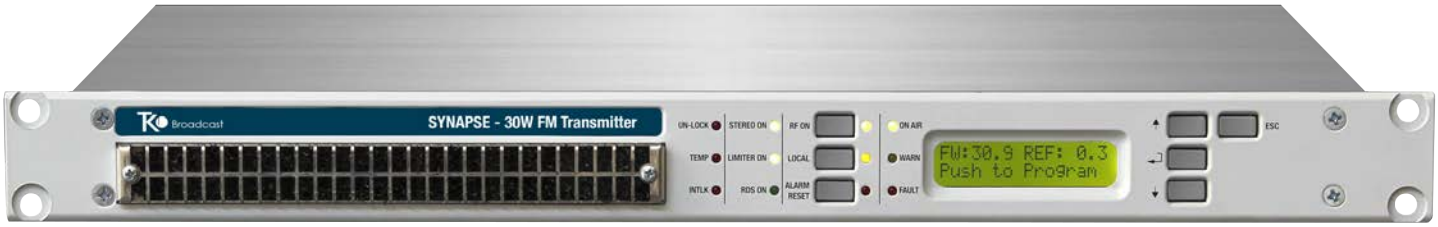
TEKO Broadcast

SYNAPSE 30W/50W FM TRANSMITTER

High Performances & Fully Customizable



User Manual (V. 1.0)

The information contained in this manual refers to TEKO Broadcast SYNAPSE30 FM Exciter

Contents

Section One

Introduction & General Information

Preface

Congratulations for your purchase of our Exciter.

Our goal is to bring you the most accurately crafted equipment to exceed current specifications and world-class quality standards. Our products are designed to withstand severe environment conditions.

Your new **TEKO Broadcast** Exciter is manufactured using the most advanced production processes available today and the highest quality materials to ensure years of trouble-free service. **BEFORE USING THE EXCITER, PLEASE READ MANUAL CAREFULLY. PARTICULAR ATTENTION MUST BE PAID TO GROUND CONNECTIONS AND OTHER MAINS SECURITY RULES.**

About TEKO Broadcast

TEKO Broadcast is devoted to the development and refinement of the newest technologies which can satisfy the ever-increasing needs of the Broadcast industry.

Our innovative engineering staff has designed our new Exciter after a ten-year experience in the research and development of equipment.

We are located in Noth Italy in the Pianura Padana where mild climate and a long-established culinary tradition offer a high quality of life. We are at the approximate latitude of Los Angeles, CA. but right in the middle of the Mediterranean Sea.

The high level of technology in the Broadcast industry has placed Italy among the most advanced countries in the world and is no second to Italy's claim to fame for fashion or food.

Ancient traditions, lush tree-covered hills, 100Km from the see here meet with the sophisticated technologies of the Bologna University, premises. This privileged position allows us to choose fresh resources from recently qualified engineers with an eye for state-of-the art.

Equipment developed and manufactured by **TEKO Broadcast** has undergone extensive computer simulation, followed a rigorous R&D method and often results from cooperation with Research Institutes or Universities.

TEKO Broadcast is committed to meet your broadcast requirements by providing the most advanced, reliable and cost-effective equipment available in the market today

Welcome INTO the passion for the things doing well!

***About This** Manual*

A step-by step guide to simple installation and setup of SYNAPSE30 Exciter, the manual contains the following sections:

1. **Introduction & General Information:** current section
2. **General Description:** key features, technical specifications and mechanical layouts
3. **Installation & Use:** how to install, set up and test Exciter
4. **Software Description:** how to read and set main parameters
5. **Software Updating:** how to update last version of software
6. **Service & Maintenance:** repair and maintenance, outlines, component location, parts lists and other technical information

Important Note On Dangerous Voltage

Hazardous Voltage

WARNING:
Voltage within equipment is high enough to endanger life!

External or internal covers are NOT to be removed, except by authorized personnel

Important Note - Serial Number

Serial Number can be read directly on front panel display. Press the arrows keys and turn it to select the slide showing **"ABOUT"**. This section contains serial number, firmware version and other general and useful information.

Some product versions might show serial number on rear panel label

Disclaimer

If you find any inaccuracies, please kindly inform us

TEKO Broadcast is not liable for any typing or technical errors and it reserves the right to make changes to product and/or manuals without prior notice

Warranty

TEKO Broadcast product is guaranteed against defects in materials and workmanship for a period of TWO YEARS from date of shipment. The standard warranty may be extended beyond the two-year period. A record of warranty extensions is listed on sales orders of each product purchased. Standard warranty conditions apply to extended warranty period.

During warranty **TEKO Broadcast Srl** will repair or replace product proved to be faulty with previous authorization. The warranty validation only applies if product is returned to **TEKO Broadcast Srl** after release of Return of Merchandise Authorization and provided that maintenance procedures have been followed as listed in the manual. Warranty does not cover repairs resulting from product carelessness, incorrect or improper use.
NO OTHER WARRANTY APPLY

TEKO BROADCAST IS NOT LIABLE FOR DAMAGES RESULTING FROM PRODUCT MISUSE
TEKO BROADCAST DOES NOT GUARANTEE ERROR-FREE EQUIPMENT, UNINTERRUPTED OPERATION, FIRMWARE OR FIRMWARE BUGS.

If your equipment needs repair call **TEKO Broadcast Srl** promptly and ask for customer service department. It is important to contact **TEKO Broadcast** immediately since many problems may be quickly solved over the phone or by e-mail. Please have your Serial Number ready before you contact **TEKO Broadcast** and clearly explain the nature of your problem. Once we acknowledge your equipment requires service we will send you an electronic form to be filled in with your name, address, phone number, e-mail and containing an accurate description of problem or failure. **TEKO Broadcast** will issue an **RMA** number.
Send the unit with prepaid shipment to indicated maintenance lab and place equipment in the original box or a suitable container to protect it from damage. **TEKO Broadcast Srl** will not be held responsible for damage incurred during shipment. Please ensure RMA number is clearly marked onto shipping container. Our standard terms are to fix or repair equipment within **five working days**. If equipment requires parts ordering or more than five working days, **TEKO Broadcast**'s service technician will contact you. We also provide service for equipment if warranty has expired. Follow the same instructions described above, but tick in the

☑ "not in warranty" box. Warranty is valid on condition that proper maintenance procedures have been complied with, as listed in the manual. Damage caused by product misuse is NOT covered by warranty.

Other General Information

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e-mail: info@tekobroadcast.com: web:http://www.tekobroadcast.com

Manual Version: SYNAPSE30-2G -2V1b
Firmware Version:
Product Definition: SYNAPSE-30
Edition Date:
File Name: SYNAPSE30-2G -2V1b-Eng.doc

CHK____

CE

Basic CPR technique

Basic CPR (Cardiopulmonary resuscitation) technique

For adults

1: Call your local emergency number

2: Tilt head, lift chin, check breathing

3: Pinch nose shut and give two breaths

4: Check pulse

5: If there is no pulse, position hands in the center of chest

6: Place one hand over other and push down two inches on the chest 15 times

7: If there is no pulse, continue with two breaths and 15 pumps for one minute and recheck pulse – if no pulse – continue until arrives

Manual Revision Record

This record page is intended for recording revisions to your **User & Service Manual** for SYNAPSE30-2G Exciter**.** Revisions can only be published by **TEKO Broadcast Srl** or its authorized representatives. We recommend that only authorized or appointed personnel make changes, or insert revised pages and ensure that obsolete pages are withdrawn and, either disposed of immediately, or marked as superseded and placed in a superseded document file.

Rev. No	Date Entered	Reason	Signature Entering Change
1		First Edition	
2	07/2010	Change Display Front Panel	0110 fr
2.1	11/2010	Changed the back panel. Interlock on/off, Preemphasis an Audio Impedance settable from the outside	0210fr
2.1.a	01/2011	Back panel. New graphics	0111fr
2.1.b	07/2011	Formatted text according to new rules	0211fr

Section Two

General Description

KEY FEATURES

Equipment is designed using the latest technologies and techniques available for Hardware and Software and includes the following key features.

