EXHIBIT 2b

INSTRUCTION MANUAL 651186400B

SAIP-750 Series

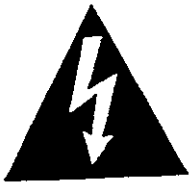
Agile Input, Channelized Agile Output Heterodyne Processor

SAIP-MF	Stock No. 5885
SAIP-40-750	Stock No. 5886
SAIP-40-750 UHF Out	Stock No. U5886
SAIP-60-750	Stock No. 5876
SAIP-60-750 UHF Out	Stock No. U5876
OFM-750-40	Stock No. 7984
OFM-750-U40	Stock No. U7984
OFM-750-60	Stock No. 7985
OFM-750-U60	Stock No. U7985

MADE IN USA

BLONDER TONGUE LABORATORIES, INC.
One Jake Brown Road, P.O. Box 1000
Old Bridge, NJ 08857-1000 USA
Tel: (732) 679-4000
Fax: (732) 679-4353

The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert you to the presence of uninsulated "dangerous voltage" within the products enclosure that may be of sufficient magnitude to constitute a risk of electrical shock to persons.



CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

The exclamation point within an equilateral triangle is intended to alert you to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER FROM THIS UNIT. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL. SEE ADDITIONAL SAFETY INSTRUCTIONS BELOW.

NOTE TO CATV SYSTEM INSTALLER

This reminder is provided to call the CATV System Installers attention to Article 820-40 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

IMPORTANT SAFEGUARDS

1. **Read Instructions** - All the safety and operating instructions should be read before this product is operated.
2. **Retain Instructions** - The safety and operating instructions should be retained for future reference.
3. **Heed Warnings** - All warnings on the product and in the operating instructions should be adhered to.
4. **Follow Instructions** - All operating and use instructions should be followed.
5. **Cleaning** - Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
6. **Attachments** - Do not use attachments not recommended by Blonder Tongue as they may cause hazards.
7. **Water and Moisture** - Do not use this product near water - for example, near a bath tub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool, and the like. Refer to individual instruction manuals included with products designed for indoor use only. Do not expose these products to rain or moisture.
8. **Accessories** - Do not place this product on an unstable cart, stand, bracket, or table. The product may fall, causing serious injury to a child or adult, and serious damage to the product. Use only with a cart, stand, bracket, or table recommended by Blonder Tongue. Any mounting of the product should follow the instructions, and should use a mounting accessory recommended by Blonder Tongue.
9.  A product and cart combination should be moved with care. Quick stops, excessive force and uneven surfaces may cause the product and cart combination to overturn.
10. **Ventilation** - Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided or the instructions are adhered to.
11. **Power Sources** - This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your home or business, consult your dealer or local power company. For products intended to operate from battery power, or other sources, refer to the operating instructions.
12. **Grounding or Polarization** - If this product is equipped with a 3-wire grounding-type plug, a plug having a third (grounding) pin, the plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding-type plug.

651130300 G

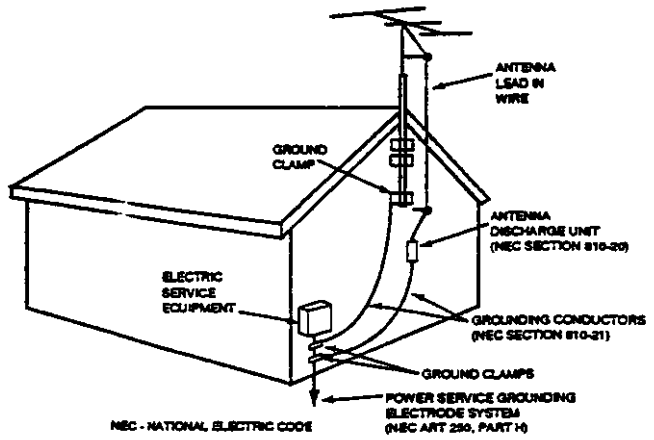
BLONDER TONGUE LABORATORIES, INC.
One Jake Brown Road, P.O. Box 1000
Old Bridge, NJ 08857-1000 USA
Tel: (732) 679-4000
Fax: (732) 679-4353

If this video product is equipped with a polarized alternating-current line plug (a plug having one blade wider than the other), the plug will fit into the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug.

13. **Power Cord Protection** - Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the unit.
14. **Lightning** - For added protection for this product during a lightning storm or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the product due to lightning and power-line-surges.
15. **Power Lines** - An outside antenna system should not be located in the vicinity of overhead power lines or other electric light or power circuits, or where it can fall into such power lines or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching such power lines or circuits as contact with them might be fatal.
16. **Overloading** - Do not overload wall outlets and extension cords as this can result in a risk of fire or electric shock.
17. **Object and Liquid Entry** - Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.
18. **Servicing** - Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.
19. **Damage Requiring Service** - Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
    a. When the power-supply cord or plug is damaged.
    b. If liquid has been spilled, or objects have fallen into the product.
    c. If the product has been exposed to rain or water.
    d. If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
    e. If the product has been dropped or the cabinet has been damaged.
    f. When the product exhibits a distinct change in performance-this indicates a need for service.
20. **Replacement Parts** - When replacement parts are required, be sure the service technician has used replacement parts specified by Blonder Tongue or have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock or other hazards.
21. **Safety Check** - Upon completion of any service or repairs to this product ask the service technician to perform safety checks to determine that the product is in proper operating condition.
22. **Outdoor Antenna Grounding** - If an outside antenna or cable system is connected to the product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Section 810 of the National Electrical Code, ANSI/NFPA No. 70, provides information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.

See notes and diagram below.

EXAMPLE OF ANTENNA GROUNDING AS PER NATIONAL ELECTRICAL CODE INSTRUCTIONS



1. Drill a hole in wall (Careful! there are wires in that wall!) near set just large enough to permit entry of cable.
2. Punch cable through hole and form a rain drip loop close to where it enters house.
3. Put a small amount of caulking around cable where it enters house to keep out drafts.
4. Install static electricity discharge unit.
5. Connect antenna cable to set.

The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert you to the presence of un-insulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

CAUTION

RISK OF ELECTRIC SHOCK DO NOT OPEN

The exclamation point within an equilateral triangle is intended to alert you to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER FROM THIS UNIT. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE

NOTE TO CATV SYSTEM INSTALLER

This reminder is provided to call the CATV System Installers attention to Article 820-40 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

EQUIPMENT DESCRIPTION

GENERAL

The SAIP 750 is a single channel processor in the 750 Series of professional quality channelized output headend products. The SAIP Series are input frequency agile TV channel processors that provide visual and aural RF carrier outputs on individual Broadcast or CATV channels in the full 750 MHz output frequency range. The processor mainframe (Stock No. 5885) contains the linear power supply, the fully agile RF to IF input converter and the fully agile IF to RF output converter. A low cost removable single channel output filter module provides exceptionally low out of band noise that permits the construction of multiple channel headends without auxiliary filtering. The output modules are availbie in +40 dBmV and +60 dBmV versions.The 7984 (+40 dBmV) and the 7995 (+60 dBmV) modules are ordered by the CATV output channel. The U7984 and the U7985 models are ordered by the UHF output channel.

Efficient AGC assures a wide dynamic range and dual SAW filters provide superior selectivity. DIP switches for setting the input frequency are accessible from the front panel, as are the A/V ratio and output level control. Two tuner IF flatness controls are located adjacent to the input dip switches. The output frequency dip switches are set internally corresponding to the channel of the output filter module installed.

An external IF loop-thru enables the replacement of the standard IF signal with an alternate source of composite IF (such as an all-call system) or the insertion of IF scrambling equipment. An on-board carrier substitution generator is automatically activated upon loss of input signal.

ELECTRICAL

A block diagram of the SAIP is shown on page 2.. All primary processor functions are carried out on three printed circuit boards. The Input Converter PCB selects and converts the incoming RF signal to the IF frequency, then filters and provides a gain control signal back to the input amplifiers. The Output Converter PCB converts the IF signal to the final RF frequency. The Output filter module amplifies the chosen channel and bandpass filters the signal.

