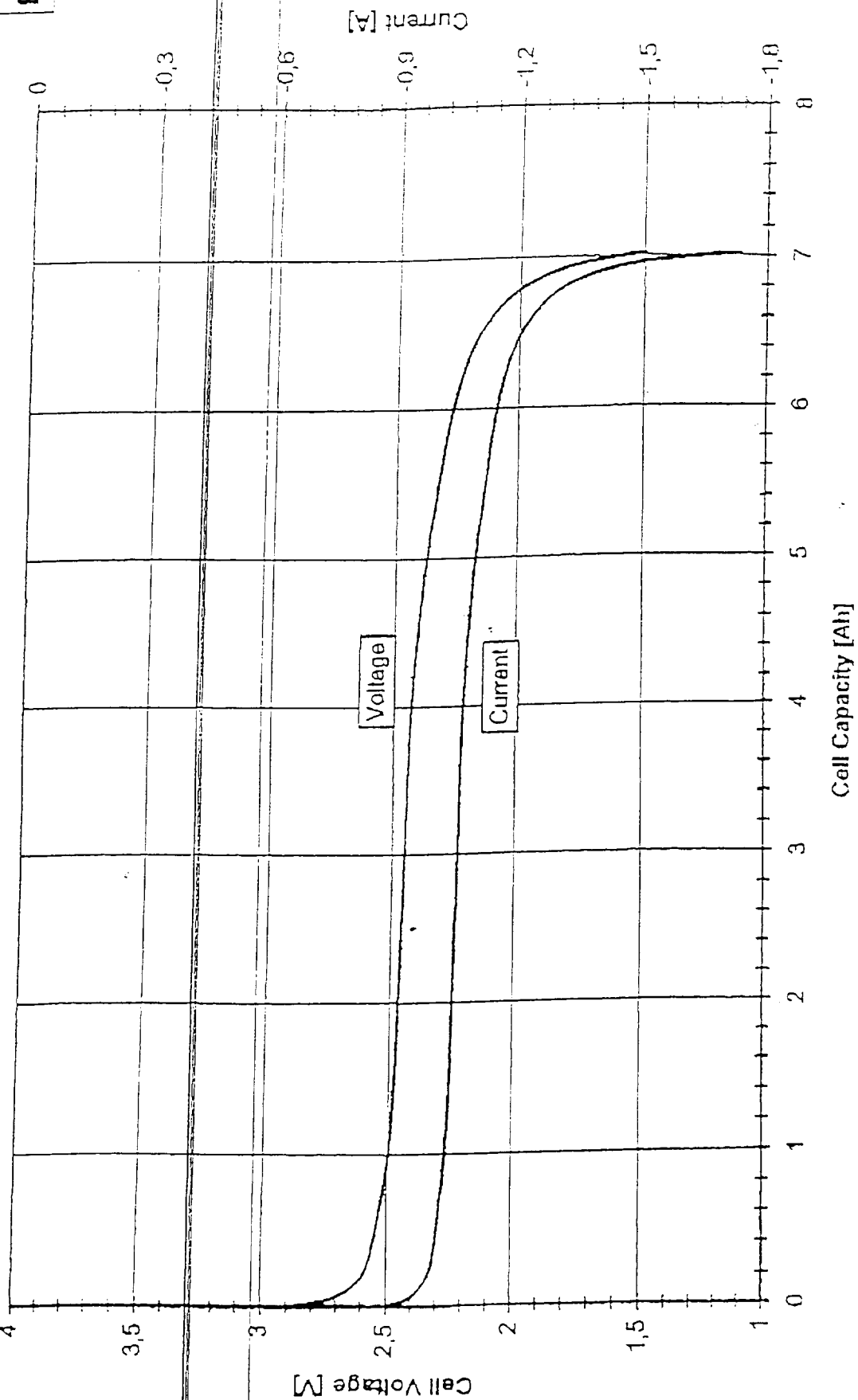
BATTERIEN

Discharge of a Li-MnO₂-Single Cell Type M20TT (D-size) at -20 °C / 2,6 Watt



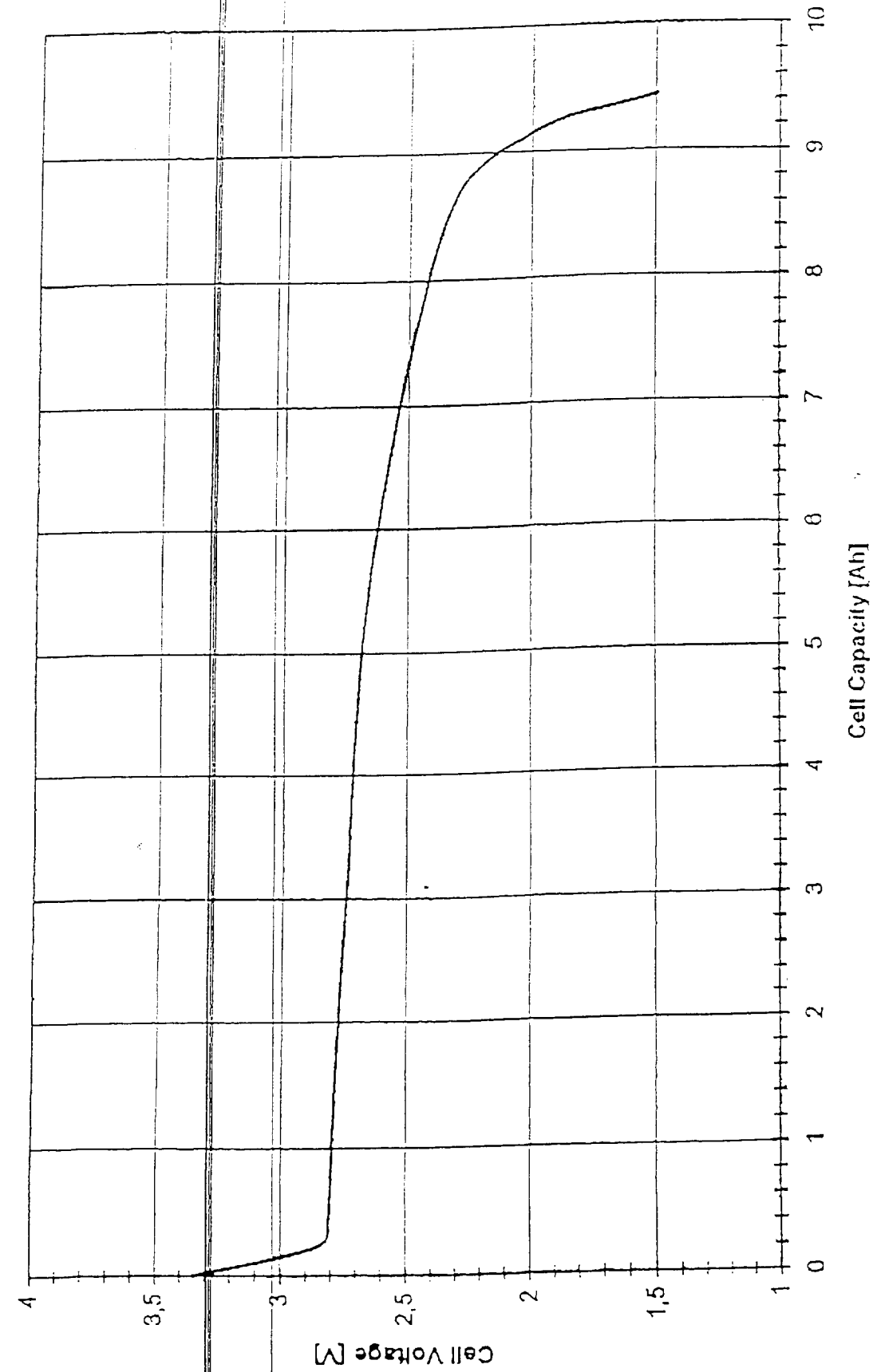
FRIWO

Discharge of a Li-MnO₂-Single Cell Type M20TT (D-size) at -20 °C / 2,6 Watt