- High Performance At Low Cost
- Nominal RF Power 30w
- Very Low Signal Noise Typ. 80 Db
- High Stereo Performance Typ. 60 Db
- Extremely Low Distortion: THD, IMD & TIM Typ. 0,05%
- Completely Broadband
- High Spectral Purity > -100 dbc Spurious, > - 70 dbc Harmonics
- Easy to handle: self-explaining monitoring and setting of all important parameters
- Remote control for telemetry dB9 connectors available on rear panel
- Modular construction specifically designed to minimize spare parts set
- Built-in RF true wattmeter
- Output provided: RF, RF monitor
- AC mains 90-260VAC extend range
- ETSI - CCIR & FCC Compliant
- Very Compact Cabinet 1 Unit Rack 19”
- All functions controlled by a knob encoder and a two-row, sixteen character LCD display. Intuitive parameters configuration
- Interlock, Reflected PWR, Forward PWR

OPTIONS

- RDS/RBDS Coder Programmable whit PC
- Stereo Coder
- FCC LPFM Code Station
- OIRT and JPN Version

TECHNICAL SPECIFICATIONS

GENERAL	
Power Output	30W
RF Output Impedance	50Ω
RF Output Connector	"N" Type
Monitor RF	-54 dBc - BNC connector
Frequency Range	87.5 – 108 MHz
VSWR	1.5:1 Maximum
Frequency control	Synthesizer μprocessor controlled
Lock-in time	Typically 4 secs
Modulation mode	Mono, Stereo, Multiplex, AUX
Off-lock attenuation	> -80 dB
RF harmonics	Exceeds ETSI, EBU/CCIR/FCC requirements
RF spurious	Exceeds ETSI, EBU/CCIR/FCC requirements
Pre-emphasis	Flat/50/75 μs selectable from back panel

MONAURAL OPERATION	
Audio frequency response	±0.15 dB 20 Hz to 15 kHz (+0/-2%)
Audio input Level	-3 to +9 dBm
Audio input impedance	600 ohm balanced, 10 KOhm unbalanced
Input Connector	XLR female ([6] fig. 2)
Audio frequency response	±0.1 dB, 30 Hz to 15 KHz
Total Harmonic distortion + noise	0.05% @ 400 Hz
Intermodulation Distortion	0.05%, 1 KHz/1.3 KHz, 1:1 ratio
Transient Intermodulation Distortion	0,05%, 2.96 KHz square wave and 14 KHz sine wave.
FM S/N Ratio	-82 dB RMS detector, -80 dB below ±75 KHz deviation, 50 μs de-emphasis, weighted.
Distortion	0.05%, 2.96 KHz squere wave and 14 KHz sine wave
Pilot frequency	19 KHz ± 1 Hz
Phase Pilot	± 2° adjustable
Output Pilot	1 Vpp., BNC female
Audio filter Attenuation	≥ -45 dB @ 19 KHz, > -40 dB 20 KHz to 100 KHz.
Modes	Stereo, Mono L+R, Mono L, Mono R.

MPX OPERATION (External coder)	
Input Connector	BNC female ([5] fig. 2)
Composite input impedance	1,2 KOhm unbalanced
Composite input level	+6 to +12 dBm
Composite amplitude response	±0.2 dB 30 Hz to 100 kHz
THD+N on encoded channels	30 Hz to 15 kHz < 0.05% @ 400 Hz
IMD	Measured with a 1 KHz and 1.3 KHz tones; 1:1ratio at FM 75 kHz D2<-75 dB D3<-80 dB Typ. D2<-80dB D3< -85 dB
TIM (DIM30)	Measured with a 2.96 kHz square wave and a 14 kHz sine wave
FM S/N Ratio	-83 dB RMS detector, -80 dB below ±75 KHz dev.50 μs de-emphasis, weighted.

STEREO OPERATION (Optional)

STEREO OPERATION	
Audio frequency response	±0.25 dB da 30 Hz to 15 kHz
Audio input Level	-3 to +9 dBm
Audio input impedance	600 ohm balanced, 10 Kohm unbalanced
Input Connector	Two XLR female L & R ([9]-[10] fig. 2)
Stereo Separation	30÷80 Hz ≥ -50 dB, 80Hz÷15 KHz ≥ -60 dB (Typ. 65 dB).)
Total Harmonic distortion + noise	0.05% @ 400 Hz
Intermodulation Distortion	0.05%, 1 KHz/1.3 KHz, 1:1 ratio
Transient Intermodulation Distortion	0,05%, 2.96 KHz square wave and 14 KHz sine wave.
FM S/N Ratio	-75 dB RMS detector, -71 dB below ±75 KHz deviation, 50 μs deephasis, weighted.
Stereo Separation	30÷80 Hz ≥ -50 dB, 80Hz÷15 KHz ≥ -60 dB (Typ. 65 dB).
Pilot frequency	19 KHz ± 1 Hz
Phase Pilot	± 2° adjustable
Output Pilot	1 Vpp., BNC female
Audio filter Attenuation	≥ -45 dB @ 19 KHz, > -40 dB 20 KHz to 100 KHz.
Modes	Stereo

ELECTRICAL	
1. AC Input power	90 - 260 VAC ;50/60 HZ Single phase
2. AC Power consumption	70 VA @ 30W
3. Power Factor	Cos Φ> 0.92
4. Cooling	Forced air

ENVIRONMENTAL	
1. Operating temperature	-10° C to + 50° C
2. Guaranteed performance temperature	0° C to + 40° C
3. Max operating altitude	3,000 mt.
4. Relative humidity range	0 to 90%

PHYSICAL DIMENSION	
1. Mounting	Standard 19” chassis 1 U Rack
2. Size	485 mm (W) x 405 mm (D) x 44 mm (H)
3. Weight	~ 4.0 Kg

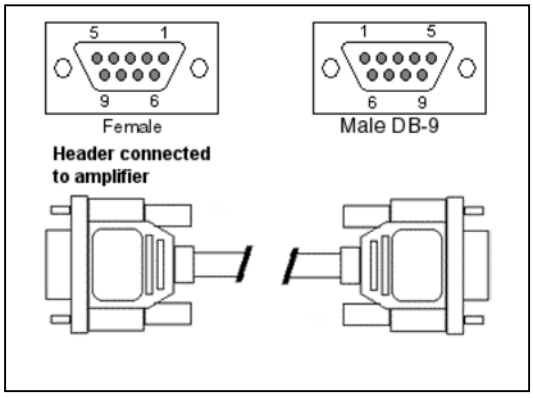
OPTIONS

OPTIONS	CODE
1. RDS/RBDS Coder Programmable with PC	**SDZ00100**
2. Stereo Coder	**SDI03100**
3. FCC LPFM Code Station	
4. OIRT and JPN Version	

AUXILIARY CONNECTIONS

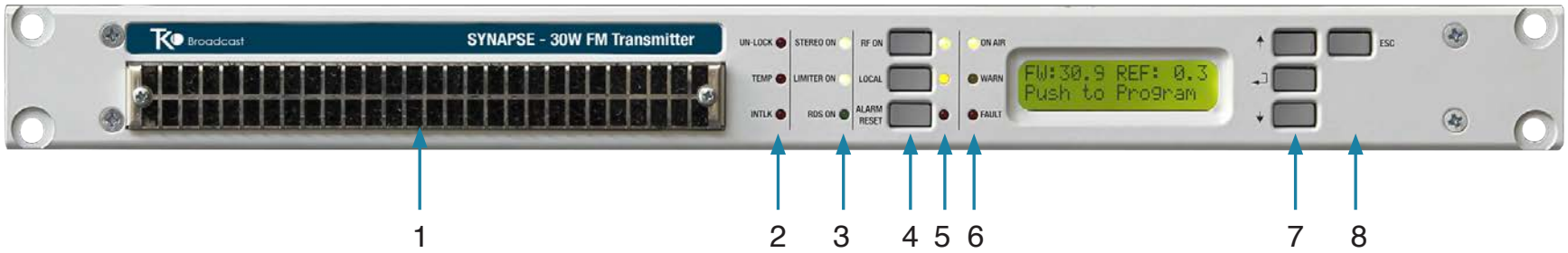
AUXILIARY TELEMETRY DB9 (REAR PANEL)					
Pin	**Description**	**Acronyms**	**Type**	**I/O**	**Value @ / Impedance**
1	GROUND –	**GND**	Gnd	-	
2	Current reading – reads power Amp current	**IPA**	Analog value	➡	3.0V/3A
3	Voltage reading – reads voltage supplied to power Amp	**VPA**	Analog value	➡	3.0V/30V
4	Interlock Input – if not continuously connected to or open from ground depending on selection: N.O or N.C causes 'Wait'	**Interlock In**	Control (TC)	⬅	Interlock CMD: L/H= Inhibit
5	Interlock Out	**Interlock Out**	Signal (TS)	➡	GND= Interlocked
6	TP				
7	12V0	**12 Volt**	Power	➡	
8	GROUND –	**GND**	Gnd	-	
9	Forward Output Power – reads Forward RF Output power	**OUT-FWD-MEAS**	Analog value	➡	3.0V/30W
Symbols: ➡ Output ⬅ Input					
Input Connector	DB9 female ([7] fig. 2)				