On the Input Converter PCB, the RF signal is applied to a PLL controlled (set by DIP switches) UHF/ VHF/ CATV tuner. The 41 to 47 MHz IF output from the tuner is amplified and filtered by two SAW filters. The resulting signal is sensed by a detector that develops an AGC voltage to control the gain of the tuner and IF amplifier. The resulting IF output level is steady regardless of changing input levels. The absence of an incoming signal activates an oscillator that substitutes an un-modulated signal at the IF visual carrier frequency.

The IF carriers are externally looped to the synthesized upconverter board. The crystal controlled synthesized oscillator frequency is selected via dip switches. Positive or negative offsets of 12.5 kHz or 25 kHz may be applied via the internal dip switches. The double balanced mixer output is amplified and coupled with 12 Vdc for connection to the Output Filter Module (stock #7984 or 7985).

The channelized Output Filter Module receives the RF signal from the upconverter where it is amplified and bandpass filtered. A multi-turn bridge-T attenuator assures flat level adjustment and excellent return loss to the final drive amplifier. A low loss two stage bandpass filter follows the final amplifier for maximum out of band carrier to noise performance.

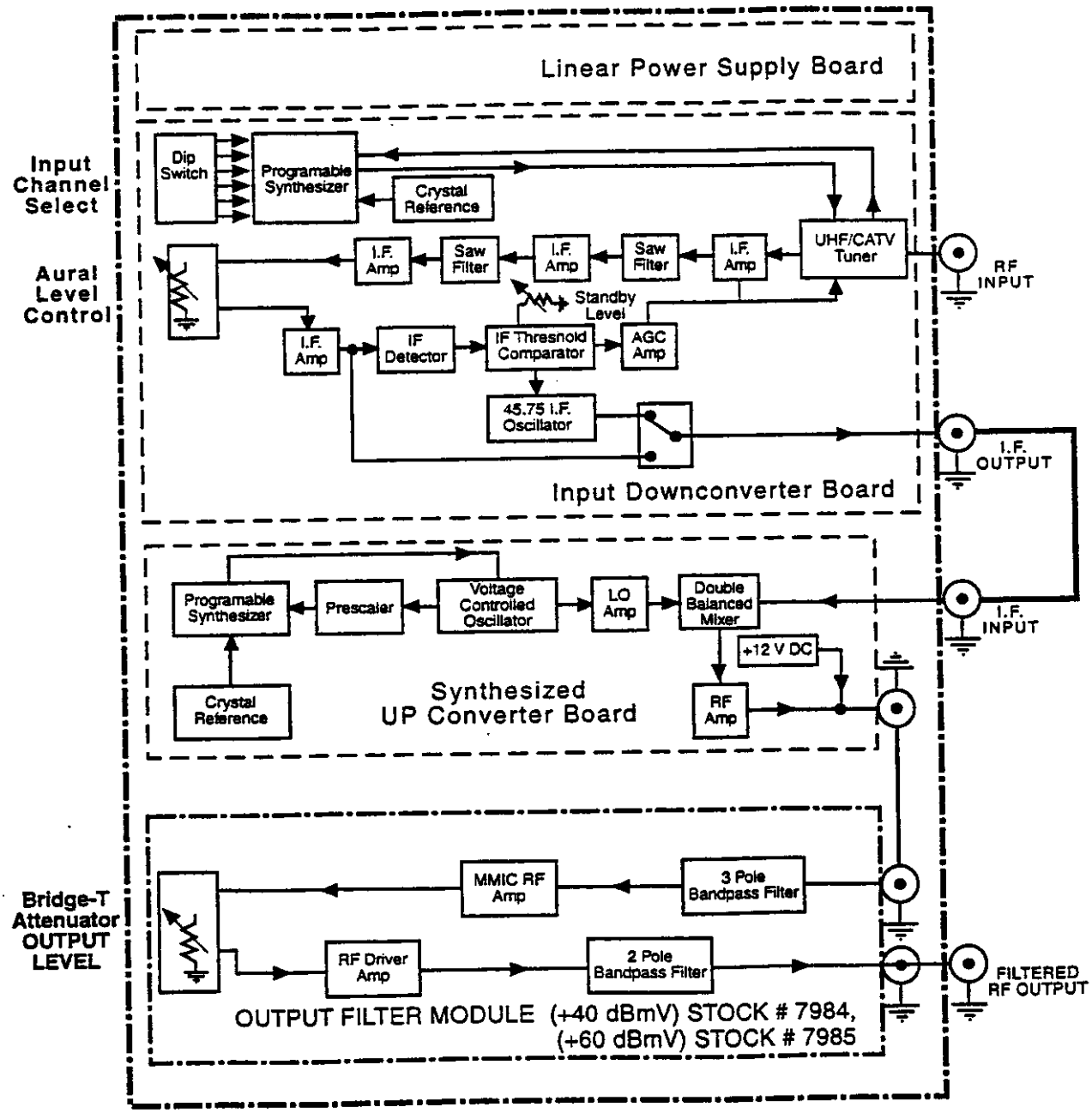
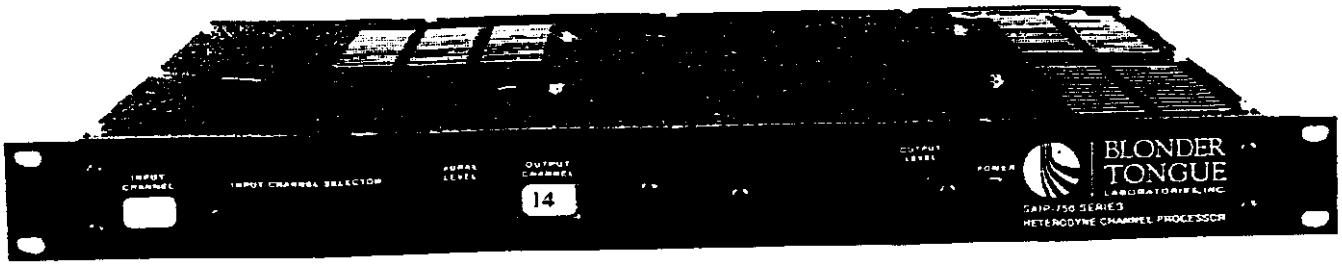


Figure 1 Complete Processor Block Diagram



SPECIFICATIONS (Typical)

RF

Frequency Range Input: ..... 50-806 MHz
including VHF, UHF, and CATV channels

Frequency Range Output: ..... 50-750 MHz
including VHF, UHF, and CATV channels

Noise Figure: ..... 8 to 11 dB

Output Level SAIP-40 Ch 2-78: .....+42 dBmV
Ch 79-117 .....+40 dBmV

Output Level SAIP-60 Ch 2-78: .....+60 dBmV
Ch 79-117 .....+58 dBmV

Output Level Range: ..... 15 dB
continuously adjustable

Aural/Visual Carrier Ratio: ..... 0 to -10 dB
from input signal, continuously adjustable

Visual Carrier Frequency Tolerance: ..... ±5 kHz

Bandpass Flatness: .....±1.5 dB

Adjacent Channel Rejection: -65 dBc, (A/V = -15 dB)

Spurious Outputs: ..... -60 dBc minimum

Out-of-Band C/N: ..... >100 dB

Intermod Distortion: (3 tone 920 kHz beat)
@ sound = -15 dB, color = -25 dB: ..... -64 dB

Intercarrier Beat:
(fv - 4.5 MHz, @ sound = -15 dB) ..... -66 dB

AGC Stiffness: ..... < 1 dB output Δ for 40 dB input Δ

Output Return Loss: ..... 15 dB

Carrier Substitution:
Active @ ..... input below -15 dBmV
Substitution Threshold: adjustable -10 to -20 dBmV
Long Term Accuracy: ..... ± 2 dB

