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SIRIO 2000

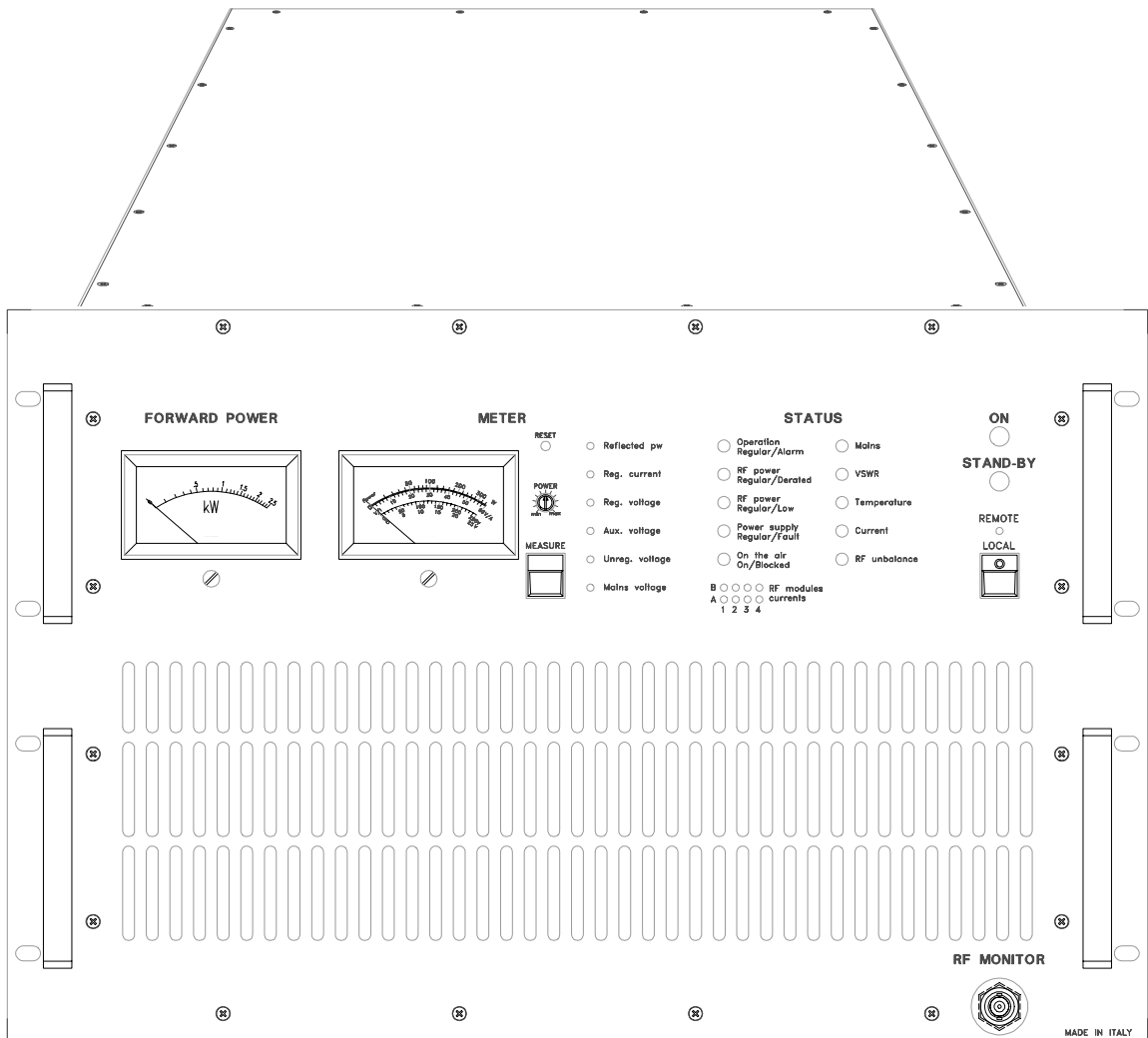
ALL SOLID STATE

88 - 108 FM BROADCAST AMPLIFIER

Operating Manual

V.1,01

By Maurizio Panicara 25-06-2000





Electronic Broadcast Equipment

Registrazione, Garanzia, Registration, Guarantee, Feedback

La garanzia è di 1 anno data fattura franco fabbrica. La garanzia non copre le rotture dovute a inadempienze del cliente, dovute a cause naturali come fulmini, a materiali soggetti ad usura, a nuove release, alla mano d'opera e al trasporto. La garanzia decade in qualsiasi caso di manomissione dell'apparato non autorizzata per iscritto.

Garanzia, Guarantee

Noi siamo molto interessati ai Vostri commenti sui nostri prodotti. I Vostri suggerimenti ci saranno utili, per la realizzazione delle nuove apparecchiature e per la realizzazione dei manuali, questo sarà di grande utilità per Voi! Se lo desiderate potete inviarci qualsiasi tipo di informazione sui prodotti Broadcast, noi saremo ben lieti di leggerli.

Le informazioni possono essere inviate tramite E-mail all' indirizzo: service@aev.net, o per posta all'AEV SERVICE.

The guarantee is valid for 1 year, ex-factory.

The guarantee does not cover damage due to customer negligence, natural causes such as lightning, normal wear and tear, new releases, labour or transport.

We are always very interested in your comments concerning our products. Your suggestions will be of use to us in the development of new products and manuals which, in turn, will be of great use to you!

Please send us any information that you have on our Broadcast products, we will be very happy to receive it.

Information can be sent to E-mail address: service@aev.net, or by post to AEV SERVICE.

Servizio Tecnico, Technical Support

Se avete la necessità di avere spiegazioni tecniche, contattate l'AEV SERVICE. Preparatevi per essere chiari nella descrizione del Vostro problema. Scrivetevi il numero di matricola del Vostro dispositivo che potete trovare sulla targhetta AEV attaccata al dispositivo questa è la prima informazione che dovete fornire.

Telefono: 39+051+6634711 Fax: 39+051+6634700

Contact AEV support if any technical explanations are required.

Make sure that you can give a clear description of the problem before phoning. You will be asked for the serial number of your unit which can be found on the AEV label attached to the equipment; please make a note of this.

Telephone: 39+051+6634711 Fax: 39+051+6634700

Servizi di Riparazione, Factory Service and Repairs

Prima di inviare un prodotto in riparazione al Service, noi vi raccomandiamo di verificare attentamente le spiegazioni contenute in questo manuale. Fate una verifica della corretta installazione. Se non siete ancora in grado di risolvere il problema, contattate il nostro supporto tecnico AEV SERVICE, per avere chiarimenti. Se il problema è semplice può essere sufficiente una spiegazione telefonica. In qualunque caso, il dispositivo può essere accettato dal SERVICE AEV solo dopo che è stato inviato il numero di autorizzazione al rientro RMA. Questo numero deve essere inserito nella documentazione relativa alla bolla di reso per riparazione. Vi raccomandiamo inoltre di inserire una spiegazione dettagliata del difetto riscontrato sull'apparecchiatura ed eventualmente il nome della persona con cui si è parlato all'AEV SERVICE. AEV non accetterà materiale in riparazione con oneri di trasporto, in questo caso il materiale sarà rifiutato.

Before returning any AEV product to our service department, we recommend that you read this manual carefully.

Check that the correct installation procedure has been carried out.

If you still cannot resolve the problem, contact AEV SERVICE technical support for help. A simple problem can be resolved over the telephone.

In any case, the equipment can only be accepted by AEV SERVICE once you have received the RMA returns authorization number. This number should be marked clearly on the shipping documents accompanying the product. We also recommend that you include with the unit a detailed explanation of the fault and the name of the AEV employee with which you spoke. AEV cannot accept repairs with transport unpaid. In this case delivery will be refused.

Istruzioni di Spedizione, Shipping Instruction

Utilizzare esclusivamente l'imballo originale, solo in questo caso avrete la certezza che l'apparecchiatura non subirà shock. Se non avete conservato l'imballo originale vi consigliamo di richiederne un'altro.

Se vorrete restituircelo con un imballo diverso, abbiate cura di effettuare un doppio imballo, tra i due interponete del materiale morbido, questo serve ad assorbire i colpi che vengono ricevuti durante il trasporto.

Riportate sul pacco in rosso queste parole:

DELICATE INSTRUMENT, FRAGILE!

Ricordate in numero RMA deve essere visibile anche sul pacco, in caso contrario non verrà accettato.

Use only the original packing materials to ensure that the product is not damaged in transit. If you no longer have the original packing, we recommend that you request new packing from AEV.

If it is not possible to use original packing materials, please ensure that the unit is double-wrapped in soft material that will absorb any shocks in transit.

Write the following phrase, in red, on the outer packing:

DELICATE INSTRUMENT, FRAGILE!

Remember that the RMA number should be visible on the packing; If not, the delivery will not be accepted.

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Electronic Broadcast Equipment

AVVERTENZE

ATTENZIONE. leggere attentamente le avvertenze contenute nel seguente paragrafo in quanto forniscono importanti indicazioni riguardanti la sicurezza, l'installazione, l'uso e la manutenzione.

Il non adempimento delle norme o degli avvertimenti specifici riportati in questo manuale **viola le norme di sicurezza di disegno, costruzione e uso di questo apparato.**

AEV S.p.A. declina ogni responsabilità nel caso non venga rispettata anche solo una parte delle seguenti prescrizioni.

AEV S.p.A. declina ogni responsabilità nel caso l'utilizzatore finale rivenda il prodotto.

L'impiego è rivolto a personale in grado di potere utilizzare questo apparato e si **presuppone che lo stesso sia conoscenza delle seguenti prescrizioni.**

- Conservare con cura questo manuale per ogni ulteriore consultazione, esso deve essere custodito nelle vicinanze dell'apparecchio stesso e di facile rintracciabilità.
- Dopo aver tolto l'imballo assicurarsi dell'integrità dell'apparecchio.
- Evitare shock meccanici che possano danneggiare l'apparecchio.
- Gli elementi dell'imballo (sacchetti di plastica, polistirolo, chiodi, ecc.) non devono essere lasciati alla portata dei bambini in quanto **potenziali fonti di pericolo.**
- Evitare di utilizzare l'apparecchiatura in luoghi dove sia presente una temperatura non compresa nell'intervallo ammesso dalle caratteristiche tecniche dichiarate.
- Prima di collegare l'apparecchio accertarsi che i dati di targa siano rispondenti a quelli della rete di distribuzione elettrica (la targa è posta sul contenitore dell'apparecchiatura).
- Non rimuovere per alcun motivo la targhetta adesiva applicata sull'apparecchio contenente i dati essenziali di macchina e la matricola.
- Per il collegamento alla rete di alimentazione utilizzare esclusivamente il cavo di rete venduto insieme all'apparecchio.
- Questo apparecchio dovrà essere destinato all'uso per il quale è stato espressamente concepito.
- Ogni altro uso è da considerarsi improprio e quindi **potenzialmente pericoloso** a persone, animali o cose. Il costruttore **non può essere considerato responsabile** per eventuali danni derivanti da **usi impropri, erronei ed irragionevoli.**
- L'uso di qualsiasi apparecchio elettrico comporta l'osservanza di alcune regole fondamentali. In particolare:

- Non toccare l'apparecchio con parti del corpo bagnate e/o umide.
- L'apparecchio non deve essere esposto a stillicidio e/o spruzzi d'acqua.
- Non usare l'apparecchio nelle vicinanze di fonti di calore intenso ed in presenza di materiali esplosivi.

-Non tentare di introdurre alcun oggetto estraneo all'interno dell'apparecchio.

-Non permettere che l'apparecchio sia usato da bambini e/o da incapaci senza sorveglianza.

- Prima di effettuare qualsiasi operazione di pulizia e/o manutenzione, disinserite l'apparecchio dalla rete di alimentazione elettrica ed attendere almeno 2 secondi come prescritto dalle normative che regolamentano la sicurezza.
- In caso di guasto e/o di cattivo funzionamento dell'apparecchio, spegnerlo, disconnettere l'alimentazione, non manometterlo e rivolgersi al rivenditore.
- Non tentare di fare alcun tipo di riparazione e/o regolazione che preveda la rimozione di coperchi o l'estrazione di schede.
- La rottura del fusibile interno all'alimentatore è sintomo di un guasto generale dell'alimentatore stesso; la sua sostituzione non è consentita se non da personale autorizzato. Si consiglia di rivolgersi direttamente al rivenditore.
- Per l'eventuale riparazione rivolgersi direttamente al rivenditore e richiedere che vengano utilizzati ricambi originali. Il mancato rispetto di quanto sopra **può compromettere la sicurezza dell'apparecchio.**
- L'apparecchio deve essere collegato alla rete di alimentazione munita di linea di terra regolamentare ed efficiente.
- L'esecuzione dell'impianto elettrico deve essere conforme alle norme C.E.I. 64-8 "Norme degli impianti elettrici negli edifici civili".
- In fase di installazione è tassativo prevedere uno spazio libero intorno all'apparecchio di almeno 1 cm per garantire un'adeguata areazione.