Pinout DB9 Connector



MECHANICAL LAYOUT

FRONT PANNEL FUNCTION KEYS AND LEDS INDICATORS



1	Air Grid input inlet with whashable Air Filter
2	Allarm Leds Indicators
3	Direct Keys Command
4	Command Status Leds Indcators
5	Working Status Leds Indicators
6	Air Grid input inlet with whashable Air Filter
7	Browser keys
8	ESC key

LEDS FUNCTIONS (LIGHTS STATE)	
UN-LOCK	PLL si UN-LOCK. The RF Power is OFF
TEMP	Ehere is a temparature alarm
INTLK	External Interlock open
LIMITER ON	Deviation limiter is ON (Enabled)
RDS ON	Internal RDS is ON (Enabled)
ON AIR	Transmitter is producig RF output so is ON AIR
WARN	Warning state, the output RF is still present but not at the nominal value
FAULT	A falut event is present, output power is off

DIRECT KEYS FUNCTION AND ASOCIATED LEDS	
RF ON	Turns RF ON/OFF (Enable or Disable the RF output) Led lights when RF is ON (enabled). Attention: the led indicate indicate if the output power is enable or disable. If the RF is enable, It lights even if the output power is zero. The ON AIR indicates if there is RF present on the output.
LOCAL	Set the transmitter in LOCAL or REMOTE Led lights when transmitter is on LOCAL mode.
RESET ALARM	Reset the VSWR allarm. in case of VSWR too high the transmitter acts the protection putting the output RF in OFF. It tryes 10 times to restablisch the output power, if the VSWR is always present the transmitter stops permanently. The red led lights. The user can reset this allarm with this button.
UP & DOWN ARROWS	Browser keys. Use these keys to navigate trough the menus and set the values of the working parametere
ENTER	Accept the value set with the arrows keys
ESC	Escape without save of all the menus and come back to the main menù

SYNAPSE 30 Rear View

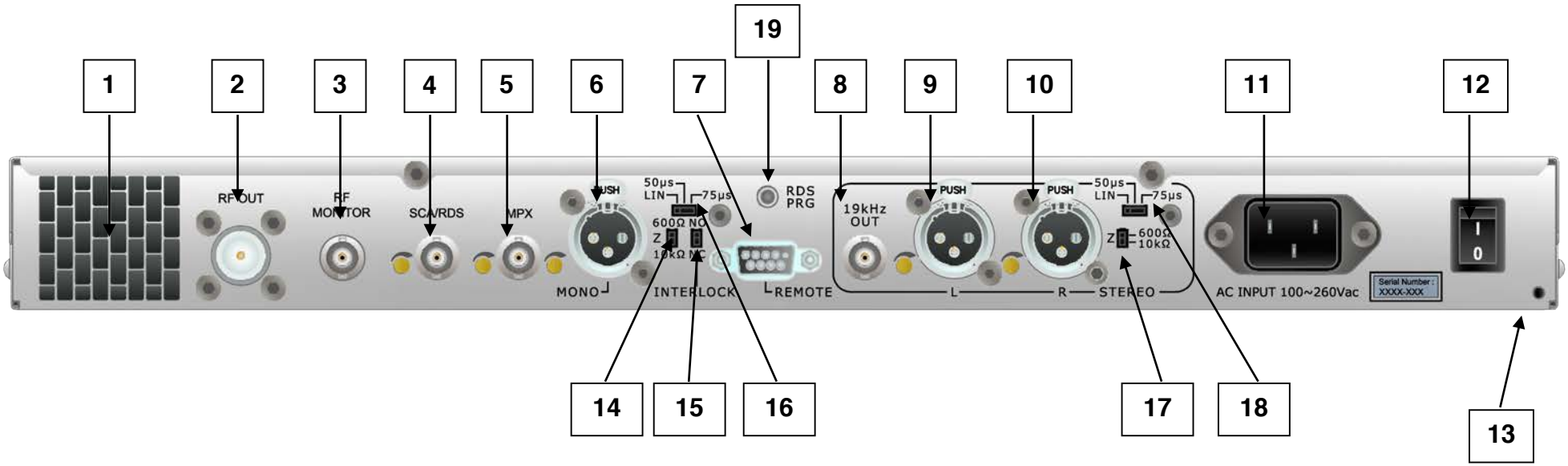


Fig.2

1 - Air Grid Input Outlet
2 - N Female Connector - RF Output
3 - BNC Female Connector – RF Monitor
4 - BNC Female Connector - AUX
5 - BNC Female Connector – MPX
6 - XLR Female Connector – Mono
7 - DB9 Connector - Remote control
8 - BNC Female Connector – 19 KHz Out
9 - XLR Female Connector – L Channel
10 - XLR Female Connector – R Channel
11 - VDE 3p 10A Mains Socket
12 - ON/OFF Switch
13 - Heart Connection
14 - Audio Mono impedance
15 - Interlock
16 - Mono Preemphasis
17 - Audio Stereo impedenze
18 - Stereo Preemphasis
19 - RDS Program (Optional)

Section Three
INSTALLATION & USE

DELIVERY

Please carefully check TEKO Broadcast delivery box for any punctures or other evidence of damage. If any, please notify TEKO Broadcast as soon as possible.

When unit is delivered as STAND ALONE equipment the following items are included:

- Exciter
- Mains cable - in some countries cable is supplied with one connector only. Customers must use matching connector to adapt to local standard mains socket

The above content could not be included in equipment delivered to Customers already integrated in a system.

OPERATING RECOMMENDATIONS


To prevent failure please strictly follow these **IMPORTANT** recommendations

Ensure that both front and rear part of equipment are properly ventilated. To prevent high temperature inside equipment you must provide adequate ventilation to rack cabinet where equipment is installed (temperature should not exceed 45 °C degrees)

PLEASE NOTE: **Exciter cannot** operate without top cover
The air-cooling system is designed to work in a closed box. Serious OVERHEATING will occur if Exciter operates without top cover