IF

Frequency: ..... 45.750 MHz
Output Level: .....+30 dBmV
Input Level Range: ..... +25 to +32 dBmV
In/Out Return Loss: ..... 12 dB

GENERAL

Power Requirements: ..... 117 VAC, ±10 %, 60 Hz
Fuse: ..... 3/8 A, Slo-Blo.
Temperature Range: ..... 0° to +50° C

MECHANICAL

Dimensions (WxHxD) : ..... 19.00" x 1.75" x 9.50"
Weight: ..... 8.00 lbs (2.73 kg)

CONNECTORS / IMPEDANCE

RF Input: .....75 ohm "F" type, female
IF IN/ OUT: .....75 ohm "F" type, female
RF Output: .....75 ohm "F" type, female

CONTROLS

Input Channel Selection: ... 18 position DIP Switches
Output Channel Selection: 18 position DIP Switches
Aural Carrier Level: ..... Pot
RF Output Level: ..... Bridge T Attenuator

INDICATORS

Power ON: .....LED, red

NOTE TO CATV SYSTEM INSTALLER

This reminder is provided to call the CATV System Installer's attention to Article 820-40 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

UNPACKING AND HANDLING

UNPACKING. Each unit is shipped with all equipment assembled, wired, factory tested, and then packaged in an appropriate shipping container.
Ensure that all accessories are removed from the container and packing material before they are discarded.

MECHANICAL INSPECTION

Inspect the front and rear of the equipment for shipping damage. Make sure the equipment is clean, and no wires, cables, or connectors are broken, damaged or loose.

DAMAGE IN SHIPMENT

Should damage be discovered after unpacking the system, immediately file a claim with the carrier. A full report of the damage shall be made and a copy forwarded to **BLONDER TONGUE LABORATORIES, INC.** The company will then advise what disposition is to be made of the equipment.

PRECAUTIONS

Adherence to the initial installation precautions outlined in the Table below will help prevent problems arising during the installation and future maintenance of the unit.

Installation Precautions Table

PRECAUTION	REQUIREMENT
Ensure easy access to rack wiring	Allow a minimum of 18 inches behind the equipment rack(s).
Facilitate servicing and maintenance.	Allow a minimum of 36" of clearance in front of the equipment rack(s).
Avoid direct heating or Air conditioning	If unavoidable, use deflector plates
AC power source outlets.	Locate equipment near sufficient outlets to provide power of test equipment and power tools.
Rack Support	Make certain rack supports are sufficiently rigid to support rack(s).
Building leakage.	Beware of dripping water onto equipment from leaky roofs, waveguide roof entries, and cold water pipe condensations.

OPERATING CONTROLS

All operating controls are located on, or are accessible from the front panel.

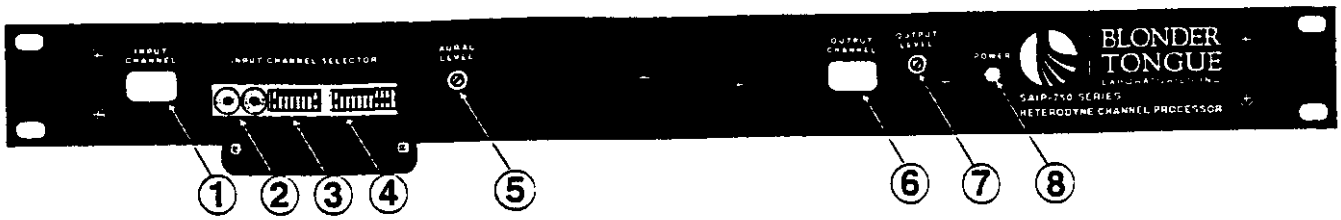


Figure 2 Front Panel Controls & Indicators

1. **INPUT CHANNEL LABEL** - Attached by user for reference.
2. **INPUT IF Flatness** - Allows adjustment of tuner output for optimum video flatness.
3. & 4. **FREQUENCY SELECTOR SWITCHES** - Sets the frequency of the visual carrier of the INPUT CHANNEL. Switch bank 1 is on the left.
5. **AURAL LEVEL** - Attenuates amplitude of aural RF carrier relative to visual RF carrier.
6. **OUTPUT CHANNEL LABEL** - The channel number label from the Output Filter Module is placed here.
7. **OUTPUT LEVEL** - The Bridge-T pot simultaneously adjusts the amplitude of aural and visual carriers to the final drive amplifier.
8. **POWER** - Power On Indicator Light

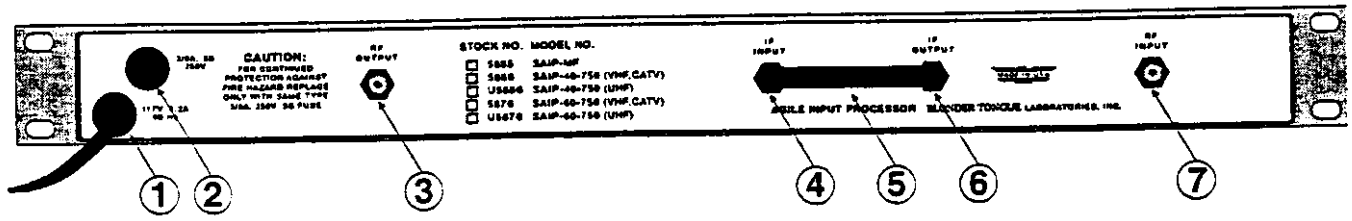


Figure 3 Rear Panel Processor Connections

PROCESSOR CONNECTIONS

All the connectors on the Processor are located on the rear panel.

1. **Line Cord**- Standard three conductor grounded power cord
2. **Fuse** - 3/8 Amp slow blow fuse
3. **RF OUTPUT** - The filtered RF signal is available for connection to a headend combiner.
4. **I.F. IN** - The composite IF signal is looped to the upconverter.
5. **I.F. Jumper** - An F to F jumper cable is provided to loop the IF Out to the IF IN.
6. **I.F. Out** - The combined SAW filtered modulated I.F. signal (visual 45.75 MHz and aural 41.25 MHz) appears at this port.
7. **RF INPUT** - Input signal from antenna, preamplifier or CATV feed.