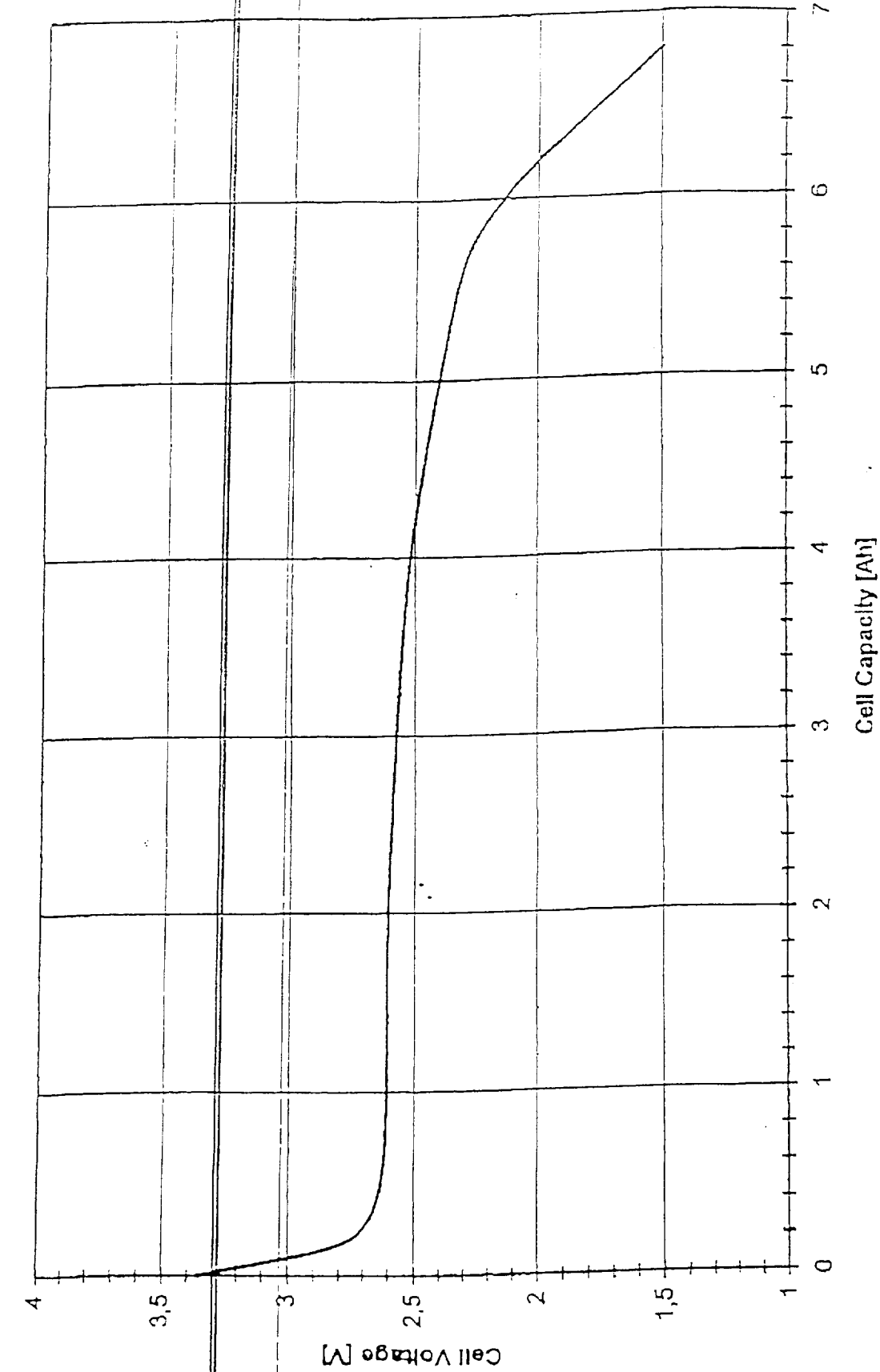
FRIWO

Discharge of a Li-MnO₂-Single Cell Type M20TT (D-size) at +60 °C, I = 2,83 A



FRIWO

Discharge of a Li-MnO₂-Single Cell Type M20TT (D-size) at -1 °C, I = 2 A



FRÍWO



SERPE-IESM

V - CIRCUIT DIAGRAM



SERPE-IESM

VI - BLOCK DIAGRAM



SERPE-IESM

2 - MECHANICAL ASPECT



KANNAD 406 WH

KANNAD 406 WH-97

- External aspect identical
- Modification of the lanyard diameter ($\varnothing$ 1,5 to $\varnothing$ 2,5)
- Lanyard fixing point reinforced