PRELIMINARY SETTINGS

All manual setting are on the rear panel

MONO CHANNEL

Input Impedance Setting and ADJ input Level

Set switch to on 600 or 10K to get the desired input impedance

Trimmer for ADJ AF Input

Preemphasis Mono Channel Setting

Set switch to on Lin-50uS or 75uS to get the desired Preemphasis

INTERLOCK SETTING

Set switch to N.O or N.C
Gli apparati di default vengono settati NO

STEREO CHANNEL OPTIONAL

Input Impedance

Set switch to on 600 or 10K to get the desired input impedance

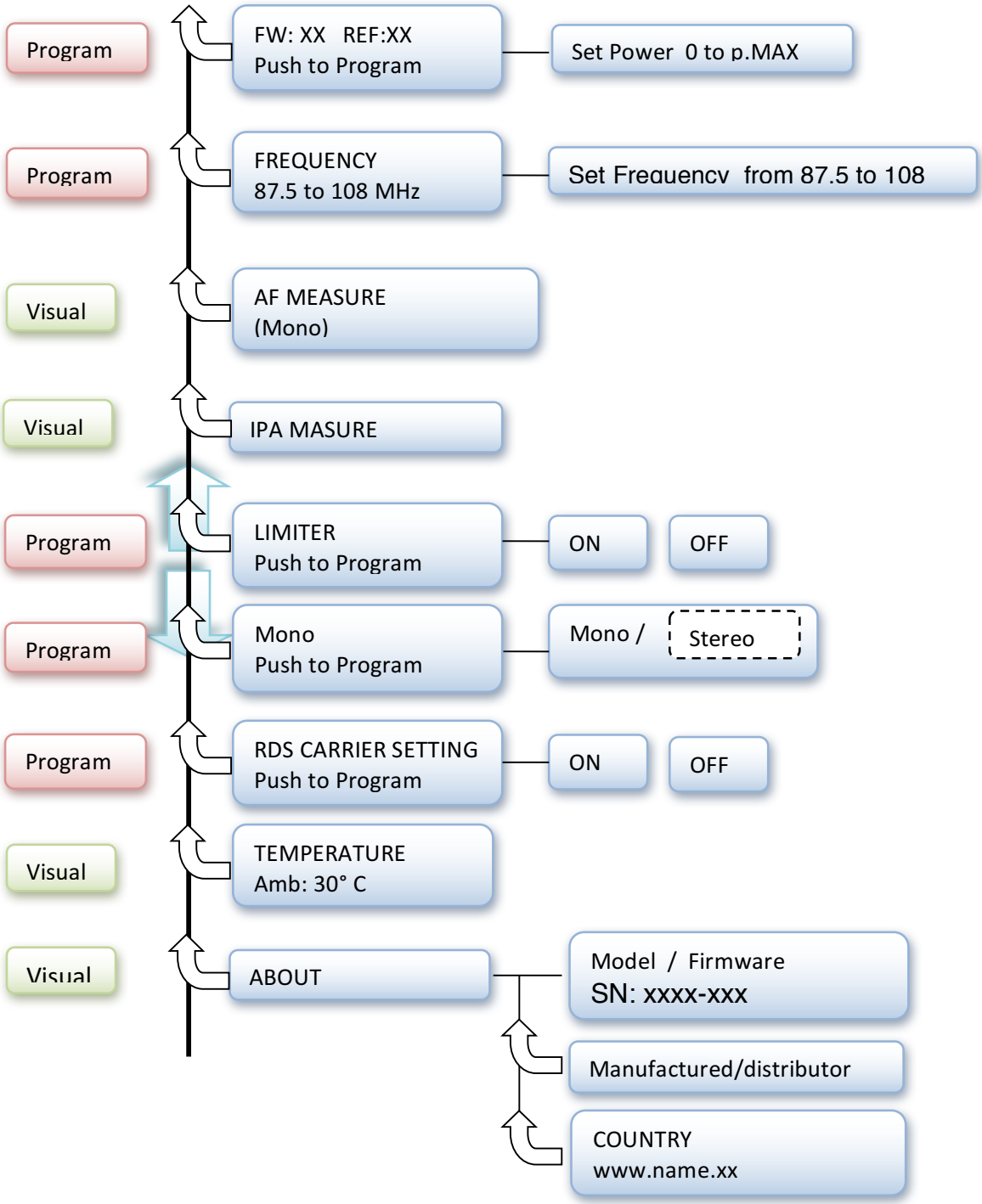
Trimmer for ADJ AF Input.Left & Right channel.

Preemphasis Stereo Channel Setting

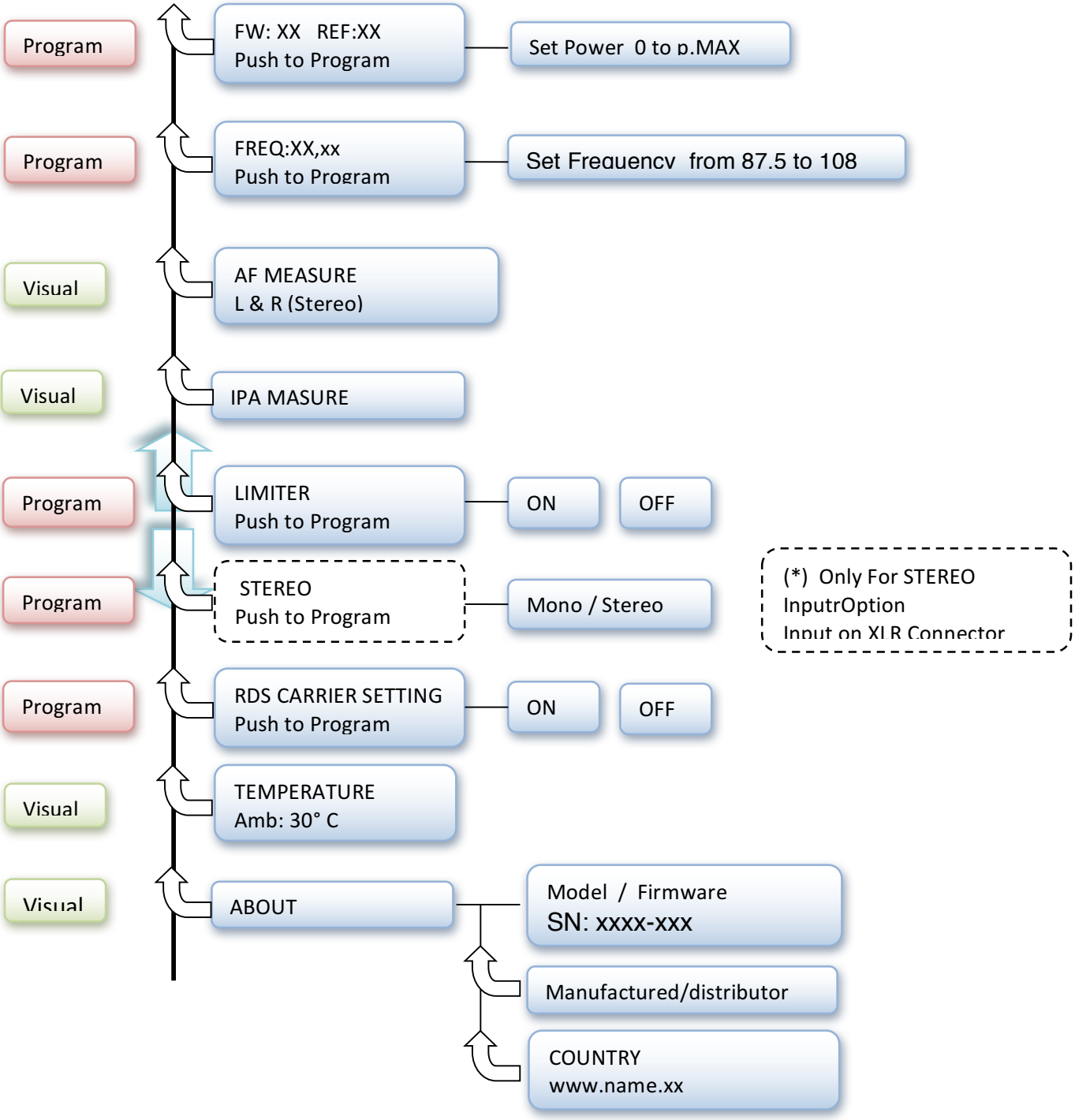
Set switch to on Lin-50uS or 75uS to get the desired Preemphasis

Flow chart Arrows keys SYNAPSE 2G

Software release	V. xxx	date



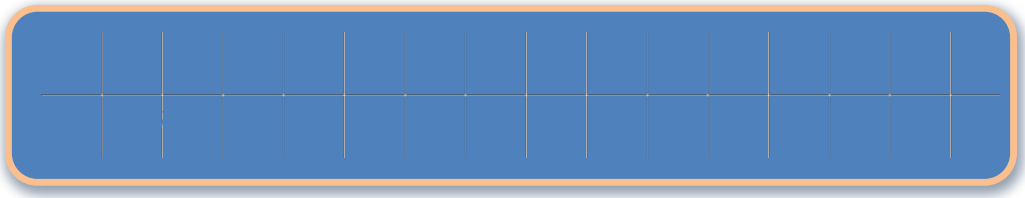
STERO Flow chart Arrows keys SYNAPSE 2G



Section Four
SOFTWARE DESCRIPTION

SWITCH ON

Connect the SYNAPSE30 Exciter to a min 50W dummy load and switch ON by pressing switch located on the rear panel or press the rack switch if Exciter is integrated in a system. The first slide on display reads