N.B. L'apparecchio è costruito a regola d'arte. L'affidabilità elettrica e meccanica sarà mantenuta efficiente se verrà fatto un uso corretto dell'apparato e rispettate le prescrizioni di manutenzione ove previste.

PRECAUTIONS

ATTENTION. The non-fulfilment of the rules and of the specific instructions contained in this handbook **infringes the drawing, construction and use safety rules is not complied with.**

AEV S.p.A. disclaims all responsibility even if only a part of the following rules of this equipment.

AEV S.p.A. disclaims all responsibility if the final user re-sells the product. This equipment can only be used by skilled personnel which is entitled to use it and it is assumed that **the a.m. personnel is aware of the following rules.**

- Carefully keep this handbook for further reference; it must be kept, within the reach, near the equipment.
- After having removed the packing check the integrity of the equipment. In case of doubt, do not use the equipment and contact the dealer.
- Avoid mechanical shocks which could damage the equipment.
- The packing elements (such as plastic bags, polystyrene, nails, etc.) must be kept out of the reach of children since they **represent a potential danger.**
- Avoid the use of the equipment in places where the temperature is not within the range allowed by the stated technical features.
- Before connecting the equipment, make sure that the rating complies with the data of the power mains (the plate is applied on the equipment case)
- Do not remove, for any reason, the adhesive plate which is applied to the equipment with all the essential data of the machine and with the serial number.
- In order to carry out the connection to the power mains only use the cable supplied together with the equipment.
- This equipment can only be used according to the use it has been designed for.
- Every other use is to be considered improper and therefore it is **potentially dangerous** for people, animals or things. The manufacturer **cannot be considered responsible** for any damage **deriving from improper, wrong and irrational use.**
- The use of any electric equipment implies the compliance with some essential rules, such as:

- Do not touch the equipment with wet or humid body parts.
- Do not expose the equipment to dripping water and / or to water sprays.
- Do not use the equipment near great heat and where explosive are located.
- Do not insert any foreign object into the equipment.

-Do not let children and / or unallowed person use the equipment without supervision.

- Before carrying out any cleaning and / or maintenance operation, disconnect the equipment from the mains removing the cable and wait at least 2 seconds as required by the safety rules.
 - In case of equipment failure and / or malfunctioning, switch it off, disconnect the power supply, do not carry out any operation and contact the dealer.
 - Do not carry out repair and / or adjustment implying the removal of covers or cards.
 - The failure of a fuse inside the feeder reveals a general failure of the feeder; it can be replaced only by authorized personnel. Contact the dealer directly.
 - For repair, please contact the dealer and ask for original spare parts. The non-fulfilment of this instruction **can jeopardize the equipment safety.**
 - The equipment must be connected to the power mains which is equipped with prescribed and efficient ground.
 - The execution of the electric system must comply with the CEI rules 64-8 "Rules concerning the electric system in civil buildings".
 - During the installation, a free space of 1 cm around the equipment must expressly be considered in order to assure a suitable ventilation.
- N.B. The equipment is workmanlike performed. The electric and mechanic reliability will remain effective if the equipment is correctly used and if the maintenance instructions, if any, are complied with.



Electronic Broadcast Equipment

SICHERHEITSINWEISE

ACHTUNG! Die im folgenden Abschnitt beschriebenen Hinweise mit Sorgfalt lesen, da sie wichtige Informationen über die Sicherheit, die Installation, die Bedienung und die Wartung enthalten.

Die Nichterfüllung der Vorschriften oder der spezifischen Warnungen, die in diesem Handbuch enthalten sind, verletzt die Zeichnungs-, Herstellungs- und Bedienungssicherheitsnormen dieses Gerätes. AEV S.p.A. lehnt jegliche Verantwortung ab, auch wenn nur ein Teil der folgenden Vorschriften nicht erfüllt wird.

Nur Fachpersonal kann das Gerät benutzen und es wird vorausgesetzt, daß das zuständige Personal von diesen Vorschriften Kenntnis hat.

- Das vorliegende Handbuch soll für ein evtl. künftiges Nachschlagen mit Sorgfalt aufbewahrt werden; es soll sich in der Nähe des Gerätes befinden und soll leicht auffindbar sein.
- Nach der Entfernung der Verpackung, die Vollständigkeit des Gerätes prüfen. Falls einige Zweifel bestehen, verwenden Sie das Gerätes prüfen. Falls einige Zweifel bestehen, verwenden Sie das Gerät nicht und wenden Sie sich an den Händler.
- Mechanische Schocks vermeiden, die das Gerät beschädigen könnten.
- Das Verpackungsmaterial (Plastiktüte, Polystyrol, Nägel, u.s.w.) soll nicht in der Reichweite von Kindern verlassen werden, da es eine potentielle Gefahrquelle darstellt.
- Das Gerät soll nicht in Umgebungen verwendet werden, wo die Temperatur nicht innerhalb des Bereichs liegt, der gemäß den angegebenen technischen Merkmalen zugelassen ist.
- Vor dem Anschluß des gerätes prüfen ob die Schilddaten den Daten der elektrischen Versorgung entsprechen (das Schild ist auf dem Gerätegehäuse angebracht).
- Das Klebschild auf dem Gerät, das die wichtigsten Daten der Maschine und die Serien-nr. zeigt, soll nie entfernt werden.
- Für den Anschluß an das Versorgungsnetz kann nur das mitgelieferte Kabel verwendet werden.
- Das vorliegende Gerät kann nur für die Benutzung verwendet werden, für die das Gerät ausdrücklich ausgelegt wurde.
- Jegliche andere Benutzung ist als unsachgemäß zu verstehen und deshalb ist für Personen, Tiere oder Gegenstände potentiell gefährlich.
- Die Verwendung eines elektrischen Gerätes sieht die Einhaltung einiger Grundnormen vor, wie:

- Das Gerät nicht mit feuchten oder naßen Händen oder Wasserspritzern ausgesetzt werden

- Das Gerät soll nicht in der Nähe von Wärmequellen und wo Explosivstoffe vorhanden sind, verwendet werden Kein fremder Gegenstand in das Gerät einsetzen

-Das Gerät soll nicht von Kindern und/oder unfähiges ohne Überwachung verwendet werden.

- Vor Reinigungs- und/oder Wartungsarbeiten soll das Gerät von der elektrischen Versorgung durch die Entfernung des Versorgungskabels ausgeschaltet werden und soll man 2 sek. abwarten, wie von den Sicherheitsnormen vorgeschrieben.
- Falls eine Störung oder eine Fehlfunktion des Gerätes vorhanden sind, sollen das Gerät und das Versorgungskabel vom Netz ausgeschaltet und keinen Eingriff an das Gerät durchgeführt werden.
- Keine Instandsetzungs- und/oder Einstellungsarbeiten durchführen, die die Entfernung von Deckeln oder das Herausziehen von Karten vorsehen.
- Das Brechen der Sicherung innerhalb des Netzteils ist ein Zeichen einer generellen Störung des Netzteils; das Netzteil kann nur von autorisiertem Personal ersetzt werden. Wir empfehlen, sich an den Händler zu wenden.
- Für eine evtl. Instandsetzung von Original-Ersatzteilen fordern. Die Nichteinhaltung der o.g. Empfehlung könnte die Sicherheit des Gerätes beeinträchtigen.
- Das Gerät soll an das Versorgungsnetz angeschlossen werden, die mit ordnungsgemässer und wirksamer Erdung ausgestattet werden soll.
- Die Ausführung der elektrischen Anlage soll den CEI Normen 64-8 "Normen der elektrischen Anlagen für Zivilgebäuden" entsprechen.
- Während der Installation ist es ausdrücklich, einen freien Raum von 1 cm um das Gerät vorzusehen, um eine ordnungsgemässe Belüftung gewährleisten zu können.

N.B.: Das Gerät ist fachgerecht hergestellt. Die elektrische und mechanische Zuverlässigkeit wird erhalten, wenn das Gerät ordnungsgemäss benutzt wird und wenn die Wartungsvorschriften, falls vorgesehen, beobachtet werden.

PRECAUTIONS

ATTENTION, lire toutes les instructions donnés dans ce paragraphe car elles concernent la sécurité, l'installation, l'emploi et l'entretien.

Ne pas accomplir les règles et les précautions spécifiques données dans ce manuel **est une violation des règles de sécurité de dessin, de construction et d'emploi de cet appareil.**

AEV S.p.A. décline toute responsabilité si on ne suit pas même seulement une partie de ces précautions.

AEV S.p.A. décline toute responsabilité si l'utilisateur final revend le produit.

L'emploi s'adresse à un personnel qui est en mesure d'utiliser cet appareil et **qui connaît les précautions suivantes.**

- Garder soigneusement ce manuel pour toute autre consultation. Il doit être gardé près de l'appareil ou dans un lieu où on peut le trouver avec facilité.
- Après avoir enlevé l'emballage il faut s'assurer de l'intégrité de l'appareil. Si on a quelques doutes ne pas utiliser l'appareil et s'adresser au détaillant.
- Eviter des chocs mécaniques qui peuvent endommager l'appareil.
- Les éléments de l'emballage (les sachets de plastique, le polystyrolène, les clous, etc.) ne doivent pas être laissés à la portée des enfants car ils peuvent être un danger pour eux.
- Eviter l'utilisation de l'appareil dans des lieux où il n'y a pas une température qui est dans l'intervalle admis par les caractéristiques techniques déclarées.
- Avant de connecter l'appareil vérifier que les données de la plaque correspondent à celles du réseau de distribution électrique (la plaque est située sur le conteneur de l'appareil).
- Ne jamais enlever (pour n'importe quelle raison) la plaque adhésive qui se trouve sur l'appareil et qui contient les données essentielles de la machine et la matricule.
- Pour la connexion au réseau d'alimentation utiliser seulement le câble de réseau qui est vendu avec l'appareil.
- Cet appareil devra être utilisé seulement pour l'usage dont il a été conçu.
- Tout autre usage doit être considéré impropre et donc potentiellement dangereux pour les personnes, les animaux et les choses. Le constructeur n'est pas responsable pour les dommages qui dérivent des usages impropres, erronés et irraisonnés.
- L'usage d'un appareil électrique prévoit l'observation de quelques règles fondamentales. En particulier:

Ne pas toucher l'appareil avec vos parties du corps ouillées et / ou humides.

L'appareil ne doit pas être exposé à stillation et / ou aux jets d'eau. Ne pas utiliser l'appareil près des sources d'une forte chaleur et en présence d'explosifs.

-Ne pas chercher à introduire des objets étrangers dans l'appareil.

- Ne pas permettre que l'appareil soit utilisé par des enfants et / ou par des incapables sans surveillance.
- Avant de faire n'importe quelle opération de nettoyage et / ou d'entretien, débrancher l'appareil du réseau d'alimentation électrique en enlevant le cordon de réseau et attendre au moins 2 secondes, en suivant ainsi les normes qui régularisent la sécurité.
- Si on a une panne et / ou un mauvais fonctionnement de l'appareil, il faut l'éteindre, déconnecter l'alimentation, ne pas l'endommager et s'adresser au détaillant.
- Ne pas chercher à faire une réparation et / ou une mise à point qui rend nécessaire le déplacement des couvercles ou l'extraction des fiches.
- La rupture du fusible dans l'alimentation signifie qu'il y a une panne de l'alimentation même; son remplacement doit être fait seulement par le personnel autorisé. On conseille de s'adresser directement au détaillant.
- Pour une réparation s'adresser au détaillant et exiger l'utilisation des pièces de rechange originales. Ne pas respecter ces normes peut compromettre la sécurité de l'appareil.

• L'appareil doit être connecté au réseau d'alimentation qui a une ligne de terre réglementaire et fonctionnante.