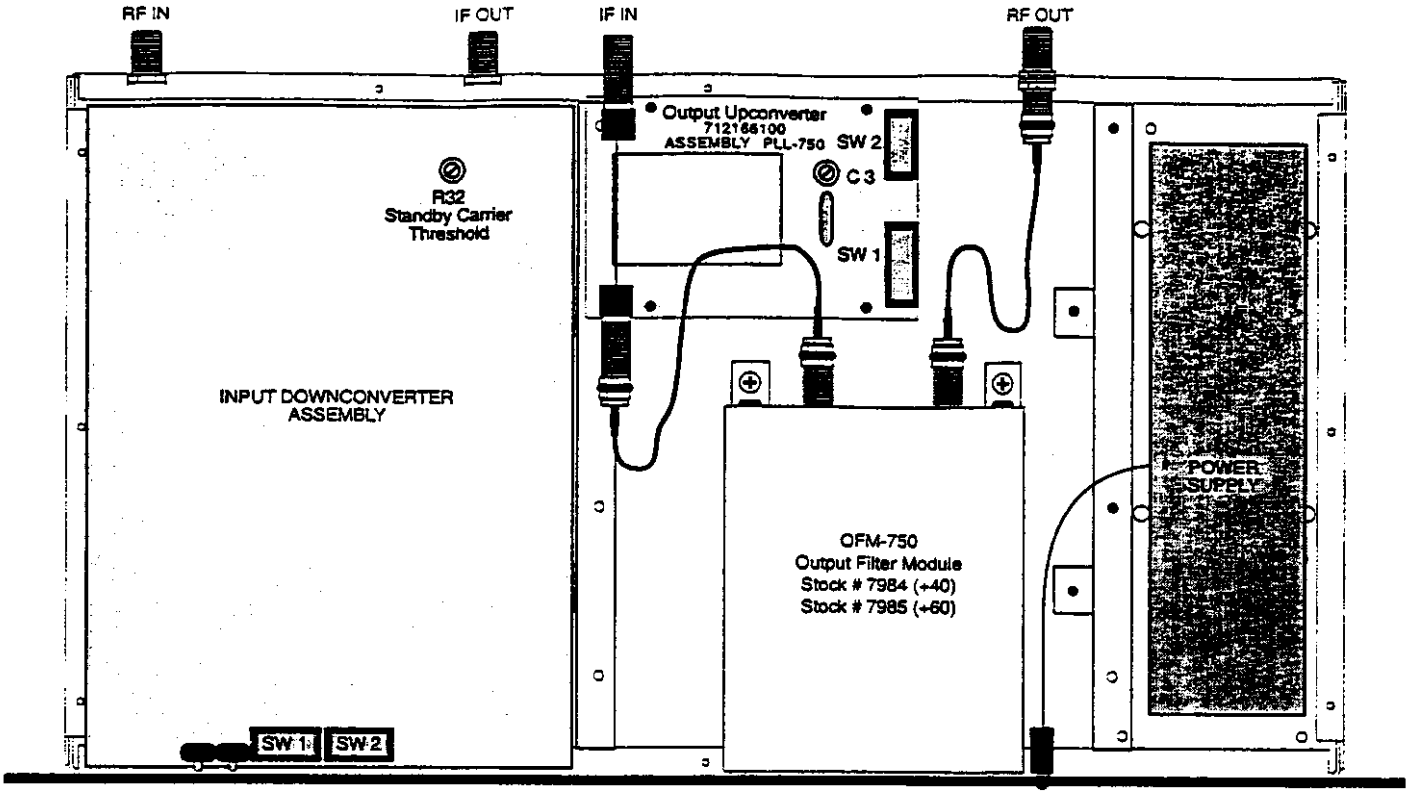


Figure 4 Internal Processor Connections

PROCESSOR INTERNAL CONNECTIONS AND CONTROLS

Figure 4 shows the processor with the cover removed. One unique feature of the processor is the channelized output filter module (OFM). The excellent out of band carrier to noise can be attributed to the OFM. Output channel selection is made by replacement of the OFM and selection of the Upconverter dip switches. With the cover removed, the OFM can be replaced by loosening the two "F" cables and removing the two screws securing the OFM to the front of the chassis and two screws securing the OFM to the inner chassis.

OUTPUT FRE UENCY OFFSETS

Off air television signals may have offsets when two transmitters of the same channel are within the range of interference. For example San Diego channel 3 and Tucson Channel 3 have 10 kHz offsets; Tucson +10 kHz, San Diego -10 kHz.

When converting to an output channel in the aeronautical band, offsets of either 12.5 kHz or 25 kHz are required. The table on pages 14 to 16 lists the output converter switch settings for the standard cable TV and broadcast TV channel assignments. **0= UP = OFF (as labeled on the switch).** The LO frequency is the sum weighting of the switches in the UP position. ± 2.5 kHz offsets can be made by adjustment of C4 on the Upconverter Assembly. The weighting of the specific switches are provided below:

Switch Bank 1

Switch#	Weight	Switch#	Weight
1	0.8 MHz	6	25.6 MHz
2	1.6 MHz	7	51.2 MHz
3	3.2 MHz	8	102.4 MHz
4	6.4 MHz	9	204.8 MHz
5	12.8 MHz	10	409.6 MHz

Switch Bank 2

Switch#	Weight	Switch#	Weight
1	VCO BandSwitch	5	50 kHz
2	VCO BandSwitch	6	100 kHz
3	12.5 kHz	7	200 kHz
4	25.0 kHz	8	400 kHz

To obtain a +12.5 kHz offset, move Switch Bank 2, switch #3 **UP.** If the switch is already in the UP position, move Switch Bank 2, switch #4 **UP &** move Switch Bank 2, switch #3 **DOWN.** (This adds 25 kHz and subtracts 12.5 kHz.)

PREPARATION FOR USE

Plug in the 3-prong connector of the AC power cord into a suitable 117 V 60 Hz AC outlet of adequate current carrying capacity. Use appropriate cables (75 Ohm coaxial) to connect the RF Signal source to the RF Input of the unit and the RF output of the unit to the system input. Make sure that the IF coaxial jumper cable is in place, connecting the IF input and the IF output.

OPERATION

INPUT CHANNEL SELECTION

Gently pull both retaining clips of the left side access door simultaneously to expose the channel selector switches. Using an appropriate tool (or a ballpoint pen) set each individual switch of both DIP switches (a total of 16) either UP or DOWN according to one of the applicable INPUT channel charts (Standard, HRC or UHF) in this manual. After setting, re-secure the access door to prevent inadvertent tampering and/or possible ingress of dust and dirt.

OUTPUT CHANNEL SELECTION

The output channel is factory preset to the output channel ordered. Changing the output channel requires replacement of the Output Filter Module (stock #7984, U7984, 7985 or U7985). The filter is ordered to the desired output channel. Inside the cover the upconverter dip switch settings must be changed to correspond to the settings identified on the Output Filter Module. The dip switch settings may also be found on pages 14 through 16 of this manual.

ADJUSTMENTS

OUTPUT LEVEL - Connect a suitable RF indicator such as a Field Strength Meter (tuned to the visual carrier frequency) or a Spectrum Analyzer to the RF output of the modulator or a system monitor point and adjust the Output Level control for the required reading of video carrier amplitude.

A/V CARRIER RATIO - To adjust the aural-to-visual carrier ratio, tune the RF indicator device to the aural carrier frequency and adjust the Aural Level control to obtain the desired aural carrier level. Note that you cannot obtain a ratio smaller (that is, the aural level relatively higher) than that of the incoming RF signal. Recommended ratio is -15 dB.

FREQUENCY OFFSETS - If the chosen output channel of the processor is subject to FCC mandated aeronautical offsets (see the output frequency settings charts on pages 14 through 16) adjustment of the output upconverter frequency may be required. The reason that adjustment may be required is due to possible offsets on the input channel. Some TV stations across the USA are offset by either + 10 kHz or -10kHz. BLONDER TONGUE sets the output upconverter frequency based upon no input offset.

The following procedures require that the unit be powered for 30 minutes prior to making adjustments.

FREQUENCY RESPONSE - The frequency response adjust controls are factory set for optimum response over all input channels. However, channel flatness can be improved for a particular input/ output channel combination by adjusting front panel controls R66 and R70.

1. Tune the SAIP Processor to the desired input channel.

2. Using proper flatness measurement equipment, observe the channel flatness.

3. Slightly adjust the front panel control R66 on the left and observe the flatness. R66 controls the flatness amplitude at the frequency set by R70, the pot next to the dip switch. If the flatness does not improve, adjust R70 then vary R66 while observing the RF flatness.

STANDBY CARRIER

THRESHOLD - The Standby Carrier Threshold is factory-set for -15 dBmV. If it is necessary to set the threshold to some other level, proceed as follows before installing the SAIP Processor in its rack or cabinet.

1. Tune the SAIP Processor to the desired input channel.

2. Connect a television receiver (tuned to the output channel) to the rear-panel RF OUT terminal; use the RF OUT control and attenuators as required to avoid overloading the receiver.

3. Using a variable attenuator and a signal level meter, adjust the input signal to the desired threshold level. Connect the input signal to the RF INPUT terminal.

4. Refer to the Figure below and locate the Threshold Control, R32.

5. Adjust R32 so that the picture just switches between the input signal and the standby carrier. Use the television receiver as an indicator.