SOFTWARE DESCRIPTION

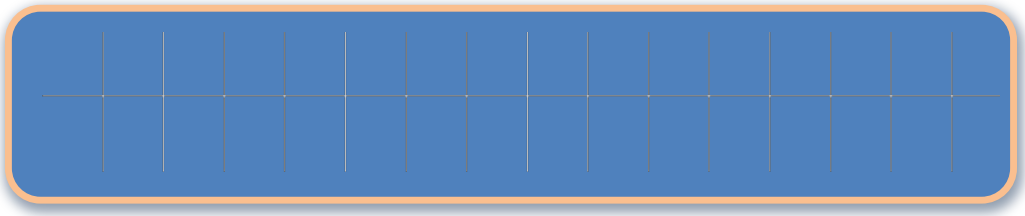
Software is designed to allow readings / settings of several important parameters of the Exciter. It is possible to visualize parameters and other stored data without making changes while Exciter is operating normally. To ensure optimum reading the LCD is placed in the central section of the front panel, it contains two rows holding sixteen characters and visualizes the information listed below by simply rotating the encoder.

PARAMETER READING SLIDES

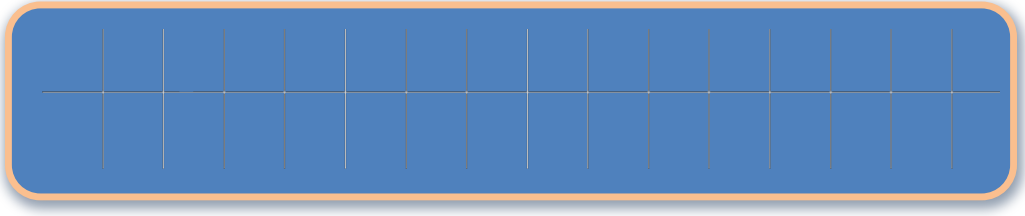
The following slides show the **readings** of the Main Menu:

“ABOUT” SLIDES

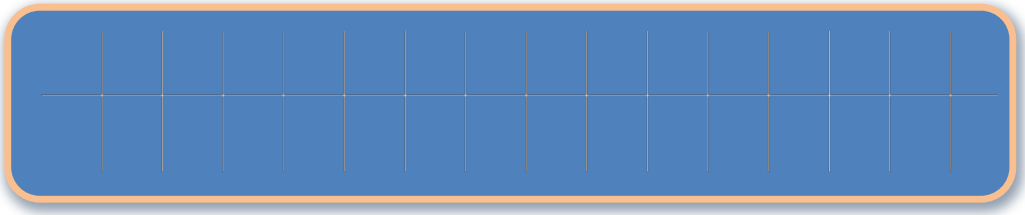
Turn arrows keys to find the ABOUT menu which contains various slides with general information on Exciter’s Model and Serial number, Address and Web site of Manufacturer / Distributor etc.etc.



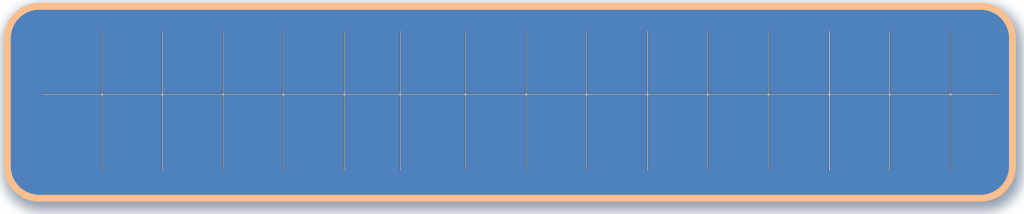
Scrolling down shows Model



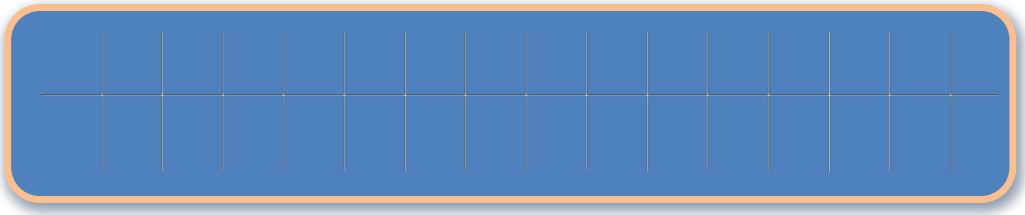
Address and Web site of Manufacturer / Distributor



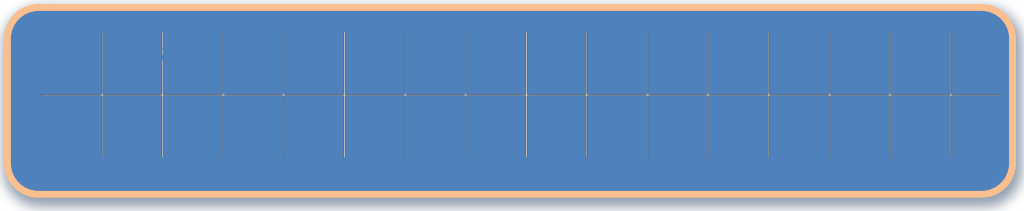
Telephone Number



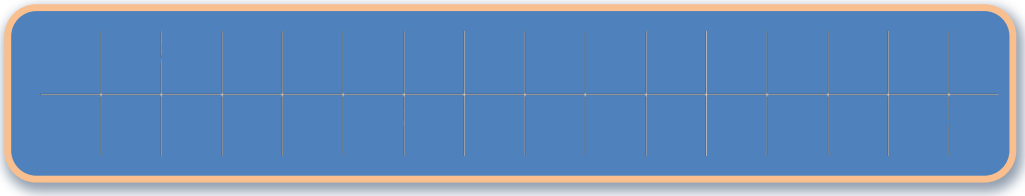
Return to main Menu



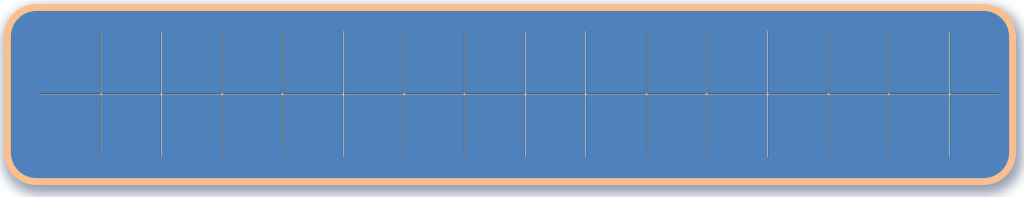
POWER OUTPUT



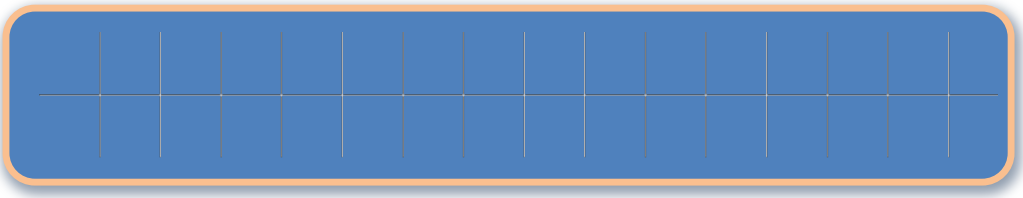
By pushing the Arrows keys the following slide appears:



Turn the encoder to select an appropriate Power level.
Confirm the new value by pushing the knob. The image below will appear :



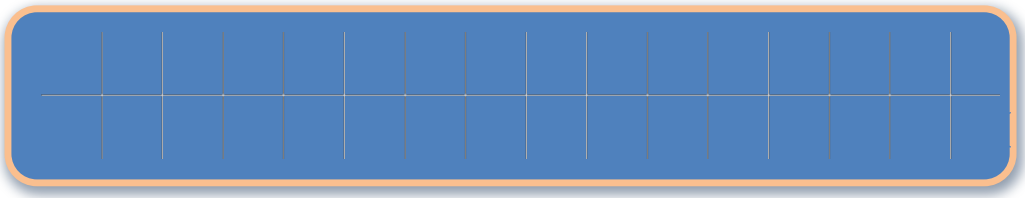
Confirm the choice by pressing YES. The display will show the following slide:



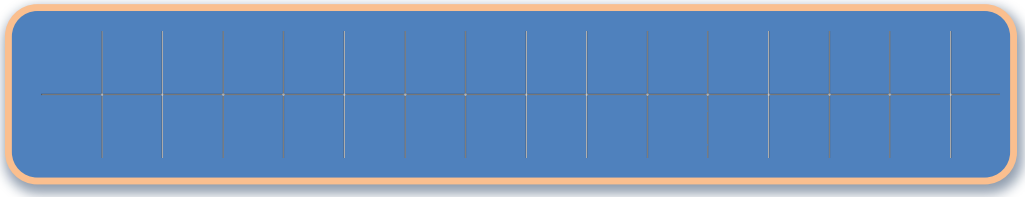
The micro is now storing new data in the memory and has activated the new Power Level.