• L'exécution de l'installation électrique devra être conforme à la norme C.E.I 64-8 "Normes des installations électriques dans les édifices civils".

• Quand on installe l'appareil on doit prévoir une espace libre autour de lui d'à peu près 1 cm pour garantir une bonne aération.

N.B. L'appareil a été construit dans les règles de l'art. La fiabilité électrique et mécanique sera toujours efficace si on utilise correctement l'appareil et si on respecte les prescriptions d'entretien.



Electronic Broadcast Equipment

WARNING!

**The currents and voltages in this equipment are dangerous!
Personnel must at all times observe safety regulation!**

This manual is intended as a general guide for trained and qualified personnel who are aware of the dangers inherent in handling potentially hazardous electrical and electronic circuits.

It is not intended to contain a complete statement of all safety precautions which should be observed by personnel in using this or other electronic equipment.

The installation, operation, maintenance and service of this equipment involves risks both to personnel and equipment. and must be performed only by qualified personnel exercising due care.

AEV S.p.A. shall not be responsible for injury or damage resulting from improper procedures or from the use of improperly trained or inexperienced personnel performing such tasks.

During installation and operation of this equipment, local building codes and fire protection standards must be observed.

WARNING!

Always disconnect power before opening covers, doors, enclosures, gates, panels or shields.

Always use grounding sticks and short out high voltage points before servicing.

Never make internal adjustments, perform maintenance or service when alone or when fatigued.

Do not remove, short-circuit or tamper with interlock switches on access covers, doors, enclosures, gates, panels or shields.

Keep away from live circuits, know your equipment and don't take chances.

WARNING!

In case of emergency ensure that power has been disconnected



Electronic Broadcast Equipment

Treatment of electrical Shock

1, If victim is not responsive follow the A-B-C'S of basic life support.

PLACE VICTIM FLAT ON HIS BACK ON A HARD SURFACE

A AIRWAY

IF UNCONSCIOUS,
OPEN AIRWAY



LIFT UP NECK,
PUSH FOREHEAD SACKF
CLEAR OUT MOUTH IF NECESSARY
OBSERVE FOR BREATHING.

B BREATHING

IF NOT BREATHING,
BEGIN ARTIFICIAL
BREATHING



TILT HEAD,PINCH NOSTRILS
MAKE AIRTIGHT SEAL,
4 QUICK FULL BREATHS
REMEMBER MOUTH TO MOUTH.
RESUSCITATION MUST BE
COMMENCED AS SOON AS POSSIBLE

C CIRCULATION

CHECK CAROTID PULSE



IF PULSE ABSENT
BEGIN ARTIFICIAL
CIRCULATION

DEPRESS STERNUM 1



APPROX. 80 SEC. : ONE RESCUE
2 QUICK BREATHS.

APPROX. 60 SEC. : TWO RESCUERSO 5 COMPRESSIONS 1 BREATH

1/2" to 2"



15 COMPRESSION

NOTE: DO NOT INTERRUPT RHYTHM OF COMPRESSIONS

WHEN SECOND PERSON IS GIVING BREATH.

Call for medical assistance as soon as possible

2) If victim is responsive.

- a. Keep them warm.
- b. Keep them as quiet as possible,
- c. Loosen their clothing (a reclining position is recommended).





FIRST-AID

Personnel engaged in the installation, operation, maintenance or servicing of this equipment are urged to become familiar with first-aid theory and practices, The following information is not intended to be a complete first-aid procedure, it is brief and is only to be used as a reference. it is the duty of all personnel using the equipment to be prepared to give adequate Emergency First Aid and thereby prevent avoidable loss of life.

Treatment of electrical Burns

1) Extensive burned and broken skin.

- a. Cover area with clean sheet or cloth. (Cleanest available cloth article).
- b. Do not break blisters, remove tissue, remove adhered particles of clothing, or apply any salve or ointment.
- c. Treat victim for shock as required.
- d. Arrange transportation to a hospital as quickly as possible
- e. If arms or legs are affected keep them elevated.

NOTE

If medical help will not be available within an hour and the victim is conscious and not vomiting, give him a weak solution of salt and soda: 1 level teaspoonful of salt and 1/2 level teaspoonful of baking soda to each quart of water (neither hot or cold).

Allow victim to sip slowly about 4 ounces (half a glass) over a period of 15 minutes.

Discontinue fluid if vomiting occurs (Do not give alcohol).

2) Less severe burns - (1st & 2nd degree)

- a. Apply cool (not ice cold) compresses using the cleanest available cloth article,
- b. Do not break blisters, remove tissue, remove adhered particles of clothing, or apply salve or ointment.
- c. Apply clean dry dressing if necessary.
- d. Treat victim for shock as required.
- e. Arrange transportation to a hospital as quickly as possible.
- f. If arms or legs are affected keep them elevated.





SIRIO 2000 **2 KW FM POWER AMPLIFIER**

1 GENERAL DESCRIPTION

The SIRIO 2000 is a highly integrated broadband solid-state Mos-Fet FM amplifier of 2000W rated power, fitted in a 16 unit 19" rack, which provides room either for the exciter and some spare equipment

Its compact size, high efficiency, wide mains range acceptance, low maintenance requirements and broadband construction, make this amplifier ideal in medium power repeaters, in unattended posts, in N+1 systems and as a reserve.

Its sturdy, modular mechanical and electrical construction guarantees a high MTBF and an easy maintenance. The modules are easily identifiable and inspectable with few interconnections each with the other, through multi-pole connectors.

The nominal RF output power is obtained over the full FM range with a mere 12W drive and is particularly stable against time, temperature and frequency variations being ALC regulated, with a front panel adjustment. The output power may be varied from a minimum level to the nominal level and the frequency varied over the full FM range, without retouching the drive power or any other adjustment than the ALC control.

The output stage has a reverse intermodulation figure, which is lower than standard bipolar construction, due to the all Mos-Fet design and approaches that of tube equipment.

A particularly complete metering and alarm section completes the amplifier, permitting an easy check of the functioning with unambiguous readings. All main parameters and alarms are externally available on a remote I/O port, which permits as well to command stand-by/on-the-air operating mode, with a fraction of a second reaction time. A suitable external controller may be supplied on request to permit full remote control of the apparatus from the studio or another service centre. Mains absorption in stand-by mode is <10W.

All the input and output ports are fitted on the rear. The exhaust air too is conveyed on the rear: an optional flanged outlet may be optionally mounted to provide a connection to an external ventilation system.

The whole assembly is designed in accordance with the CCIR, FCC and tighter international norms and conforms to the recent, strict CE requirements for EMI susceptance and emission.

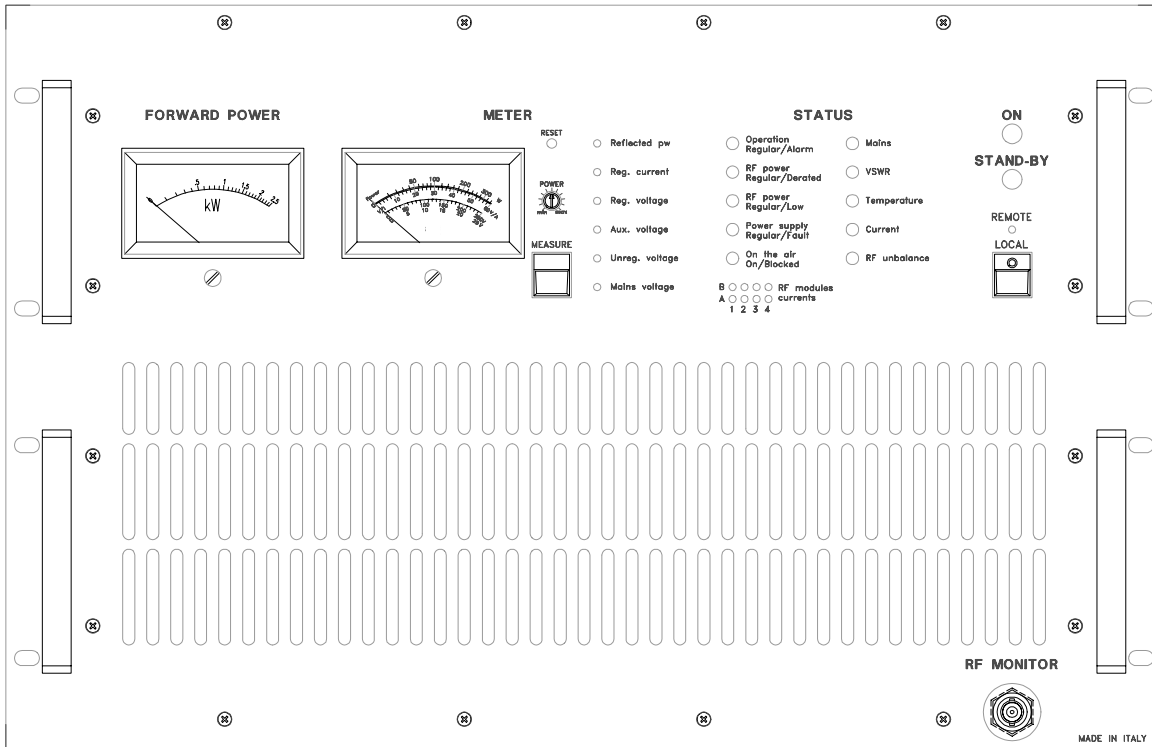
This Equipment complies with and ETSI 300.384 requirements.



2

TECHNICAL FEATURES

2.1 FRONT PANEL COMMANDS AND SIGNALLING



The front control panel carries all the metering facilities, with a fixed RF power meter, a switchable one, a "STATUS/ALARM" section and the "ON/STAND-BY" control and signalling section.

The switchable meter permits the reading of the reflected power (340W f.s.), the regulated current and voltage (60Adc and 60Vdc f.s.), the auxiliary regulated voltage (25Vdc f.s.), the unregulated voltage and the mains voltage (250Vdc and 250 Vac f.s.).

The switching between the various measures is commanded by pushing on the "MEASURE" switch, which is sensitive to the time being pushed. The time to pass from the first measure, reflected power, to the second one is 3 times as long as the others and this measure is the default reading at the turn-on.

The "STATUS" section signals regular or alarm modes: the first led column on the left must be always on with green light during regular "on the air" operation and becomes red in case of warning. The second column lights on with red light only in case of failure.



Electronic Broadcast Equipment

LED	GREEN	RED
OPERATION	Regular functionment	Alarm
RF POWER reg./der.	Regular	RF reduced for any internal safety reason
RF POWER reg./low	Regular	RF lower than approx. -3dB (≈ 500 W)
POWER SUPPLY	Regular	Low regulated voltage ($\ll 42$ Vdc)
ON THE AIR	Regular	Blocked for any continuous safety reason Needs manual reset
MAINS HIGH		High input mains voltage (> 250 Vac)
MAINS LOW		Low input mains voltage (< 190 Vac)
VSWR		High RF output refl. power (> 100 W)
TEMPERATURE		High internal temperature
CURRENT		High current absorbtion (> 80 A)

Table 1: Status led meaning

The meaning of the various led is summarised on table 1.

The "ON" and "STAND-BY" led on the last section unambiguously signals the corresponding operating mode. Note that "on" do not means "on-the-air", but simply that the amplifier is completely powered and ready to deliver power if correctly driven.

The "on" state is the default state when the SIRIO 2000 is switched on by the general switch and turns to "stand-by" by pushing on the "local" switch, which will light. Remotely commanding stand-by mode will do the same, and the remote control is signalised by its small yellow led. Local and remote commands both acts in parallel to force the equipment in stand-by.

During stand-by only the command interface section is active, the auxiliary regulated voltage is on, and the main regulated power supply and all the fans are off.