6. After making the adjustment, disconnect the power cord and input and output cabling.

7. Install the unit in its mounting location.

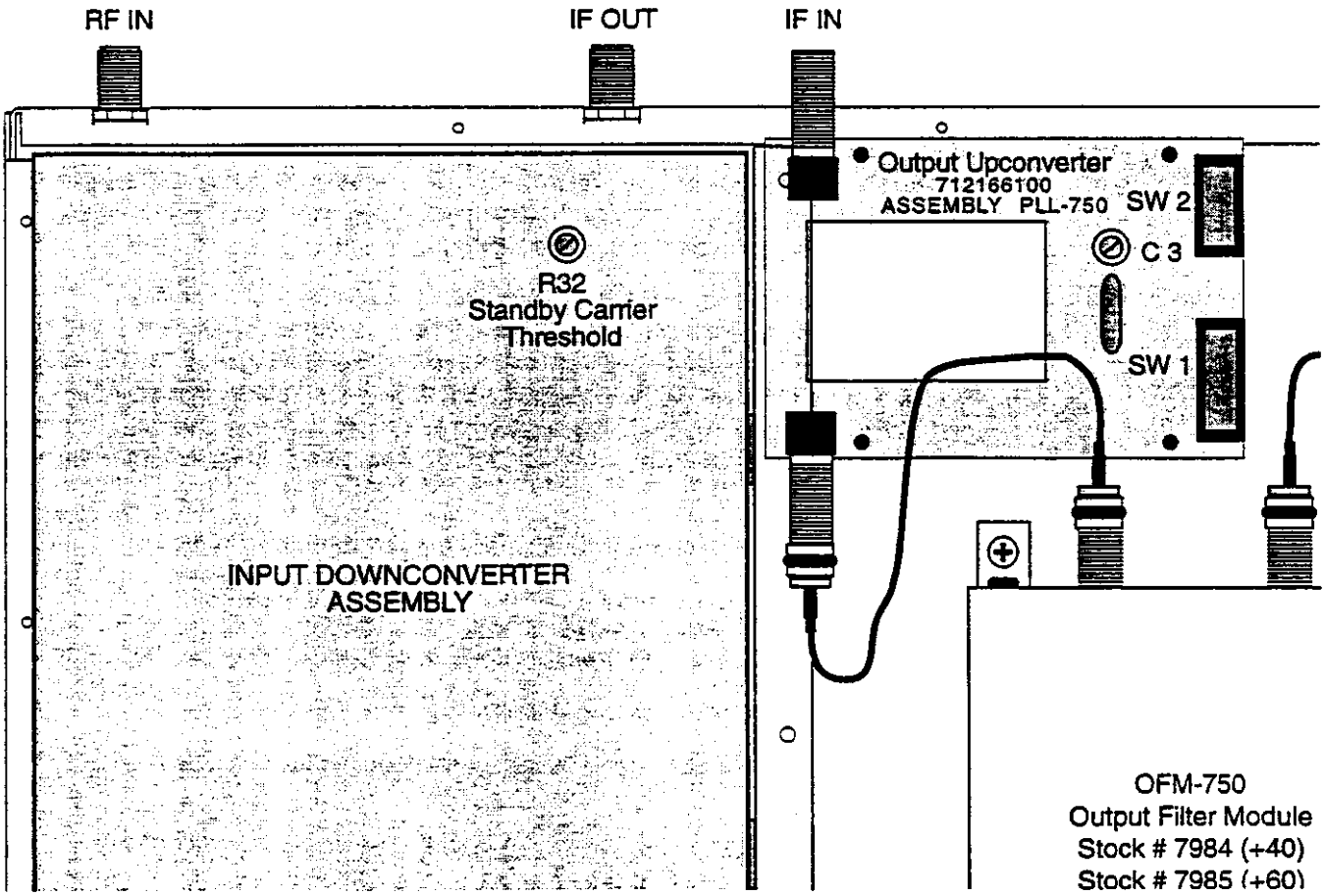


Figure 5 Top Cover Processor Adjustments

SAIP SERIES - SWITCH SETTINGS FOR STANDARD INPUT CHANNELS

CH.	CH	PIX	L.O.	SWITCH ONE 0 = DOWN, 1 = UP								SWITCH TWO 0 = DOWN, 1 = UP							
				1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
2	2	55.25	101.00	0	1	1	1	0	0	1	0	1	0	0	1	1	0	0	0
3	3	61.25	107.00	0	1	1	1	0	0	1	1	0	1	0	1	1	0	0	0
4	4	67.25	113.00	0	1	1	1	0	0	1	0	0	0	1	1	1	0	0	0
A-8	1	73.25	119.00	0	1	1	1	0	0	1	1	1	0	1	1	1	0	0	0
5	5	77.25	123.00	0	1	1	1	0	0	1	1	0	1	1	1	1	0	0	0
5(IRC)	5(IRC)	79.25	125.00	0	1	1	1	0	0	1	0	1	1	1	1	1	0	0	0
6	6	83.25	129.00	0	1	1	1	0	0	1	0	0	0	0	0	0	1	0	0
6(IRC)	6(IRC)	85.25	131.00	0	1	1	1	0	0	1	1	0	0	0	0	0	1	0	0
A-2	98	109.25	155.00	0	0	1	1	0	0	1	1	0	1	1	0	0	1	0	0
A-1	99	115.25	161.00	0	0	1	1	0	0	1	0	0	0	0	1	0	1	0	0
A	14	121.25	167.00	0	0	1	1	0	0	1	1	1	0	0	1	0	1	0	0
B	15	127.25	173.00	0	0	1	1	0	0	1	0	1	1	0	1	0	1	0	0
C	16	133.25	179.00	0	0	1	1	0	0	1	1	0	0	1	1	0	1	0	0
D	17	139.25	185.00	0	0	1	1	0	0	1	0	0	1	1	1	0	1	0	0
E	18	145.25	191.00	0	0	1	1	0	0	1	1	1	1	1	1	0	1	0	0
F	19	151.25	197.00	0	0	1	1	0	0	1	0	1	0	0	0	1	1	0	0
G	20	157.25	203.00	0	0	1	1	0	0	1	1	0	1	0	0	1	1	0	0
H	21	163.25	209.00	0	0	1	1	0	0	1	0	0	0	1	0	1	1	0	0
I	22	169.25	215.00	0	0	1	1	0	0	1	1	1	0	1	0	1	1	0	0
7	7	175.25	221.00	0	0	1	1	0	0	1	0	1	1	1	0	1	1	0	0
8	8	181.25	227.00	0	0	1	1	0	0	1	1	0	0	0	1	1	1	0	0
9	9	187.25	233.00	0	0	1	1	0	0	1	0	0	1	0	1	1	1	0	0
10	10	193.25	239.00	0	0	1	1	0	0	1	1	1	1	0	1	1	1	0	0
11	11	199.25	245.00	0	0	1	1	0	0	1	0	1	0	1	1	1	1	0	0
12	12	205.25	251.00	0	0	1	1	0	0	1	1	0	1	1	1	1	1	0	0
13	13	211.25	257.00	0	0	1	1	0	0	1	0	0	0	0	0	0	0	1	0
J	23	217.25	263.00	0	0	0	1	0	0	1	1	1	0	0	0	0	0	1	0
K	24	223.25	269.00	0	0	0	1	0	0	1	0	1	1	0	0	0	0	1	0
L	25	229.25	275.00	0	0	0	1	0	0	1	1	0	0	1	0	0	0	1	0
M	26	235.25	281.00	0	0	0	1	0	0	1	0	0	1	1	0	0	0	1	0
N	27	241.25	287.00	0	0	0	1	0	0	1	1	1	1	1	0	0	0	1	0
O	28	247.25	293.00	0	0	0	1	0	0	1	0	1	0	0	1	0	0	1	0
P	29	253.25	299.00	0	0	0	1	0	0	1	1	0	1	0	1	0	0	1	0
Q	30	259.25	305.00	0	0	0	1	0	0	1	0	0	0	1	1	0	0	1	0
R	31	265.25	311.00	0	0	0	1	0	0	1	1	1	0	1	1	0	0	1	0
S	32	271.25	317.00	0	0	0	1	0	0	1	0	1	1	1	1	0	0	1	0
T	33	277.25	323.00	0	0	0	1	0	0	1	1	0	0	0	0	1	0	1	0
U	34	283.25	329.00	0	0	0	1	0	0	1	0	0	1	0	0	1	0	1	0
V	35	289.25	335.00	0	0	0	1	0	0	1	1	1	1	0	0	1	0	1	0
W	36	295.25	341.00	0	0	0	1	0	0	1	0	1	0	1	0	1	0	1	0
AA	37	301.25	347.00	0	0	0	1	0	0	1	1	0	1	1	0	1	0	1	0
BB	38	307.25	353.00	0	0	0	1	0	0	1	0	0	0	0	1	1	0	1	0
CC	39	313.25	359.00	0	0	0	1	0	0	1	1	1	0	0	1	1	0	1	0
DD	40	319.25	365.00	0	0	0	1	0	0	1	0	1	1	0	1	1	0	1	0
EE	41	325.25	371.00	0	0	0	1	0	0	1	1	0	0	1	1	1	0	1	0
FF	42	331.25	377.00	0	0	0	1	0	0	1	0	0	1	1	1	1	0	1	0
GG	43	337.25	383.00	0	0	0	1	0	0	1	1	1	1	1	1	1	0	1	0
HH	44	343.25	389.00	0	0	0	1	0	0	1	0	1	0	0	0	0	1	1	0
II	45	349.25	395.00	0	0	0	1	0	0	1	1	0	1	0	0	0	1	1	0
JJ	46	355.25	401.00	0	0	0	1	0	0	1	0	0	0	1	0	0	1	1	0
KK	47	361.25	407.00	0	0	0	1	0	0	1	1	1	0	1	0	0	1	1	0
LL	48	367.25	413.00	0	0	0	1	0	0	1	0	1	1	1	0	0	1	1	0
MM	49	373.25	419.00	1	1	1	0	0	0	1	1	0	0	0	1	0	1	1	0
NN	50	379.25	425.00	1	1	1	0	0	0	1	0	0	1	0	1	0	1	1	0
OO	51	385.25	431.00	1	1	1	0	0	0	1	1	1	1	0	1	0	1	1	0
PP	52	391.25	437.00	1	1	1	0	0	0	1	0	1	0	1	1	0	1	1	0
QQ	53	397.25	443.00	1	1	1	0	0	0	1	1	0	1	1	1	0	1	1	0
RR	54	403.25	449.00	1	1	1	0	0	0	1	0	0	0	0	0	1	1	1	0