FREQUENCY SETTING

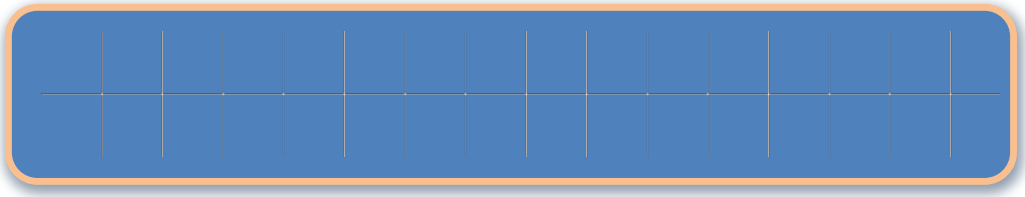
Rotate arrows keys to find slide to program frequency. Push arrows keys as indicated.



Slide below shows current frequency at 105.00 Mhz. Value can be modified when cursor is moved under the relevant character. Turn arrows keys right or left to increase or decrease value.



The range limits are: 87.50 MHz to 108 MHz. The default step is 10 kHz, but upon request, it is possible to choose different step values (i.e. 25 or 50 kHz). Confirm new value and exit routine by pushing the arrows keys.



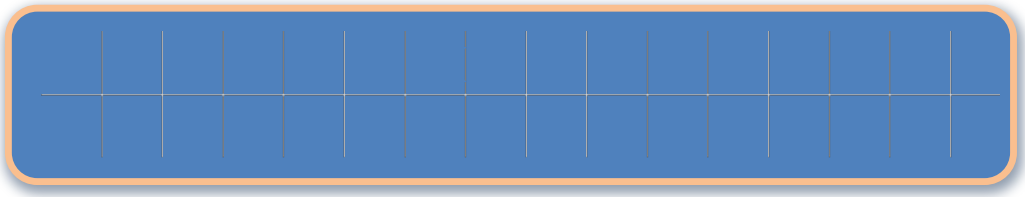
Cursor highlights **NO** selection by default. This is to *inadvertently* prevent pushing the arrows keys and consequently enter a mistaken value.

To validate your change move cursor to **YES** selection and press arrows keys or move cursor to **NO** selection to reject setting.

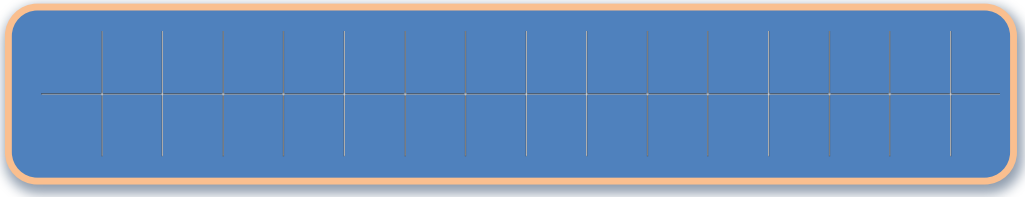
AUDIO MEASURE

The Audio menu shows the following slides:

1) AF measure, (Mono)

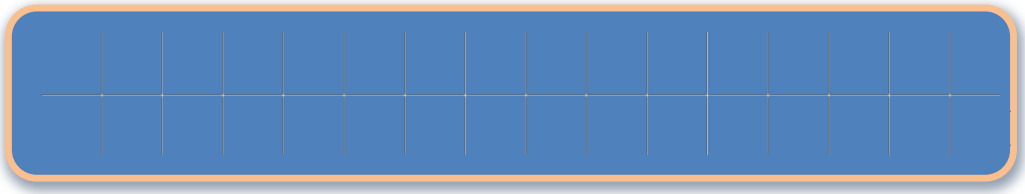


2) AF measure, (STEREO)
L & R bars show the peak modulation. The filled square blocks indicate 10% each of modulation; unfilled block shows 100% modulation **(Only for Stereo code options).**

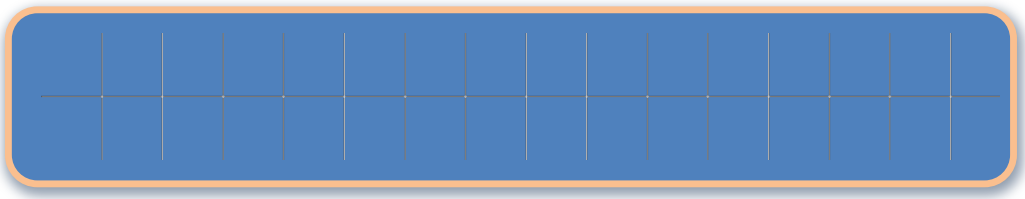


LIMITER SETTING

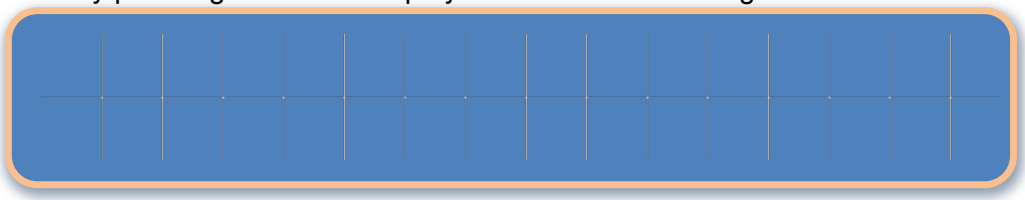
The following image shows the Limiter status and how to switch on or off as required.



Confirm the new value by pushing the knob. The image below will appear :



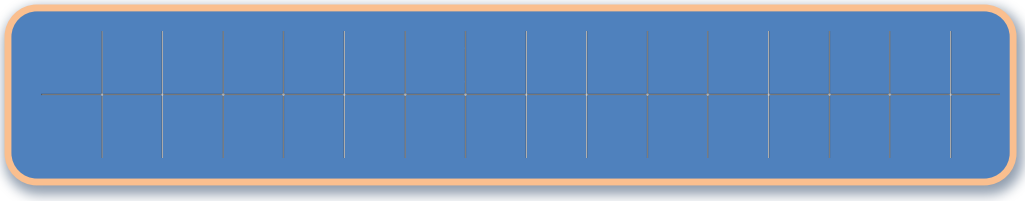
Confirm the choice by pressing YES. The display will show the following slide:



The micro is now storing new data in the memory and has activated the new Limiter status.

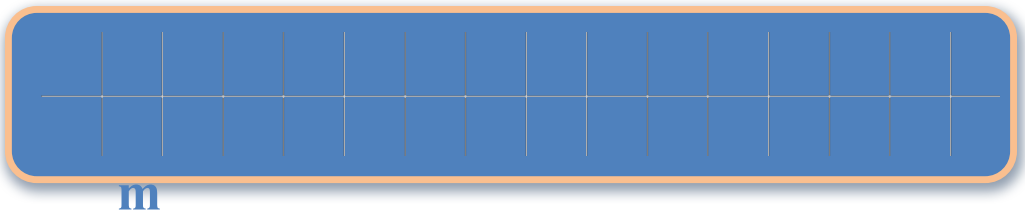
IPA MEASURE

It indicates the current absorbed from the RF POWER stage. IPA current results from the combination of driver and the power amplifier supply consumption. The RF driver section absorbs approx. 300mA and to evaluate the final amplifier current, you must simply subtract 300mA from the total IPA current.