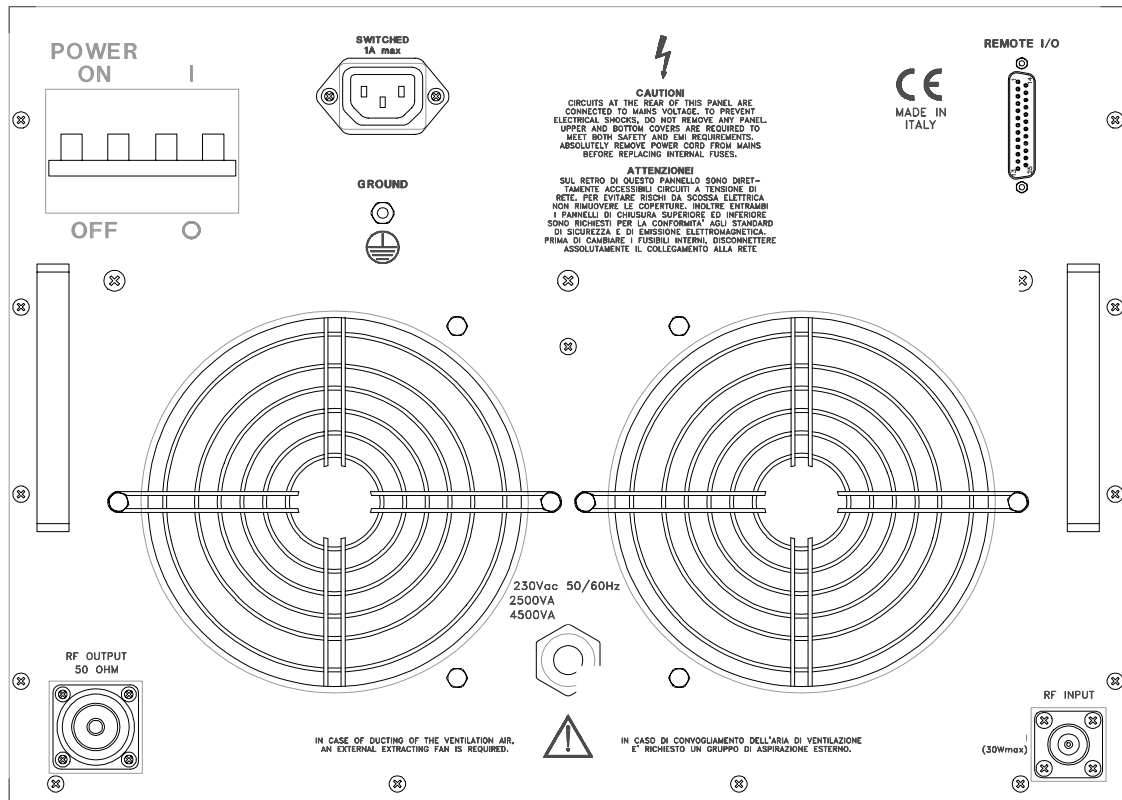
The RF output power may be adjusted by the front panel trimmer without retouching the drive power, which is usually set at 20W, i.e. a value which is only slightly higher than that needed to drive the amplifier at full power. RF Output range in this condition is comprised between 1/5 and full power. If needed, very low power operation, down to zero, may be achieved slightly reducing the input power.



Electronic Broadcast Equipment

A recessed reset snap switch may be operated, if needed, with a small pointed object, through a hole in the panel. This alarm-reset pushbutton must be manually pushed if the module is blocked for any reason, for repeated or prolonged action of any protection, mainly for very high VSWR or high input power. The reset may be remotely applied too, through the remote I/O port.

2.2 THE REAR PANEL AND THE CONNECTIONS



The rear panel allocates all the RF and the I/O ports in addition to the mains power cord, the earthing screw and the on/off switch.

The Antenna output is brought out on a 7/16" connector, while the input connector is a "N" type. At the RF monitor output, BNC type, a sample of the output power is available, which is attenuated 54 dB typically (i.e. +6 dBm @ 2.0 kW output). Even if this output is fairly flat vs. frequency, it is not suggested to use this for accurate harmonica analysis.

Through this panel it passes the mains power cord, which is not removable. If it is required a longer cable than that provided in the factory (roughly 2 meters long), a suitable 3x 2.5 mm sq. power cord may easily replace the original one.



Electronic Broadcast Equipment

Directly on the panel are fixed the remote I/O port (SUBD 25 poles, female) and the exhaust air output opening.

Wide room must be provided during installation to permit ventilation air flux, which must not be obstructed. It is not permitted to insert the equipment in a closed rack without a suitable external air extraction system. An optional exhaust air flanged outlet may be required and mounted to ease the connection to an external ventilation system

An auxiliary IEC-320 female type mains outlet is provided, which is powered only when the amplifier is on (enabled), i.e. not in stand-by mode. The exciter is usually connected to this outlet, so being powered only when the apparatus is fully on. A separate power connection may be used if the exciter may be switched in stand-by/operation by the logic signal available on the I/O remote connector (see later), so avoiding any delay to lock in frequency nor delivering power to the amplifier during stand-by.

No fuses other than the general fuses (16A) are inserted on this line. Limit the power absorption from this outlet to low levels, i.e. 100W / 1A max.



To gain access to the inner in the event of changing the internal fuses, the top covering must be removed. Be sure to remove the power cord from mains to avoid direct exposure to hazardous mains voltage, which are always present on the fuses and the input board, even with power on switch in the off position.



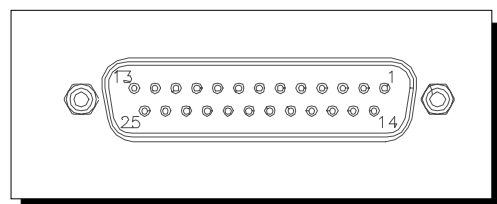
2.3 I/O REMOTE CONTROL SPECIFICATIONS

The remote I/O DB25 female connector, located on the rear panel, makes available several analog and digital lines to permit remote control and surveillance of the equipment. The assigned lines to each connector pin follows:

Pin	Line	Range/use
1	ground	common
2	Stand-by	connect to ground to stand-by
3	n.c. / ground	
4	Regular/Alarm	+12V when Alarm (Cmos out)
5	RF Derate	+12V when RF power derated on protection (Cmos out)
6	VSWR Alarm	+12V when high VSWR on antenna line (Cmos out)
7	Current Alarm	+12V when dc Current too high (Cmos out)
8	Block Alarm	closed to ground when regular (100mA/24Vmax relay contact)
9	Reflected Power	0÷5V vs. 0÷340Wout (Op-Amp out, Zo=156Ω) (2.71 V typ. @ 100W)
10	Forward Power	0÷5V vs. 0÷2.5kWout (Op-Amp out, Zo=156Ω) (3.16 V typ. @ 1000W / 3.87 V typ. @ 1500W)
11	ground	signal ground
12, 24	Aux. supply out	+12.5Vdc / 100mAout, protected by fuse
13, 25	ground	power ground
14	Reset	Close to ground to reset Block Alarm for T>0.2 sec
15	Enable out	open/close an internally programmable relay contact to ground
16	ground	signal ground
17	RF low	+12V when RF low, i.e. < ≈700Wout (Cmos out)
18	P. Supply Alarm	+12V on Power Supply Regulator alarm (Cmos out)
19	Temper. Alarm	+12V when too high Temperature (Cmos out)
20	Mains alarm	+12.5V when Mains line is out of range (Cmos out)
21	n.c. / ground	future option
22	Regulated Volt.	0÷5V vs. 0÷50V out on Power Supply Regulator (Zo≈300Ω)
23	Regulated Cur.	0÷5V vs. 0÷100A out from P.S. Regulator (Op-Amp out, Zo=156Ω)

WARNING: Never connect anything to the Remote I/O connector with power supply on. Damage or overload to any buffered line may cause improper function or measure on the equipment.

The remote I/O signal and control DB25 female connector, on the rear panel





2.4 TECHNICAL SPECIFICATIONS

- Frequency range: 87.5 ÷ 108 MHz
- RF input power 20 W nom., 25 W max
- RF output power 2000 W ±0.5 dB
- RF input/output impedance: 50 Ω
- RF input connector: N
- RF output connector: 7/16"
- RF monitor connector: BNC
- Harmonic and spurious emissions: < -70 dBc
- RF monitor attenuation: 54 dB, typ.
- Max total current handling capability on the auxiliary sockets: 1A @ 230 Vac, 100Wmax, not fused
- Mains supply requirements: 90÷265V c.a. 50/60Hz<3800W (5000VA)
340÷46V c.a. 50/60Hz<3800W (4000VA)
- Operating temperature range: 0 ÷ +35 °C recommended, -10 ÷ +45 °C max
- Dimensions, not including the handles: 483 x 310 x 570 mm (H x W x L)
See drawings
- Weight, not including the exciter: 47 kg, approx.

REMOTE CONTROLS: Stand-by, Alarm Reset, Exciter enable

REMOTE SIGNALS: Alarm, Power derating, Power low, High VSWR, Power supply fault, Current alarm, Temperature alarm, Mains alarm, System block

REMOTE MEASURES: Forward and Reflected power, Regulated Power Supply current and voltage



3

INSTALLATION AND USE

3.1 FOREWORD TO INSTALLATION

Although in most cases no special instruments are required, have skilled personnel install the apparatus. To make best use of the apparatus's capabilities and prevent damage to the unit, comply with the recommendations throughout this manual.

When in doubt, or if any technical problems should arise during the installation procedure, AEV strongly recommend the apparatus not be tampered with in any way by unskilled personnel and will be glad to supply qualified after-sale service.

As a rule, the user should not have access to the inside of the apparatus for normal installation and use. Tampering with the factory settings makes the guarantee null and void and might also affect apparatus' performance, causing costly damage.

NO ADJUSTMENT OR INTERNAL PRESETTING IS REQUIRED FOR NORMAL OPERATIONS. THE APPARATUS SHALL BE PROPERLY EARTHED AND BE OPERATED WITH ALL THE COVERS CLOSED TO PREVENT ELECTRICAL HAZARDS IN OPERATION AND FULLY COMPLY WITH CE EMI AND SAFETY REQUIREMENTS.

NEVER TOUCH THE INSIDE OF THE APPARATUS WITHOUT FIRST DISCONNECTING IT FROM THE MAINS. DANGEROUS AC, DC AND RADIO-FREQUENCY VOLTAGES ARE PRESENT INSIDE AND BECOME ACCESSIBLE WHEN THE COVERS ARE REMOVED.

———— **MAINS VOLTAGE MAY KILL** ————



3.2 PLACING THE APPARATUS

Install apparatus in a dry, sheltered but well-ventilated room away from dust, moisture, insects and vermin (mice).

Place apparatus as close as possible to the antenna to prevent excessive power loss in the cables. If this is not feasible, use antenna cables of suitable cross-section.

Room size shall be such that the apparatus can be placed in an upright position and that technical personnel can easily carry out routine or extraordinary maintenance. The minimum recommended size is 2.5m x 2m, and 2.2m high when there is no other broadcasting or support equipment nearby.

The room must be ventilated to ensure that the inside temperature never exceeds 35°C. Even if 45°C is the max. allowed temperature: it is anyway suggested not to approach to this limit.

This condition cannot generally be met when the exhaust cooling air is not pushed outside and is fed back into the room. This is even truer if more than one apparatus is installed in the same location. An efficient ventilation system is thus required in the room. Air exchange in the room shall have a minimum flow-rate of 500 metres cubed per hour or more.

If the apparatus is fitted in a rack system, the back door of the rack cannot usually be fixed in place. If a completely closed assembly is needed, a suitable ventilation extraction unit must equip the system. To aid air ducting, an optional flange may be retrofitted on the ventilation outlet to which a duct can be attached to convey hot air outside. In this case remember that the SIRIO 2000 internal fans are low-pressure units: some sort of external air extraction blower is than imperative on the exhaust air duct.

Vents in the walls and any other openings shall be fitted with a metal grating to keep rodents out, and with a dust filter. Make absolutely certain that no water can seep through the vents or the air exhaust duct or antenna-cable grommet, and that the floor cannot be flooded during heavy rainfall.

Moisture and/or dust, when contained in the air or in the room in excessive quantity, may cause condensation build-up in the amplifier. When the system is periodically switched on and off, this can trigger destructive electric arcs and short circuits and thus cause damage that is not covered by the guarantee.

3.3 WIRING INTO THE MAINS

The SIRIO 2000 is powered by a single-phase line. Mains capacity must be at least 5kVA and the nominal voltage is 230 Vac.



Electronic Broadcast Equipment

Whilst the power supply regulator accepts a wide input voltage (190 ÷ 250 Vac), operation near the lower input voltage on high impedance lines must be avoided: if the line drops more than 6 volt at full load, the low line sense circuitry may trigger an oscillating turn-on / turn-off cycle, which is very dangerous. In this cases adopt an external line stabiliser.