CH.	CH	PIX	LO.	SWITCH ONE 0 = DOWN, 1 = UP								SWITCH TWO 0 = DOWN, 1 = UP							
				1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
SS	55	409.25	455.00	1	1	1	0	0	0	1	1	1	0	0	0	1	1	1	0
TT	56	415.25	461.00	1	1	1	0	0	0	1	0	1	1	0	0	1	1	1	0
UU	57	421.25	467.00	1	1	1	0	0	0	1	1	0	0	1	0	1	1	1	0
VV	58	427.25	473.00	1	1	1	0	0	0	1	0	0	1	1	0	1	1	1	0
WW	59	433.25	479.00	1	1	1	0	0	0	1	1	1	1	1	0	1	1	1	0
XX	60	439.25	485.00	1	1	1	0	0	0	1	0	1	0	0	1	1	1	1	0
YY	61	445.25	491.00	1	1	1	0	0	0	1	1	0	1	0	1	1	1	1	0
ZZ	62	451.25	497.00	1	1	1	0	0	0	1	0	0	0	1	1	1	1	1	0
AAA	63	457.25	503.00	1	1	1	0	0	0	1	1	1	0	1	1	1	1	1	0
BBB	64	463.25	509.00	1	1	1	0	0	0	1	0	1	1	1	1	1	1	1	0
CCC	65	469.25	515.00	1	1	1	0	0	0	1	1	0	0	0	0	0	0	0	1
DDD	66	475.25	521.00	1	1	1	0	0	0	1	0	0	1	0	0	0	0	0	1
EEE	67	481.25	527.00	1	1	1	0	0	0	1	1	1	1	0	0	0	0	0	1
FFF	68	487.25	533.00	1	1	1	0	0	0	1	0	1	0	1	0	0	0	0	1
GGG	69	493.25	539.00	1	1	1	0	0	0	1	1	0	1	1	0	0	0	0	1
HHH	70	499.25	545.00	1	1	1	0	0	0	1	0	0	0	0	1	0	0	0	1
III	71	505.25	551.00	1	1	1	0	0	0	1	1	1	0	0	1	0	0	0	1
JJJ	72	511.25	557.00	1	1	1	0	0	0	1	0	0	1	0	1	0	0	0	1
KKK	73	517.25	563.00	1	1	1	0	0	0	1	1	1	1	0	1	0	0	0	1
LLL	74	523.25	569.00	1	1	1	0	0	0	1	0	0	0	1	1	0	0	0	1
MMM	75	529.25	575.00	1	1	1	0	0	0	1	1	0	1	1	1	0	0	0	1
NNN	76	535.25	581.00	1	1	1	0	0	0	1	0	1	1	1	1	0	0	0	1
OOO	77	541.25	587.00	1	1	1	0	0	0	1	1	1	0	0	0	1	0	0	1
PPP	78	547.25	593.00	1	1	1	0	0	0	1	0	0	1	0	0	1	0	0	1
QQQ	79	553.25	599.00	1	1	1	0	0	0	1	1	0	0	1	0	1	0	0	1
RRR	80	559.25	605.00	1	1	1	0	0	0	1	0	1	0	1	0	1	0	0	1
SSS	81	565.25	611.00	1	1	1	0	0	0	1	1	1	1	1	0	1	0	0	1
TTT	82	571.25	617.00	1	1	1	0	0	0	1	0	0	0	0	1	1	0	0	1
UUU	83	577.25	623.00	1	1	1	0	0	0	1	1	0	1	0	1	1	0	0	1
VVV	84	583.25	629.00	1	1	1	0	0	0	1	0	1	1	0	1	1	0	0	1
WWW	85	589.25	635.00	1	1	1	0	0	0	1	1	1	0	1	1	1	0	0	1
XXX	86	595.25	641.00	1	1	1	0	0	0	1	0	0	1	1	1	1	0	0	1
YYY	87	601.25	647.00	1	1	1	0	0	0	1	1	0	0	0	0	0	1	0	1
ZZZ	88	607.25	653.00	1	1	1	0	0	0	1	0	1	0	0	0	0	1	0	1
	89	613.25	659.00	1	1	1	0	0	0	1	1	1	1	0	0	0	1	0	1
	90	619.25	665.00	1	1	1	0	0	0	1	0	0	0	1	0	0	1	0	1
	91	625.25	671.00	1	1	1	0	0	0	1	1	0	1	1	0	0	1	0	1
	92	631.25	677.00	1	1	1	0	0	0	1	0	1	1	1	0	0	1	0	1
	93	637.25	683.00	1	1	1	0	0	0	1	1	1	0	0	1	0	1	0	1
	94	643.25	689.00	1	1	1	0	0	0	1	0	0	1	0	1	0	1	0	1
	100	649.25	695.00	1	1	1	0	0	0	1	1	0	0	1	1	0	1	0	1
	101	655.25	701.00	1	1	1	0	0	0	1	0	1	0	1	1	0	1	0	1
	102	661.25	707.00	1	1	1	0	0	0	1	1	1	1	1	1	0	1	0	1
	103	667.25	713.00	1	1	1	0	0	0	1	0	0	0	0	0	1	1	0	1
	104	673.25	719.00	1	1	1	0	0	0	1	1	0	1	0	0	1	1	0	1
	105	679.25	725.00	1	1	1	0	0	0	1	0	1	1	0	0	1	1	0	1
	106	685.25	731.00	1	1	1	0	0	0	1	1	0	1	0	1	1	1	0	1
	107	691.25	737.00	1	1	1	0	0	0	1	0	1	1	0	1	1	1	0	1
	108	697.25	743.00	1	1	1	0	0	0	1	1	0	0	0	1	1	1	0	1
	109	703.25	749.00	1	1	1	0	0	0	1	0	1	0	0	1	1	1	0	1
	110	709.25	755.00	1	1	1	0	0	0	1	1	1	1	0	1	1	1	0	1
	111	715.25	761.00	1	1	1	0	0	0	1	0	0	0	1	1	1	1	0	1
	112	721.25	767.00	1	1	1	0	0	0	1	1	0	1	1	1	1	1	0	1
	113	727.25	773.00	1	1	1	0	0	0	1	0	1	1	1	1	1	1	0	1
	114	733.25	779.00	1	1	1	0	0	0	1	1	0	0	0	0	0	0	1	1
	115	739.25	785.00	1	1	1	0	0	0	1	0	0	1	0	0	0	0	1	1
	116	745.25	791.00	1	1	1	0	0	0	1	1	0	0	1	0	0	0	1	1
	117	751.25	797.00	1	1	1	0	0	0	1	0	1	0	1	0	0	0	1	1
												1	1	1	0	0	0	1	1