TEMPERATURE READING

The following image shows the Ambient **TEMPERATURE READING**



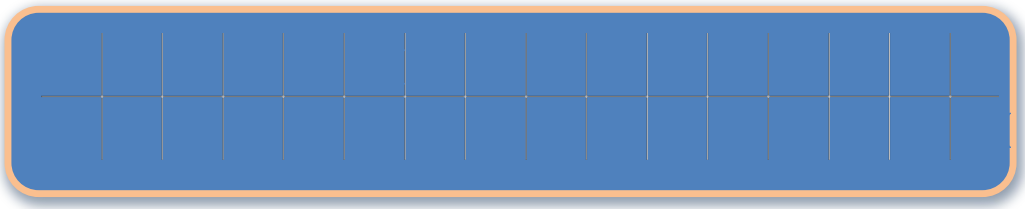
To convert **Celsius** to **Fahrenheit**, please apply the formula below:

°F = (°C x 1.8) + 32

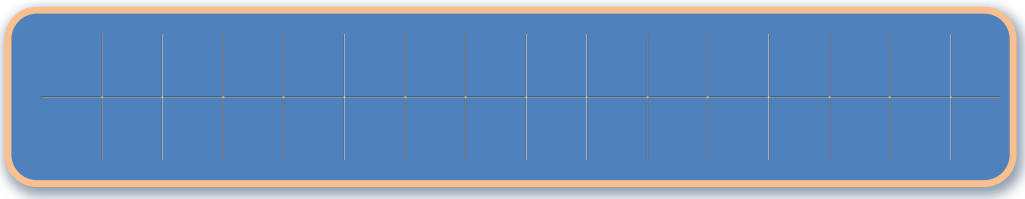
i.e.: 25 °C = 77 °F

MODE SETTINGS MONO/MPX)

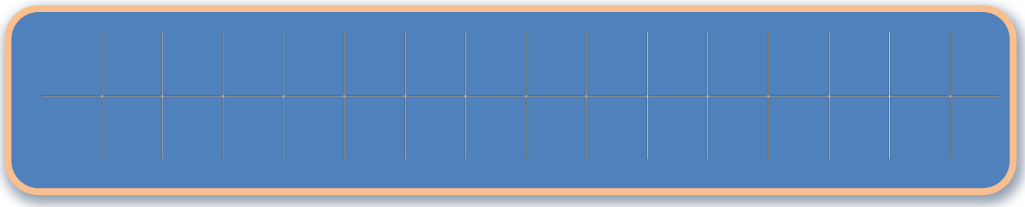
The following image shows the mode that is stored and consequently is “on air”. It also allows the access
to the slides for the mode routine.



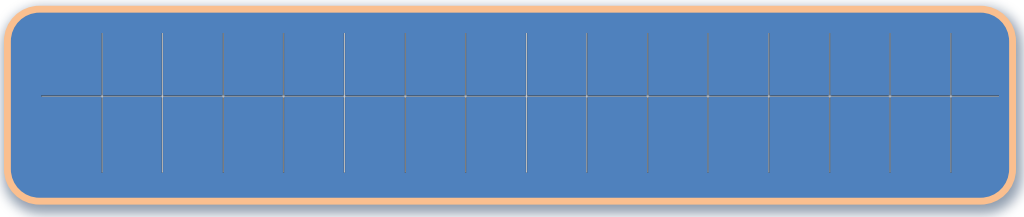
if the board "Stereo" is not present, it is not can continue programming.



Turn the encoder and set Mono or Stereo. Confirm the new value by pushing the knob. The image below will appear on front display:



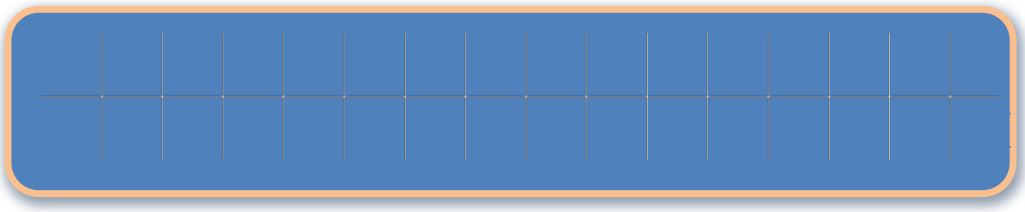
Confirm the choice by pressing YES. The display will show the following slide:



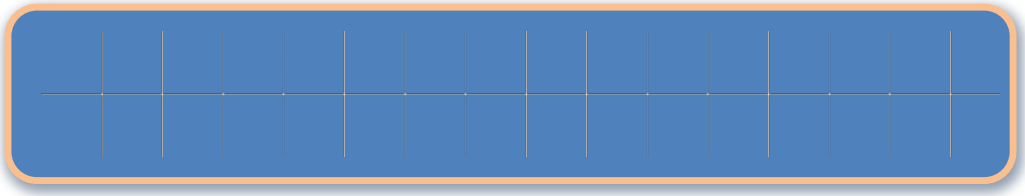
MODE SETTINGS (only for stereo coder option)

Inserire TESTO

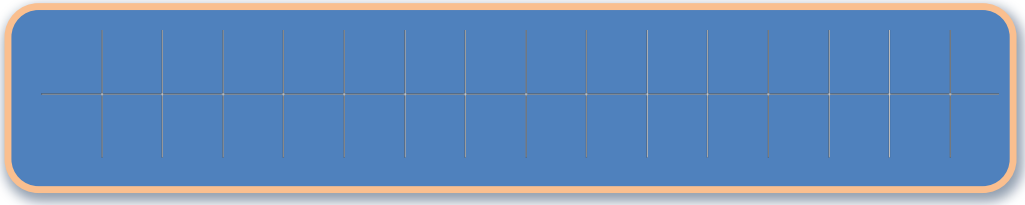
The following image shows the mode that is stored and consequently is “on air”. It also allows the access
to the slides for the mode routine.



By pushing the Arrows keys the following slide appears:



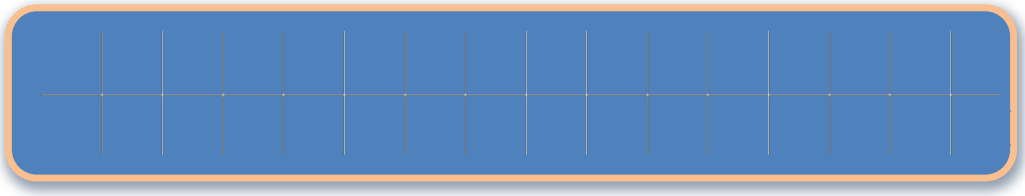
Turn the encoder and set Mono or Stereo. Confirm the new value by pushing the knob. The image below will appear on front display:



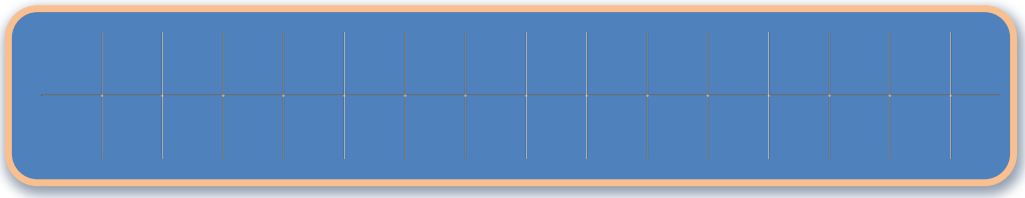
Confirm the choice by pressing YES. The display will show the following slide:

RDS CARRIER SETTING (only for RDS option)

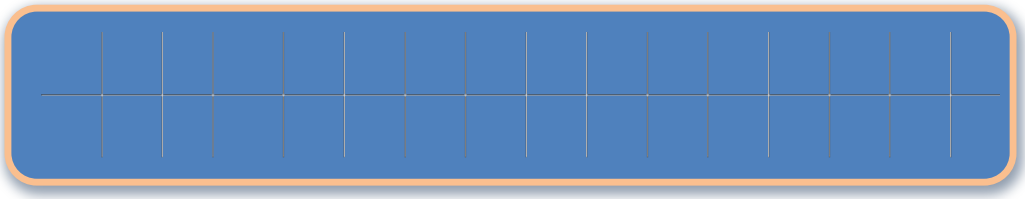
The following image shows the RDS CARRIER status and how to switch on or off as required.