The nominal mains input range (190 ÷ 265 Vac) is achieved when the primary side of the main transformer is wired to the 230 V tap. Two other taps, the first one slightly lower (220 V), the second higher (240 V), are available to adjust the input voltage range of ± 10 V. In countries where a stable 240V is the norm, it is important to set this tap on the transformer. In this case the allowed voltage range window must be shifted higher to avoid nuisance trip at occasional higher mains voltage. See proper section in the service section of this manual.

To ensure proper operation and comply with the safety regulations, efficient earthing is required. Use the yellow/green lead in the power cable. The cable's neutral lead is blue. Never connect the earth to the mains' neutral lead.

The cable connecting the SIRIO 2000 mains input terminal block to the external board should consist of leads of adequate cross-section. Recommended values are 2.5 to 4 mm squared.

Do never switch the apparatus on without antenna connection, even when no RF drive is on.

3.4 ANTENNA CONNECTION

A 7/16" output connector is fitted at the back of the amplifier module. It is very important to check that the antenna, the connecting cables and the connectors are suitable for 2.0 kW.

The antenna coupler too, should be capable of adequate power; its input connector shall be 7/16" or 7/8" or larger.

The cable connecting the amplifier and antenna will generally be of the corrugated, spongy-dielectric type, such as a 1/2" or 7/8" celflex or flexwell. Smaller cables as RG214, cannot be used.

The antenna shall be earthen via a copper braid of adequate cross-section to prevent lightning reaching the amplifier via the antenna cable.

3.5 LF CONNECTION

To maximally avoid earth loops, wire the modulation signal line directly on the exciter, with high quality shielded and preferably balanced cable. Earth the shield only on the exciter LF input

If balanced lines are not feasible, use the highest available level: the suggested SIRIO25 exciters may easily accommodate signals at +6 or +10 dBm.



3.6 OTHER RECOMMENDATIONS

The ambient temperature shall range between -5°C and $+30^{\circ}\text{C}$ (35°C max. peak). It is advisable to hang a min.-max thermometer on the wall to display any variation.

Air conditioning at $20 \div 25^{\circ}\text{C}$ would obviously be the best solution, but installation and operating costs are generally excessive. Thermal isolation and efficient ventilation with a thermostat-controlled blower are generally the most advantageous solution.

Mains fluctuation and electric discharges due to the weather or nearby industrial machinery may cause significant trouble, especially in mountain areas and in places close to industrial areas.

In such cases, it is advisable if not indispensable, to install a protector, and insulating transformer or possibly an electromechanical mains voltage regulator. AEV can provide all these accessories on request.

Since the total cost of the plant, inclusive of broadcasting equipment, antenna system and installation, is rather high, a certain percentage of the budget should be estimated for buying and installing suitable protection and conditioning facilities as described above.

Depending on location, the share of total cost should be around $10 \div 20\%$; with this expenditure, however, the machinery will operate under optimum conditions, its useful lifespan will increase and, above all, the incidence of accidental breakdowns due to ambient or mains trouble will be reduced.

3.7 IMPORTANT NOTE TO VENTILATION

It is mandatory to provide adequate ventilation to the apparatus to maintain its internal temperature as low as possible, in the recommended range $5 \div 25^{\circ}\text{C}$. Even if the apparatus may sustain 45°C , and occasionally slightly higher temperatures, its life expectancy will be impaired by high temperature.

As general rule the life expectancy may be halved by each 10°C increase in ambient temperature, over 30°C .



3.8 OPERATION

Check that the antenna or a suitable dummy load is connected to the amplifier RF output, and control that its power cord is connected to the proper auxiliary mains outlet, as explained in the previous section "REAR PANEL AND CONNECTIONS". Check that the exciter output signal is fed to amplifier input and the correct frequency is set, then:

- 1) Reduce to zero the exciter power.
- 2) Reduce to the minimum the amplifier power set by completely rotating the proper trimmer on the amplifier module's panel.
- 3) Push down the control panel "LOCAL" switch: it must hold down.
- 4) Switch-on the rear power-on switch. The SIRIO 2000 will turn-on in stand-by mode.
 - Some leds will light in green on the control panel, i.e. OPERATION, RF POWER reg./derated, ON THE AIR.
 - Some leds will light in red, i.e. RF POWER reg./low, POWER SUPPLY.
 - The measure module will start in "reflected power" position.
- 5) Push down the "LOCAL" switch to release it: the SIRIO 2000 will turn to "ON" state.
 - The POWER SUPPLY led must turn to green.
 - Internal blowers will start.
 - The exciter must switch-on (if not, control its power switch!) and must lock in frequency after some seconds.
 - No RF output power.
- 6) Raise the drive power to the required level, usually 20 W at the input of the amplifier.
 - The RF output power can rise from zero to 100 ÷ 200 Watt.
- 7) Slowly increase the preset power by the proper trimmer on the amplifier front panel, until reaching the required output power, not higher than 2050 W.
 - Roughly at 700 W, the RF POWER led on the control panel will change to green
 - At the same time the green RF REGULAR led on the amplifier module will light.
- 8) Control and note for future reference the correct reading of the operating parameters through the internal instrumentation, which must indicate the following values:
 - FORWARD POWER: up to 2050W
 - REFLECTED POWER: < 50 W
 - REGULATED CURRENT: < 75 A
 - REGULATED VOLTAGE: 48 V
 - AUXILIARY VOLTAGE: 12.5 V



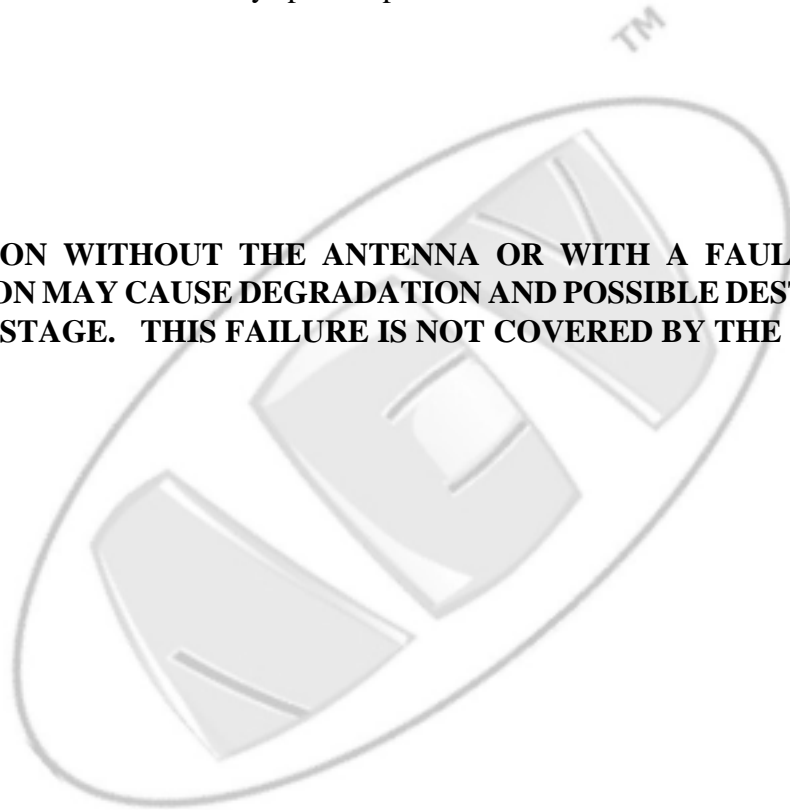
Electronic Broadcast Equipment

- UNREGULATED VOLTAGE: 120 ÷ 170 V
- MAINS VOLTAGE: 200 ÷ 245 V

The installation of the amplifier is thereby completed. A spectrum analysis is now advisable to assure no spurious products due to internal or external causes (i.e. reverse intermodulation on the final stage) are generated.

AEV wishes you success in your work and remind you that they are always available for further information or to tackle any specific problem.

OPERATION WITHOUT THE ANTENNA OR WITH A FAULTY ANTENNA CONNECTION MAY CAUSE DEGRADATION AND POSSIBLE DESTRUCTION OF THE FINAL STAGE. THIS FAILURE IS NOT COVERED BY THE GUARANTEE.





4

SERVICE AND MAINTENANCE

Since the SIRIO 2000 is cooled by air, it is subject to clogging by dust. Because of the high-quality materials used in their manufacture, if it is installed as set forth under “INSTALLATION AND USE,” it will not require special maintenance for quite some time.

A regular service routine, mainly to remove internal dust is suggested over a 6 month to a year rate. Take present that 90% of the air circulation is restricted to the main internal ventilation channel and do not affect the components. Regularly change the ventilation fan, especially in higher temperature environments. A 2-year rate may be prudential: always use the same high quality, ball bearing fan type.

After a few years of continuous service, it is recommended that the apparatus be overhauled in the factory or in a specialised laboratory, where the characteristics can be checked against the initial ones and recalibration can be made when needed.

It is also especially important that the power supply be over-hauled when the apparatus has been working at high temperatures, over $30 \div 35^{\circ}\text{C}$.

Never change or cause the original settings to be changed when the necessary, complex testing equipment and standard calibration procedure are not available.

5

GUARANTEE

Like all AEV's solid state equipment, the SIRIO 2000 carries a one-year guarantee on all its components with the exclusion of the final RF power module, which may be damaged by faulty output connections.

This guarantee is null and void if the apparatus is tampered with or if failure is due to improper use, wrong installation or external causes, such as mains overvoltage.

This guarantee covers work done exclusively in our laboratories and in those of our agreed representatives.

The goods shall be delivered carriage prepaid to the laboratory and shall be returned freight forward.

This guarantee does not cover any consequential damage due to non-operation or faulty operation.

6

SERVICE MANUAL

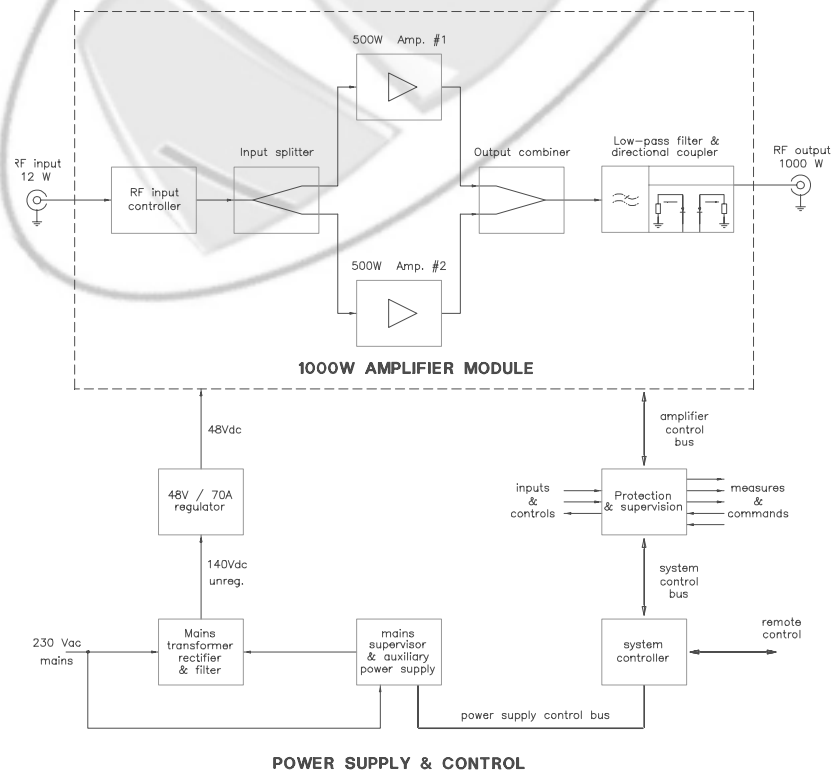
6.1 SYSTEM DESCRIPTION

3 basic sections compose the SIRIO2000: the RF amplifier box, the power supply and the control and metering section.

The RF section comprises 4 x 500W amplifier modules connected through strip-line combiners. All the RF transistors are Mos-Fet type. A low-pass filter with directional coupler completes the section, which is completely screened by a metal box, to comply with EMI requirements. A fully planar design permits an immediate access and inspection to the 4 internal modules.

The power supply comprises a mains input screened transformer, whose output is rectified and filtered and a highly efficient Switch-Mode Power Supply regulator. A separate power supply controller provides input filtering and voltage range check.