SAIP SERIES - SWITCH SETTINGS FOR HRC INPUT CHANNELS

				SWITCH ONE 0 = DOWN, 1 = UP								SWITCH TWO 0 = DOWN, 1 = UP							
CH.	CH	PIX	LO.	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
2	2	54.00	99.75	0	1	1	1	1	1	1	1	0	0	0	1	1	0	0	0
3	3	60.00	105.75	0	1	1	1	1	1	1	0	0	1	0	1	1	0	0	0
4	4	66.00	111.75	0	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0
A-8	1	72.00	117.75	0	1	1	1	1	1	1	0	1	0	1	1	1	0	0	0
5	5	78.00	123.75	0	1	1	1	1	1	1	1	0	1	1	1	1	0	0	0
6	6	84.00	129.75	0	1	1	1	1	1	1	0	0	0	0	0	0	1	0	0
A-2	98	108.00	153.75	0	0	1	1	1	1	1	0	0	1	1	0	0	1	0	0
A-1	99	114.00	159.75	0	0	1	1	1	1	1	1	1	1	1	0	0	1	0	0
A	14	120.00	165.75	0	0	1	1	1	1	1	0	1	0	0	1	0	1	0	0
B	15	126.00	171.75	0	0	1	1	1	1	1	1	0	1	0	1	0	1	0	0
C	16	132.00	177.75	0	0	1	1	1	1	1	0	0	0	1	1	0	1	0	0
D	17	138.00	183.75	0	0	1	1	1	1	1	1	1	0	1	1	0	1	0	0
E	18	144.00	189.75	0	0	1	1	1	1	1	0	1	1	1	1	0	1	0	0
F	19	150.00	195.75	0	0	1	1	1	1	1	1	0	0	0	0	1	1	0	0
G	20	156.00	201.75	0	0	1	1	1	1	1	0	0	1	0	0	1	1	0	0
H	21	162.00	207.75	0	0	1	1	1	1	1	1	1	1	0	0	1	1	0	0
I	22	168.00	213.75	0	0	1	1	1	1	1	0	1	0	1	0	1	1	0	0
7	7	174.00	219.75	0	0	1	1	1	1	1	1	0	1	1	0	1	1	0	0
8	8	180.00	225.75	0	0	1	1	1	1	1	0	0	0	0	1	1	1	0	0
9	9	186.00	231.75	0	0	1	1	1	1	1	1	1	0	0	1	1	1	0	0
10	10	192.00	237.75	0	0	1	1	1	1	1	0	1	1	0	1	1	1	0	0
11	11	198.00	243.75	0	0	1	1	1	1	1	1	0	0	1	1	1	1	0	0
12	12	204.00	249.75	0	0	1	1	1	1	1	0	0	1	1	1	1	1	0	0
13	13	210.00	255.75	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0
J	23	216.00	261.75	0	0	0	1	1	1	1	0	1	0	0	0	0	0	1	0
K	24	222.00	267.75	0	0	0	1	1	1	1	1	0	1	0	0	0	0	1	0
L	25	228.00	273.75	0	0	0	1	1	1	1	0	0	0	1	0	0	0	1	0
M	26	234.00	279.75	0	0	0	1	1	1	1	1	1	0	1	0	0	0	1	0
N	27	240.00	285.75	0	0	0	1	1	1	1	0	1	1	1	0	0	0	1	0
O	28	246.00	291.75	0	0	0	1	1	1	1	1	0	0	0	1	0	0	1	0
P	29	252.00	297.75	0	0	0	1	1	1	1	0	0	1	0	1	0	0	1	0
Q	30	258.00	303.75	0	0	0	1	1	1	1	1	1	1	0	1	0	0	1	0
R	31	264.00	309.75	0	0	0	1	1	1	1	0	1	0	1	1	0	0	1	0
S	32	270.00	315.75	0	0	0	1	1	1	1	1	0	1	1	1	0	0	1	0
T	33	276.00	321.75	0	0	0	1	1	1	1	0	0	0	0	0	1	0	1	0
U	34	282.00	327.75	0	0	0	1	1	1	1	1	1	0	0	0	1	0	1	0
V	35	288.00	333.75	0	0	0	1	1	1	1	0	1	1	0	0	1	0	1	0
W	36	294.00	339.75	0	0	0	1	1	1	1	1	0	0	1	0	1	0	1	0
AA	37	300.00	345.75	0	0	0	1	1	1	1	0	0	1	1	0	1	0	1	0
BB	38	306.00	351.75	0	0	0	1	1	1	1	1	1	1	1	0	1	0	1	0
CC	39	312.00	357.75	0	0	0	1	1	1	1	0	1	0	0	1	1	0	1	0
DD	40	318.00	363.75	0	0	0	1	1	1	1	1	0	1	0	1	1	0	1	0
EE	41	324.00	369.75	0	0	0	1	1	1	1	0	0	0	1	1	1	0	1	0
FF	42	330.00	375.75	0	0	0	1	1	1	1	1	1	0	1	1	1	0	1	0
GG	43	336.00	381.75	0	0	0	1	1	1	1	0	1	1	1	1	1	0	1	0
HH	44	342.00	387.75	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	0
II	45	348.00	393.75	0	0	0	1	1	1	1	0	0	1	0	0	0	1	1	0
JJ	46	354.00	399.75	0	0	0	1	1	1	1	1	1	1	0	0	0	1	1	0
KK	47	360.00	405.75	0	0	0	1	1	1	1	0	1	0	1	0	0	1	1	0
LL	48	366.00	411.75	0	0	0	1	1	1	1	1	0	1	1	0	0	1	1	0
MM	49	372.00	417.75	1	1	1	0	1	1	1	0	0	0	0	1	0	1	1	0
NN	50	378.00	423.75	1	1	1	0	1	1	1	1	1	0	0	1	0	1	1	0
OO	51	384.00	429.75	1	1	1	0	1	1	1	0	1	1	0	1	0	1	1	0
PP	52	390.00	435.75	1	1	1	0	1	1	1	1	0	0	1	1	0	1	1	0
QQ	53	396.00	441.75	1	1	1	0	1	1	1	0	0	1	1	1	0	1	1	0
RR	54	402.00	447.75	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	0
SS	55	408.00	453.75	1	1	1	0	1	1	1	0	1	0	0	0	1	1	1	0