By pushing the Arrows keys it is possible to switch the RDS CARRIER off:
Confirm the new value by pushing the knob. The image below will appear :



Confirm the choice by pressing YES. The display will show the following slide:



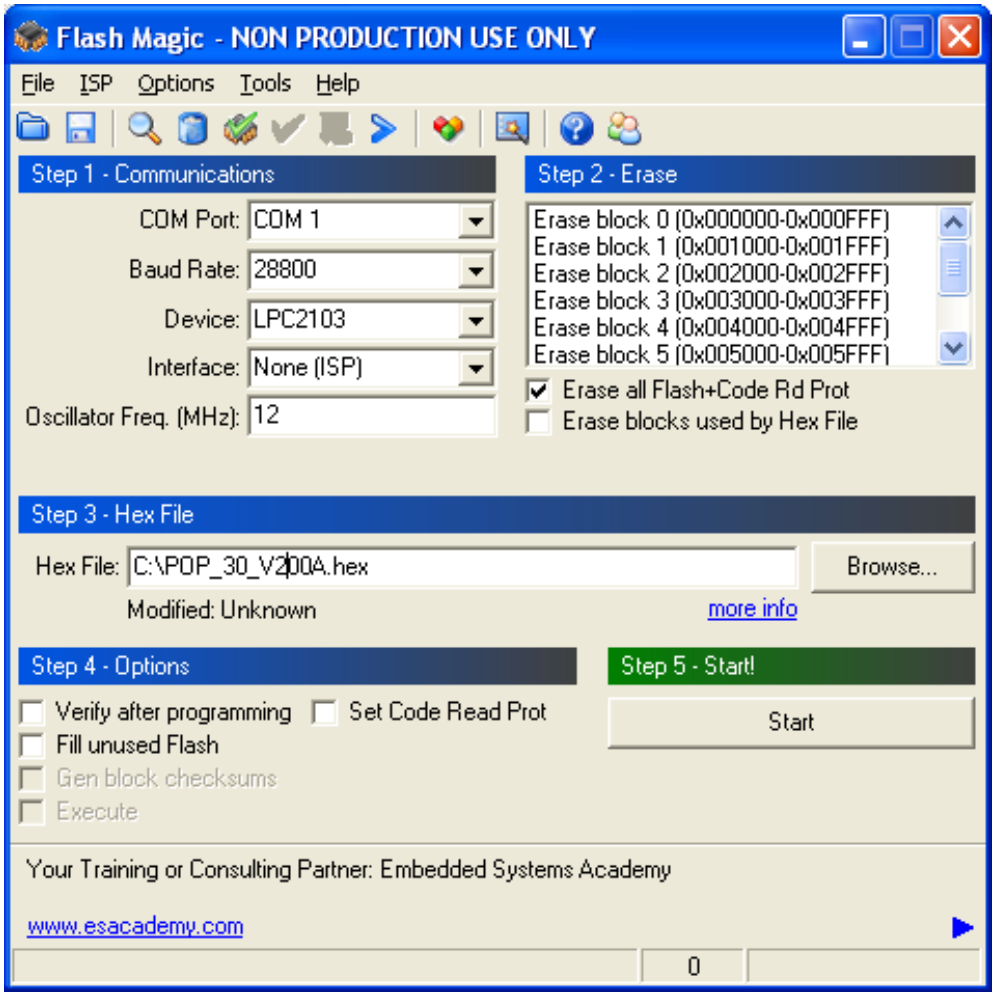
The micro is now storing new data in the memory and has activated the new Limiter status.

SectionFive

SOFTWARE UPDATING

REQUIRED INSTRUMENTS

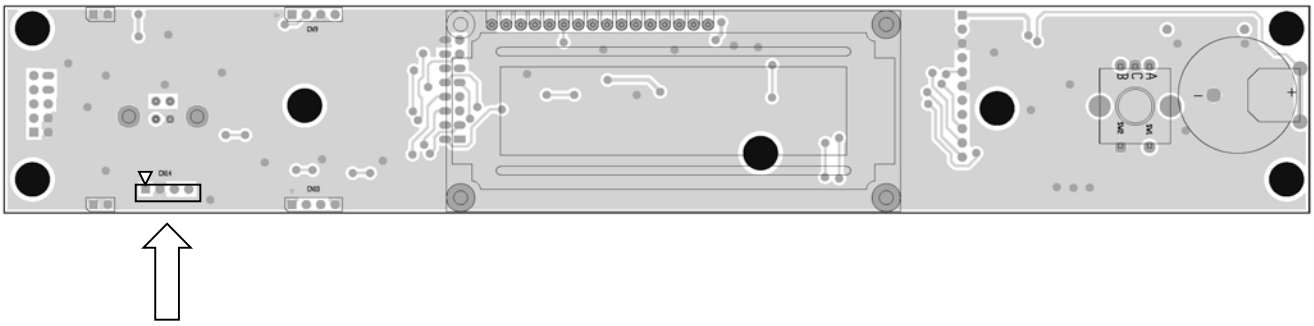
1. Serial cable 232 + Adapter cable
2. Software “Flash Magic” (Download and referred instructions are available on http://www.flashmagictool.com)



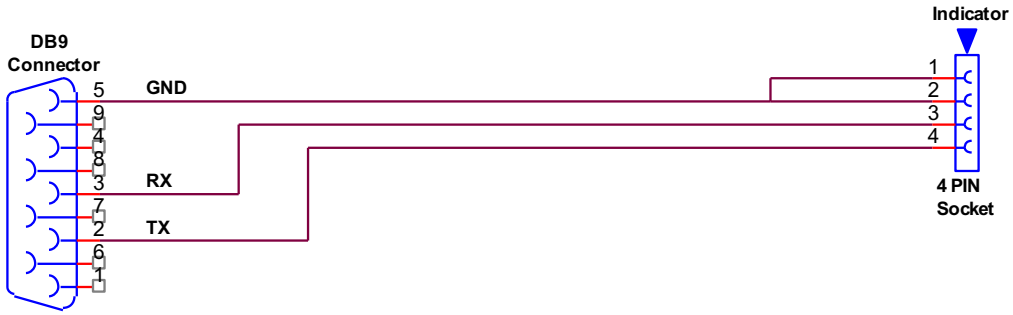
LOAD FIRMWARE

Load firmware:

1) Download the last firmware version available
2) Before switching the exciters on, connect the pin 1 of programming cable to pin 1 of CN14
3) Switch on the exciters
4) Run flash magic and set “Step 1 and Step 2”, as described in the figure shown in previous page
5) At “Step 3” link the Software file
6) Push Start and the updating will start



Programming cable



Section Six

SERVICE & MAINTENANCE

EXCITER SUBSYSTEMS

The Exciter is built using the following parts which are replaceable units:

N°item	Description	Code Spare part
1	Mainboard with RF Power and Filter	SDM00810 – SYNAPSE30 MAINBOARD
2	Logic & Display Board	SDI03601 – SYNAPSE30 1HE uP BOARD SDI03602 – SYNAPSE30 DISPLAY BOARD SDI03604 – SYNAPSE30 1HE LED BOARD
3	AC/DC Power Supply 100-240Vac in 27V-3.8A	APA00060
4	Compact DC Blower 24V 0.27A	ZBD00010
5	RDS Module (Optional)	SDZ00100 - RDS – BOARD
6	Stereo Coder Module (Optional)	SDI03100 – SYNAPSE30 STEREOCODER BOARD
7	VDE Socket with filter	JAH00100
8	24 VDC Blower	ZBD00010

Parts Overview