The control section is built of two boards. The first one performs full RF AGC and protection control; the other provides metering and an interface to the external I/O port. All main parameters as Voltages, Currents, Direct and Reflected Power and protections are displayed and provided at the Remote I/O port. Through this port is possible as well to command the stand-by / on-the-air operating mode.



SIRIO 2000: Block diagram



6.2

INTERNAL DESCRIPTION

The SIRIO 2000 amplifier comprises 8 internal different modules/boards plus some spare components, as can be seen in the drawing of the inner contents and in the "General wiring diagram"; both comprised in this manual:

- The power supply transformer, rectifiers and capacitor(s)
- The Switch Mode Power Supply regulator
- The power supply controller and ac filter
- The controls and measures board
- The control, interface and protection board
- The current sensing board
- The input RF power splitter
- The 500W RF power amplifier modules
- The output RF combiner, Low-Pass Filter and coupler

For the detailed description of each module on the following pages, always refer to the corresponding electrical diagram, in the relevant section of the manual.

THIS SECTION IS ONLY AIMED TO GENERAL KNOWLEDGE OF THE APPARATUS AND FOR SERVICE PURPOSE BY SKILLED PERSONNEL. AS EXPLAINED IN THE PREVIOUS SECTIONS, INTERNAL ADJUSTMENTS ARE NOT REQUIRED DURING NORMAL OPERATION. TAMPERING WITH INTERNAL SETTINGS VOIDS THE WARRANTY, MAY HARM THE APPARATUS AND JEOPARDIZE THE GUARANTEED PERFORMANCE.

IN ADDITION, MANY MODULES ARE TOO MUCH SPECIALIZED AND DIFFICULT TO REPAIR EVEN BY SKILLED TECHNICIANS AND MUST BE REPLACED IN CASE OF NEED BY BRAND NEW ONES AND POSSIBLY RETURNED BACK TO FACTORY TO VERIFY IF THEY CAN BE REPAIRED.

All modules are easy to be accessed and substituted with minimum or no adjustment and in most cases, no need of the soldering iron.

ANY INSPECTION ON THE MODULES DESCRIBED ABOVE MUST BE EXECUTED WITH THE TOP COVER REMOVED AND OFTEN WITH THE OPERATING APPARATUS CONNECTED TO THE MAINS. ALTHOUGH MOSTLY OF THE PARTS UNDER VOLTAGE ARE INSULATED AND ARE NOT EASILY ACCESSIBLE, THIS EXPOSES TO THE RISK OF ACCIDENTAL CONTACT WITH THE MAINS VOLTAGE.



TO AVOID IT, ALWAYS USE INSULATED TOOLS AND NEVER TOUCH THE SUPPLY TRANSFORMER, THE MAINS SWITCH OR THE MAINS SOCKET WITH MAINS CONNECTED. NEVER OPERATE THE EQUIPMENT WITH THE COVERS REMOVED. REMOVAL OF THE BOTTOM COVER MAY LEAD TO IMPROPER FUNCTIONING OF ANY ELECTRONIC MEASURING METER DUE TO HIGH RF FIELD.

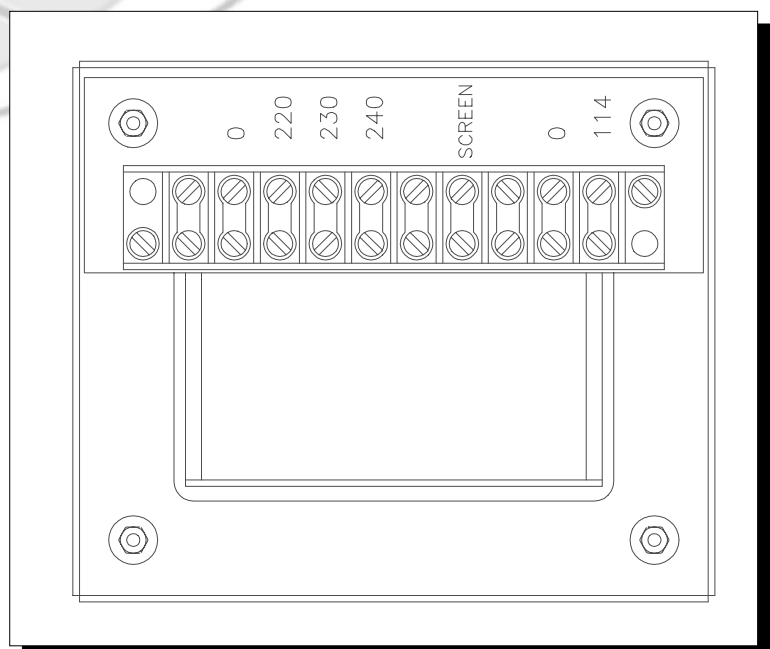
--- MAINS VOLTAGE MAY KILL! ---

6.3 The power supply components

The power supply components, other the boards below described, are very few: the power transformer, 2 bridge rectifiers and a power capacitor, which delivers the raw rectified dc power to the SMPS regulator module.

The unregulated dc voltage, nominally 140 Vdc, may range $120 \div 170$ V. The primary tap on the power transformer is factory set on the 230V input, allowing a mains range approximately $200 \div 250$ Vac. Should the mains voltage be 240Vac nominally, it is suggested to change the transformer tap to that voltage. If the mains voltage is a stable $215 \div 225$ Vac, the transformer tap may be left as factory set. Only if there are frequent occasional drops of mains input below 195V and consequent system stops, it is suggested to lower the input tap to 220V.

To do that, the power cord must be disconnected from the mains, the top cover must be removed and the transformer voltage terminals may be accessed.



SIRIO 2000:
The power transformer



6.4

The Switch Mode Power Supply regulator

This module performs an efficient regulation of the raw dc input, nominally 140V \pm 15% to a lower 48V \pm 1%. Being its efficiency very high, very little heat is produced in the regulation process. The nominal current capability of the regulator is much higher than requested, and approaches 70A @ 48V.

A control I/O connector on an upper daughter board permits a remote control of the regulator by the apparatus controller, i.e. output on/stand-by, current and voltage monitoring, status prompting and alert.

A fast 80A semiconductor-grade protection fuse is screwed on the board: it may be fused by the crowbar protection in case of switching transistor damage. If this happens a first attempt to replace the fuse may be accomplished, after having verified the integrity of the power transistors. Usually something is broken so causing the fuse blow-up.

Reparation of this module in the field is very difficult if any component other than the fuse and/or a power transistor failed. It is suggested to substitute the module with a new one and send back the damaged unit to the factory for inspection and possible reparation.

6.5 The power supply controller

The power supply controller accomplishes several tasks:

- Provides line filtering for EMI compliance
- Carries line power fuses
- Carries the power relay and the anti-surge devices in series to the power transformer
- Supports an auxiliary power supply, which feeds all the internal circuitry but the RF stages
- Controls the allowed range of the input mains, consequently enabling the main regulator
- Discharges the power filter capacitor, when the main power supply is turned off

The first tasks are self-explanatory. The auxiliary power supply is another, IC based, switching-type regulator, preceded by an isolation/step-down transformer. The raw filtered dc voltage, in the range 20V \pm 15%, is regulated to 12.5 \pm 0.5 Vdc

Two separately rectified dc taps drive the power relay and an average filter (R7, R8, C17, C18). RT1 regulates the sensitivity of the rectifier and must be set to provide 20mV/Vac-in on TP2, i.e. 4.60 Vdc @ 230 Vac-in. IC2a and IC2b performs a window comparator on the mains input, disabling the main transformer for voltage outside approx. 190 ÷ 255 Vac, when RT2 is adjusted to have 5.16 \pm 0.02 Vdc on TP1.

Note that this voltage may be set to 4.96 and 5.36 Vdc in case of occasional protection trip-on, when the primary side of the main transformer is changed to 220 or 240 Vac input. If



this do not happen, RT2 may be left as factory preset for 230 V.

TR2, driven by the opto-insulator IC7, inserts the resistor chain R40 ÷ R43 in parallel to the power dc filter capacitor, to discharge it in few seconds, when the apparatus is turned off. Note that the discharge time is not very fast: it may need some 10 seconds and even more to lower the raw dc voltage to a safe level. Even so there may be enough energy in the power storage capacitors to destroy some delicate component or performing hazardous electrical arcs, if accidentally short circuited by some metal tool.

Look at the system meter in the "Unregulated Power" position, to have an idea of the time needed to reach a safe dc level, after having switched the apparatus in the stand-by position.

Note that the resistor chain R40 ÷ R43 become very hot during the turn-off process and that repeated turn-off cycling in little time (i.e. more than 2-3 times in a minute) may overheat, scorch the external body of the resistors and even destroy them.

6.6 The controls and measure board

This board accommodates the stand-by/operation switch, the system metering section and the I/O interface to the remote I/O connector.

The Stand-by switch generates a disable logic low signal, which is processed by the power supply controller, when in the high state, generating a "Enabled" signal which turns on the RL1 relay. This component enables the RF control / interface board, through the "Enable_amp" line.

All the measure lines coming from the control/interface and the power supply controller boards but the forward power, are processed by the Cmos switch IC3 and amplified by IC4a, then applied to the meter M1. A separate meter, M2, is always connected to the forward power line.

An oscillator built around IC1, is triggered by the measure range switch SW2 and the digital output of the internal divider drive both IC1 and IC2. The only function of IC2 is to light a corresponding led to the meter range, in parallel with IC1. The position of the range switch depends on the time-length it is pushed the pushbutton SW2.

This board carries the output RF adjustment trimmer RT5, which is externally accessible through a hole in the front panel. An internal trimmer, RT4, is adjusted to limit the maximum output power to 2050W, for safety purpose.



6.7 The control, interface and protection board

This is quite a complicate board and carries all the circuitry to regulate and protect the RF amplifier stage. Let us consider its various loops.

An internal regulator, IC13, feeds al the internal circuitry with a regulated +12 Vdc, derived by an unregulated dc input of some +20V.

The Forward power line drives the IC2b buffer, which isolates the input, with unity gain. The subsequent IC3b op-amp is the forward power loop amplifier and compares the sense line with the preset level at the line "5" (TP8). Its output drives the gate command line of T5 and T6, which generate the AGC signal at their drains, on the line "VB", i.e. the bias of the RF amplifier modules. IC14 limits the maximum output power set.

An auxiliary op-amp IC4a, compare the forward sense voltage with a preset value, to detect if the output power is lower than a fixed threshold (approx. 700W), in this case generating a warning alarm on line "6".

The reflected power line is amplified and buffered by IC2a. IC3a is the reflected control loop amplifier and compares the reflected sense signal to a preset threshold, which approximates 100W, i.e. 3V on TP5. The output of IC3 adds on T5/6 gate command line to control the AGC. This circuit performs a soft reflected power protection; a hard protection is managed by IC1b, which trips at a 30% higher level than IC3a, but it is much speeder and more effective. In fact, while the soft IC3a circuit simply decreases the output power to the level, which determines the maximum allowed reflected power, IC1b triggers the monostable circuit IC8 that completely disables the RF line for as much as some 5 seconds.

The input RF sense voltage is applied on IC1a, which trips at the maximum allowed RF input drive level, exciting IC7, which disables the RF line in the same manner than the previous circuit.

A similar circuit based on IC5b, IC5a and IC9 buffers the current sense line and trips if the SMPS regulator current exceeds a preset value.

The circuit built around D11, D12, D13, D14 and IC10b perform a logical Or on any of the SMPS warning lines, to advice of a fault.

The temperature protection is performed by IC6a, which trips when the Temperature Detect line crosses its preset threshold, diminishing or completely disabling the RF output. IC6b trips at a lower level, so possibly starting (or increase the rotation speed) a dc ventilation fan, before to reach the warning level. Nevertheless this part of circuit is not always present on the SIRIO 2000.

The last parametric protection is built around IC4b and it Or'ed lines through D15, D16, D17, D18 and D33, on which is applied a voltage proportional to the current flowing on each



of the RF modules, with a sensitivity of 0.25V/A on the main power lines. If any line exceeds some 5V at any input, i.e. approx. 20A, IC4b decreases the RF power gain and trips the warning current alarm.

The last circuit, built around IC11, trips after many repeated alarms positively triggering the bi-stable relay RL1, which needs a manual reset from the control panel of the apparatus, even if the apparatus is turned off and on again. IC11 loses the memory of the counted alarm when the apparatus is completely turned off, i.e. not simply in stand-by mode, or reset.

6.8 The current sensing board

This small board is allocated very near to the SMPS regulator and its current input line, which is a solid brass profiled sheet, is screwed on its positive terminal, to reduce the line loss.

Each current monitor line passes through a very low-ohmic precision power resistor (R46, R37, etc.) which develops a small proportional voltage at its ends. The subsequent operational amplifier senses this voltage and generates a similarly proportional current upon the paired resistors R49, R40, etc. The PNP transistors T6, T5, etc. transfer this currents to ground, where they develop a proportional voltage on the loading resistors R51, R43, etc.

The output voltage proportionality on these outputs is usually 250 mV/A, i.e. 5V/20A.

Note that only 4 sensors are used on SIRIO2000: the board has room for more identical sections, which are mounted in other apparatuses.

6.9 The input RF power splitter

The purpose of this simple board is mainly to divide the input RF drive power in two identical signals, one for each power amplifier module, providing a good insulation between each output port (>20 dB, typ. 23 dB minimum on the whole FM band).

This is done by a Wilkinson type printed coupler, followed by the balancing resistor array R21 ÷ R24.

A directional coupler senses the input RF level and RT1 is regulated to provide the overdrive protection circuit trip at the right maximum input level. The board supports also the direct (or forward) and reflected detector sensitivity trimmers, whose input comes from the output board.

Two additional lines support the RF module bias (or AGC) line and the temperature sensing PTC thermistor.



6.10 The RF power amplifier modules

These modules are built around a couple of "Gemini type" Mos-fet transistors each one forming a 300W push-pull amplifier.

Discrete Wilkinson-type couplers equip both the input and the output module section, doing the job of dividing and recombining the input and output signals, providing a suitable insulation between the transistors.

A small balancing resistor R1 is mounted on the input splitter, while a much bigger resistor R14 is mounted in the output combiner.

A group of C, R and L RF decoupler and dampening components are mounted on the positive supply line of each amplifier, plus a small value resistor, R12 and R13, for possible separate current detection of each supply leg.

The gate bias is separately adjusted through R15 and R16 on each section. Do not tamper the factory bias preset values!

The full power output of the whole module exceeds 600W, to provide some room for coupling losses on the combining stages of higher power amplifiers, like the same SIRIO 2000.

6.11 The output RF power combiner, LPF and coupler

This module is symmetric to the input power splitter and is another printed Wilkinson coupler, whose power management capability is obviously much higher than the input board. In this case the power balancing resistors are high power devices, whose centre connection is referred to ground through an inductor, which discharges any static electricity on the antenna up to a relevant amount of power.

The power combiner is followed by a printed low-pass filter, which attenuates the harmonic products generated by the amplifiers.

3 directional sample lines derive two rectified voltages proportional to the direct and reflected output power and a RF signal for external monitoring purposes.



7

REPAIR AND REPLACEMENT OF DAMAGED MODULES

The SIRIO 2000 is a high reliability apparatus, as much effort was done in the design and development stage to assure the maximum reasonable working margin for each part. Nevertheless, as all apparatus which works 24 hours a day for years, some failures are possible, especially in those environments which over-stress the apparatus, like hot or dusty or moist places, or subjected to wide mains fluctuations or static discharges and things like that.

In the event of any failure an appropriate analysis must be done to avoid subsequent failures due to faulty ambient conditions. A often underestimate cause of failure is simply a too high ambient temperature or insufficient ventilation. Improving the ambient and system ventilation as suggested in the installation paragraph of this manual, usually fix the problem.

Other obvious causes may be dust clogging and ventilator fan failure. A regular service and maintenance routine will avoid these sources of problems and it is suggested to change the ventilator each two years, even if no damage is still visible, especially at high ambient temperature.

No air pipe must be attached to the ventilator fan output for air ducting, if an external extracting fan is not installed in that system.

In any case, if the amplifier fails, some work must be done on the apparatus to fix the problem. With the appropriate spare parts, most of repairing work may be done on site, without need of special tools and often without need of any solder joint.

Practically 95% of any reported failure in similar equipment applies to the power managing modules, i.e. the RF power amplifiers module (65 ÷ 70% of the failures), the RF output combiner ($\approx 10\%$), which may be consequent to an amplifier module failure and the SMPS regulator, accounting for another 10 ÷ 15% of the failures. All the other components and boards are responsible for the remaining 5% of problems!

Not much needs to be said about the general boards and components changing: virtually all of them may be changed in few minutes, without retouching the adjustments. Most of them are immediately accessible or needs a minimum of dislocation of other components and plates. Only the RF boards need a deeper look.

RF boards are delicate modules, which contains some parts as flanged power transistors and resistors which must separately be screwed on the supporting heatsink and may be easily damaged by improper handling. These boards are the 500 W power amplifier modules and the RF output combiner.

Repairs of these modules are usually made in the factory or in a specialised laboratory, if possible at all. If the p.c. board is damaged perhaps only the costly RF active devices may be recovered. Nevertheless, very often this is worthless because, in case of major damages, these



parts are internally electrically damaged or degraded.

Repair of the RF modules requires too, at the end of the reparation, a full check of the module's working parameters in a dummy fixture or in a test assembly which are not available even in most specialised laboratories. For these reasons repairs of the modules, specially the higher power amplifiers, is discouraged at the most and the broken one must be replaced by new parts with the same identical characteristics, fully tested at the factory.

To replace the modules avoiding as much as possible to damage the new part or the old transistors, if not already broken, carefully follow the subsequent steps:

- 1) Remove the amplifier cabinet from the rack, after having disconnected from its rear connectors the RF input and output cables, the power supply and the control cables. Disconnect also the ground cable from its screw.
- 2) To investigate on the damaged parts or to test the reparation, it may be required to externally connect the removed cables and the RF output load to the amplifier assembly in manner to permit inner inspection of the top and bottom of the apparatus. If the latter is placed on a small stand aside of the main rack, the internal cables are usually long enough to permit the connections, avoiding extension cables.
- 3) Open the bottom cover of the cabinet and remove the screen from the damaged module(s), if any.
- 4) If the damage is not immediately visible, it may be helpful to measure the currents sunk by each 300W sub-module amplifier. To this aim a low ohmic value shunt resistor is inserted in series to the 48V power supply of the module's subsections (R12 and R13, 10m Ω).

To measure the current sunk, the amplifier assembly must be completely connected and powered with and without RF. A sensitive, RF proof, digital voltmeter must be used to measure the voltage across the shunt resistors, which vary from nearly 1 mV at no load to 100 mV at full power.

Take care: most of low quality digital or analog meters are not able to do this reading, because they are affected by the high RF field and their reading is completely meaningless!

WARNING: great care must be paid not to accidentally short-circuit the resistor leads to the ground with the voltmeter probe tips, during the measurements!

- 5) When properly functioning at full power, each module 300W subsection will sink $8 \div 10$ Amperes, i.e. $80 \div 100$ mV across the shunt resistor. The absorption must be balanced $\pm 10\%$ around the mean value on each amplifier. A lower or higher value may mean a module failure.



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- 6) Remove the power supply cable screwed on a centre terminal in the board and the small bias cable.
- 7) Unscrew the input and output RF connections, at the module opposite sides.
- 8) Carefully unscrew the RF transistor flanges from the heatsink base-plate. This operation, if not properly done, may mechanically over-stress the transistor, cracking the internal delicate beryllium-oxide ceramic which supports the active silicon dies and determine unrecoverable damage of the device.
CAUTION: beryllium-oxide is toxic and must not be thrown with domestic refuse but in specialised toxic material disposals. No special handling precaution must be paid when the transistors or power resistors are not mechanically broken, apart those deriving from the handling of mechanically fragile (and very costly) devices. If the transistor or resistor flange is broken, avoid to get in touch with it and the brittle white exposed internal ceramic or inhaling dust of it. Dispose the transistor or the entire broken module as previously described.
- 9) Make a note of the position and the length and remove the threaded screen spacers and the board fixing screws.
- 10) Remove the broken module and clean the supporting heatsink base-plate before mounting the new one.
- 11) Smear thin heat-conductive silicon grease below the flanges of the power transistors and resistors of the new module, before mounting it.
- 12) Position the new module, placing the threaded spacers and screws over the p.c. board avoiding to tighten them. When all the screws are placed, control the correct alignment of the transistors and resistors fixing holes and tighten the screws and spacers.
- 13) Insert the proper screws and washers, if any, across the transistors and resistors and carefully tighten them in several, alternate steps.
- 14) Reconnect the power supply and bias cables to the module.
- 15) Turn-on the whole amplifier fully connected to the supporting power and control rack without RF power, with RF load connected and driver exciter off. Enable the equipment, with the exciter still off.
- 16) Measure the bias current of the two transistors on the module, as explained on previous paragraphs 4 and 5. They were factory adjusted to 100 mA (1mV).
- 17) If the currents are off the range 50 ÷ 200 mA (0.5 ÷ 2 mV), carefully retouch the bias trimmers on the board. A small clockwise rotation increases the bias current.



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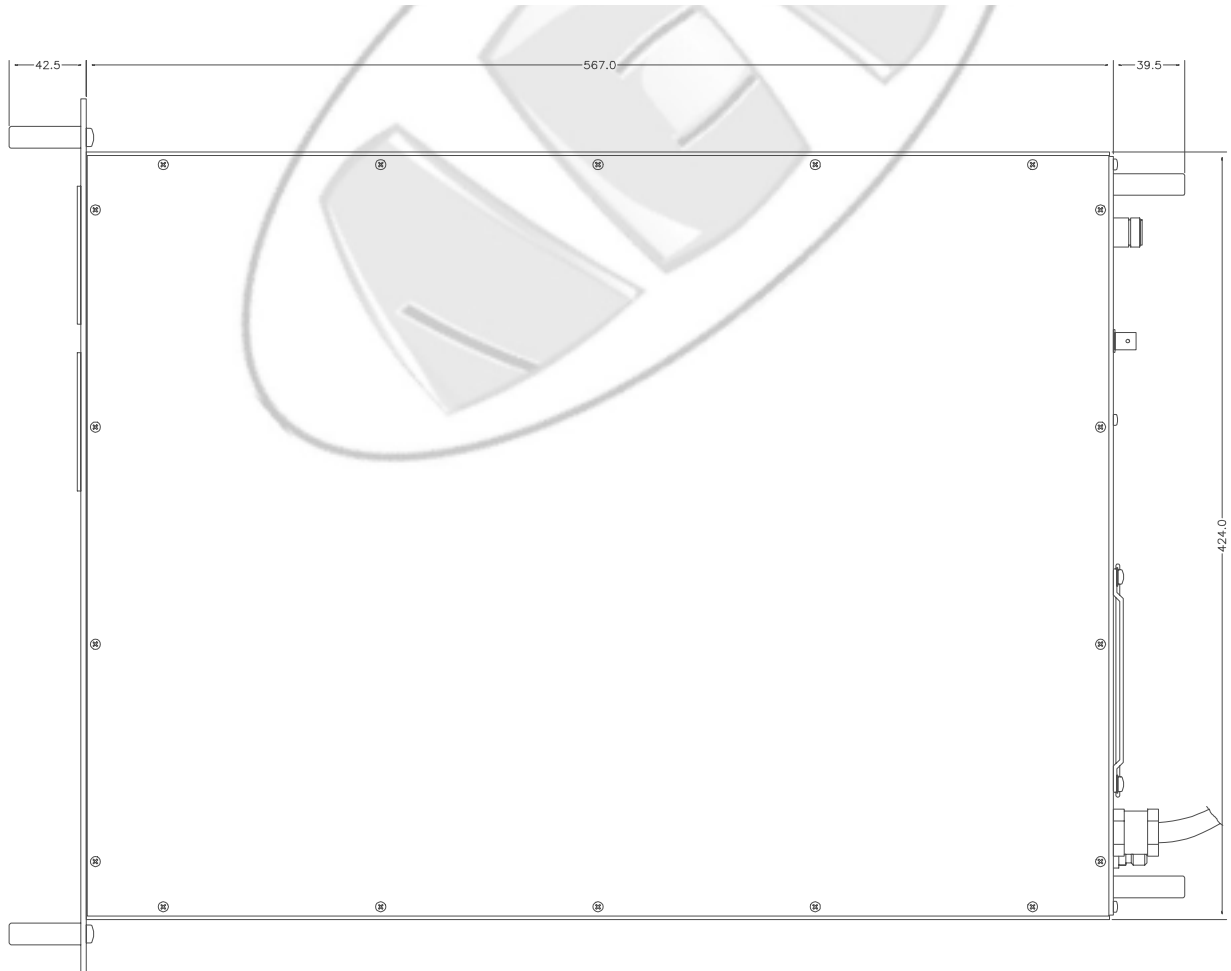
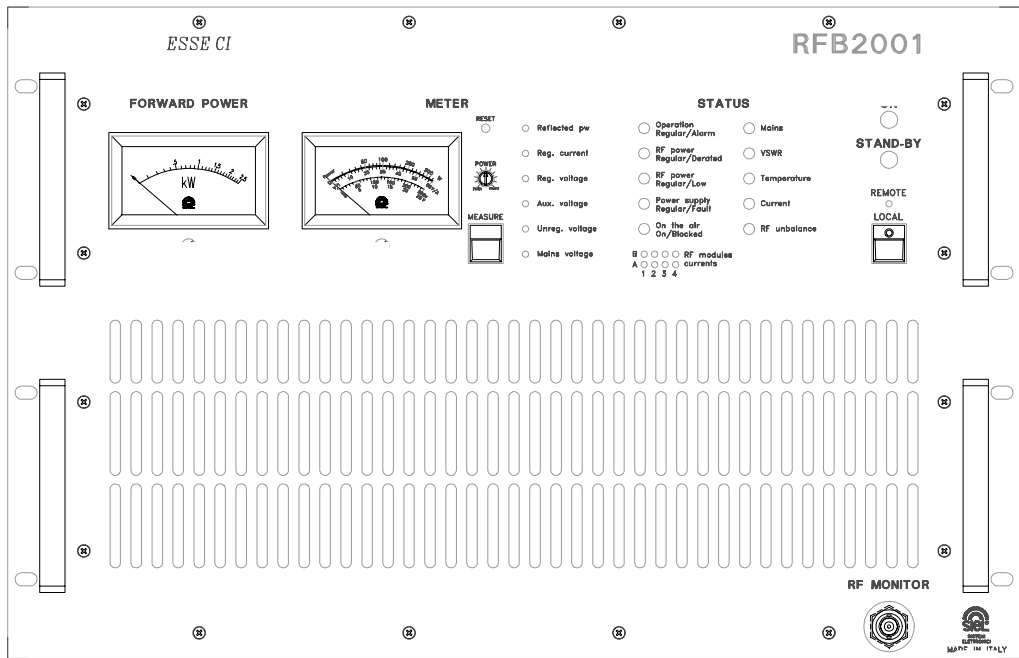
- 18) Reduce the output set power to a low value, acting on the front panel power set trimmer and turn on the exciter power.
- 19) Slowly increase the power-set and measure the balance of the current drained by each module at half level and at full power. Verify the limits written in paragraph 5.
- 20) Turn off the equipment, reassemble the screening covers and the bottom panel of the apparatus and reposition it in its working location with full connections.
- 21) Perform a limited period of test at full power, i.e. $2050 \div 2100$ W and then reduce power at maximum nominal working level, i.e. no more than 2000 W.





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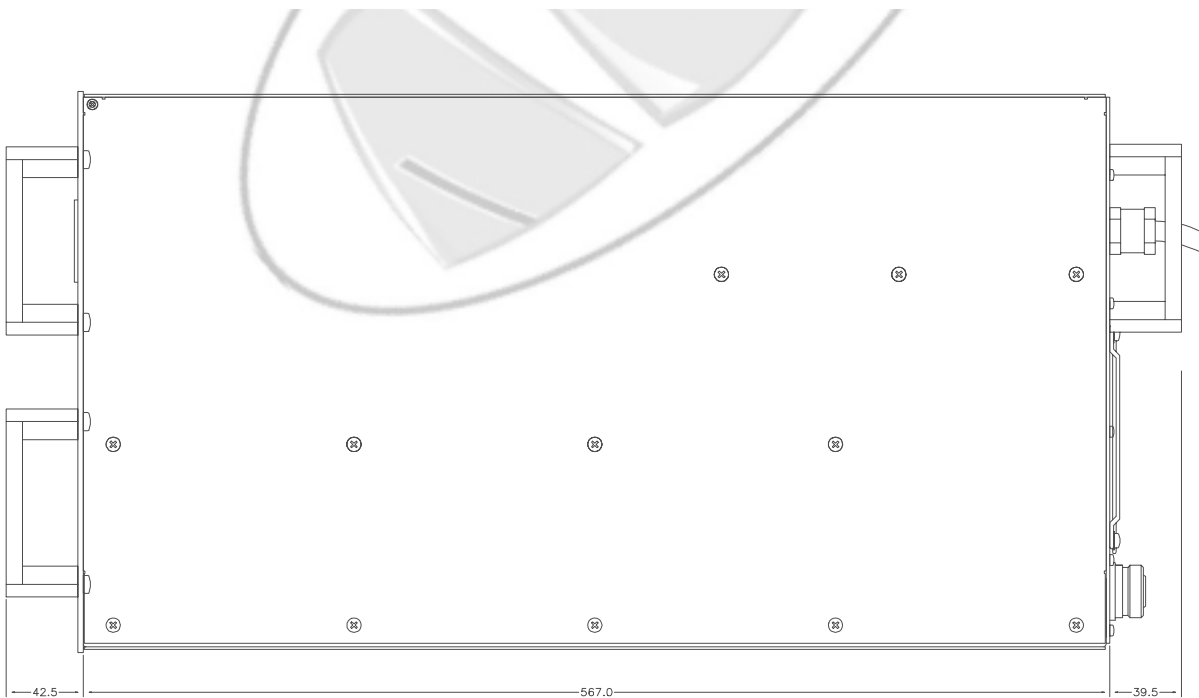
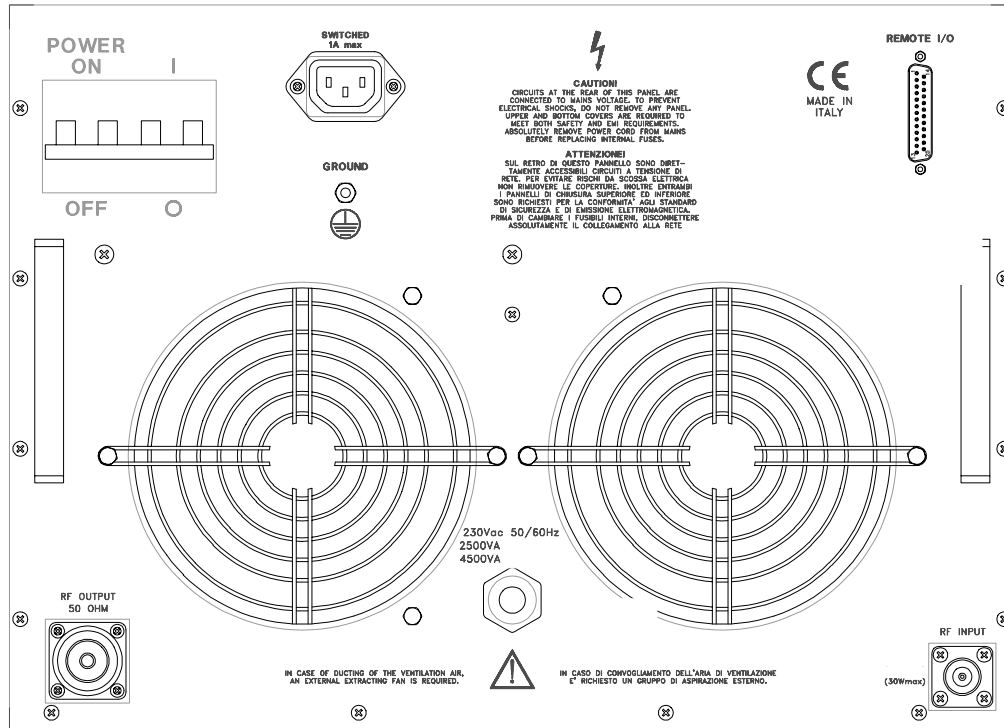
SIRIO 2000 AMPLIFIER - VISTA FRONTALE E DALL' ALTO





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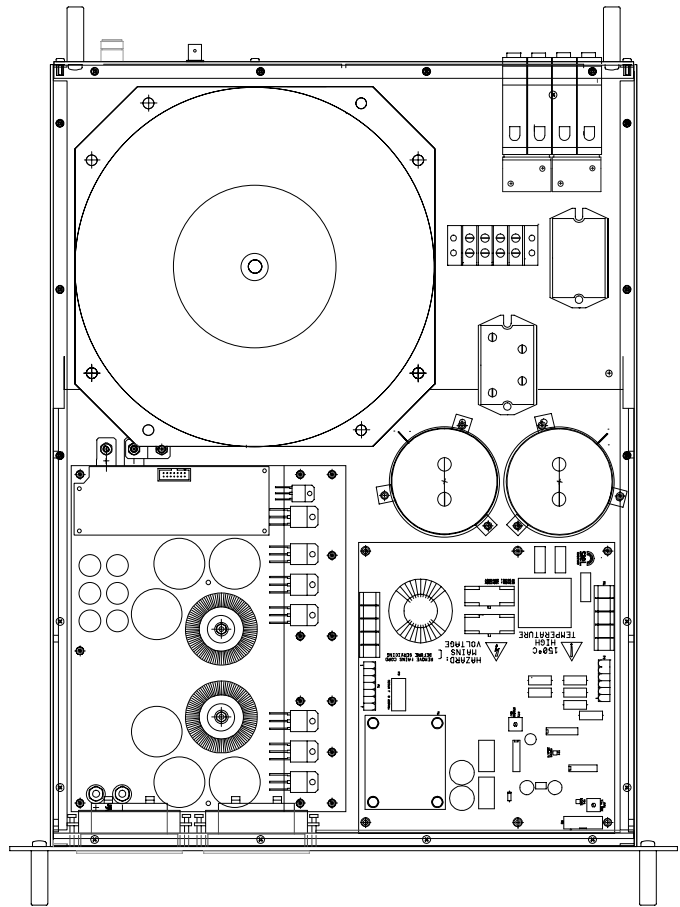
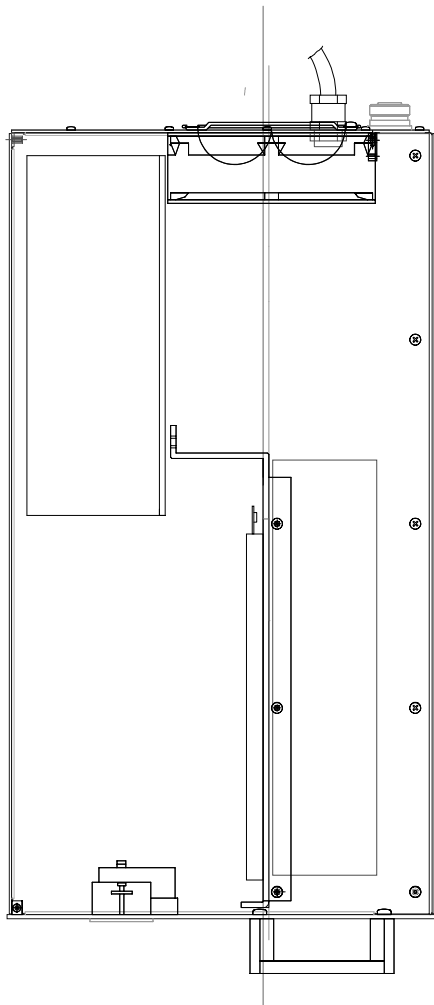
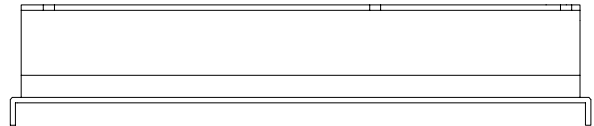
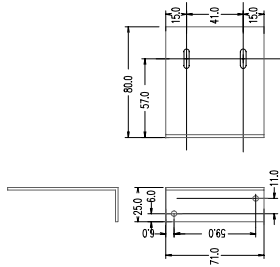
SIRIO 2000 AMPLIFIER - REAR & SIDE VIEW





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SIRIO 2000 AMPLIFIER - TOP INTERNAL ASSEMBLY VIEW



SIRIO 2000 AMPLIFIER - BOTTOM INTERNAL ASSEMBLY VIEW