				SWITCH ONE 0 = DOWN, 1 = UP								SWITCH TWO 0 = DOWN, 1 = UP							
CH.	CH	PIX	LO.	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
TT	56	414.00	459.75	1	1	1	0	1	1	1	1	0	1	0	0	1	1	1	0
UU	57	420.00	465.75	1	1	1	0	1	1	1	0	0	0	1	0	1	1	1	0
VV	58	426.00	471.75	1	1	1	0	1	1	1	1	1	0	1	0	1	1	1	0
WW	59	432.00	477.75	1	1	1	0	1	1	1	0	1	1	1	0	1	1	1	0
XX	60	438.00	483.75	1	1	1	0	1	1	1	1	0	0	0	1	1	1	1	0
YY	61	444.00	489.75	1	1	1	0	1	1	1	0	0	1	0	1	1	1	1	0
ZZ	62	450.00	495.75	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	0
AAA	63	456.00	501.75	1	1	1	0	1	1	1	0	1	0	1	1	1	1	1	0
BBB	64	462.00	507.75	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	0
CCC	65	468.00	513.75	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	1
DDD	66	474.00	519.75	1	1	1	0	1	1	1	1	1	0	0	0	0	0	0	1
EEE	67	480.00	525.75	1	1	1	0	1	1	1	0	1	1	0	0	0	0	0	1
FFF	68	486.00	531.75	1	1	1	0	1	1	1	1	0	0	1	0	0	0	0	1
GGG	69	492.00	537.75	1	1	1	0	1	1	1	0	0	1	1	0	0	0	0	1
HHH	70	498.00	543.75	1	1	1	0	1	1	1	1	1	1	1	0	0	0	0	1
III	71	504.00	549.75	1	1	1	0	1	1	1	0	1	0	0	1	0	0	0	1
JJJ	72	510.00	555.75	1	1	1	0	1	1	1	1	0	1	0	1	0	0	0	1
KKK	73	516.00	561.75	1	1	1	0	1	1	1	0	0	0	1	1	0	0	0	1
LLL	74	522.00	567.75	1	1	1	0	1	1	1	1	1	0	1	1	0	0	0	1
MMM	75	528.00	573.75	1	1	1	0	1	1	1	0	1	1	1	1	0	0	0	1
NNN	76	534.00	579.75	1	1	1	0	1	1	1	1	0	0	0	0	1	0	0	1
OOO	77	540.00	585.75	1	1	1	0	1	1	1	0	0	1	0	0	1	0	0	1
PPP	78	546.00	591.75	1	1	1	0	1	1	1	1	1	1	0	0	1	0	0	1
QQQ	79	552.00	597.75	1	1	1	0	1	1	1	0	1	0	1	0	1	0	0	1
RRR	80	558.00	603.75	1	1	1	0	1	1	1	1	0	1	1	0	1	0	0	1
SSS	81	564.00	609.75	1	1	1	0	1	1	1	0	0	0	0	1	1	0	0	1
TTT	82	570.00	615.75	1	1	1	0	1	1	1	1	1	0	0	1	1	0	0	1
UUU	83	576.00	621.75	1	1	1	0	1	1	1	0	1	1	0	1	1	0	0	1
VVV	84	582.00	627.75	1	1	1	0	1	1	1	1	0	0	1	1	1	0	0	1
WWW	85	588.00	633.75	1	1	1	0	1	1	1	0	0	1	1	1	1	0	0	1
XXX	86	594.00	639.75	1	1	1	0	1	1	1	1	1	1	1	1	1	0	0	1
YYY	87	600.00	645.75	1	1	1	0	1	1	1	0	1	0	0	0	0	1	0	1
ZZZ	88	606.00	651.75	1	1	1	0	1	1	1	1	0	1	0	0	0	1	0	1
	89	612.00	657.75	1	1	1	0	1	1	1	0	0	0	1	0	0	1	0	1
	90	618.00	663.75	1	1	1	0	1	1	1	1	1	0	1	0	0	1	0	1
	91	624.00	669.75	1	1	1	0	1	1	1	0	1	1	1	0	0	1	0	1
	92	630.00	675.75	1	1	1	0	1	1	1	1	0	0	0	1	0	1	0	1
	93	636.00	681.75	1	1	1	0	1	1	1	0	0	1	0	1	0	1	0	1
	94	642.00	687.75	1	1	1	0	1	1	1	1	1	1	0	1	0	1	0	1
	100	648.00	693.75	1	1	1	0	1	1	1	0	1	0	1	1	0	1	0	1
	101	654.00	699.75	1	1	1	0	1	1	1	1	0	1	1	1	0	1	0	1
	102	660.00	705.75	1	1	1	0	1	1	1	0	0	0	0	0	1	1	0	1
	103	666.00	711.75	1	1	1	0	1	1	1	1	1	0	0	0	1	1	0	1
	104	672.00	717.75	1	1	1	0	1	1	1	0	1	1	0	0	1	1	0	1
	105	678.00	723.75	1	1	1	0	1	1	1	1	0	0	1	0	1	1	0	1
	106	684.00	729.75	1	1	1	0	1	1	1	0	0	1	1	0	1	1	0	1
	107	690.00	735.75	1	1	1	0	1	1	1	1	1	1	1	0	1	1	0	1
	108	696.00	741.75	1	1	1	0	1	1	1	0	1	0	0	1	1	1	0	1
	109	702.00	747.75	1	1	1	0	1	1	1	1	0	1	0	1	1	1	0	1
	110	708.00	753.75	1	1	1	0	1	1	1	0	0	0	1	1	1	1	0	1
	111	714.00	759.75	1	1	1	0	1	1	1	1	1	0	1	1	1	1	0	1
	112	720.00	765.75	1	1	1	0	1	1	1	0	1	1	1	1	1	1	0	1
	113	726.00	771.75	1	1	1	0	1	1	1	1	0	0	0	0	0	0	1	1
	114	732.00	777.75	1	1	1	0	1	1	1	0	0	1	0	0	0	0	1	1
	115	738.00	783.75	1	1	1	0	1	1	1	1	1	1	0	0	0	0	1	1
	116	744.00	789.75	1	1	1	0	1	1	1	0	1	0	1	0	0	0	1	1
	117	750.00	795.75	1	1	1	0	1	1	1	1	0	1	1	0	0	0	1	1

SAIP SERIES - SWITCH SETTINGS FOR UHF INPUT CHANNELS

CH	PIX	L.O.	SWITCH ONE 0 = DOWN, 1 = UP								SWITCH TWO 0 = DOWN, 1 = UP							
			1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
14	471.25	517.00	1	1	1	0	0	0	1	0	1	0	0	0	0	0	0	1
15	477.25	523.00	1	1	1	0	0	0	1	1	0	1	0	0	0	0	0	1
16	483.25	529.00	1	1	1	0	0	0	1	0	0	0	1	0	0	0	0	1
17	489.25	535.00	1	1	1	0	0	0	1	1	1	0	1	0	0	0	0	1
18	495.25	541.00	1	1	1	0	0	0	1	0	1	1	1	0	0	0	0	1
19	501.25	547.00	1	1	1	0	0	0	1	1	0	0	0	1	0	0	0	1
20	507.25	553.00	1	1	1	0	0	0	1	0	0	1	0	1	0	0	0	1
21	513.25	559.00	1	1	1	0	0	0	1	1	1	1	0	1	0	0	0	1
22	519.25	565.00	1	1	1	0	0	0	1	0	1	0	1	1	0	0	0	1
23	525.25	571.00	1	1	1	0	0	0	1	1	0	1	1	1	0	0	0	1
24	531.25	577.00	1	1	1	0	0	0	1	0	0	0	0	0	1	0	0	1
25	537.25	583.00	1	1	1	0	0	0	1	1	1	0	0	0	1	0	0	1
26	543.25	589.00	1	1	1	0	0	0	1	0	1	1	0	0	1	0	0	1
27	549.25	595.00	1	1	1	0	0	0	1	1	0	0	1	0	1	0	0	1
28	555.25	601.00	1	1	1	0	0	0	1	0	0	1	1	0	1	0	0	1
29	561.25	607.00	1	1	1	0	0	0	1	1	1	1	1	0	1	0	0	1
30	567.25	613.00	1	1	1	0	0	0	1	0	1	0	0	1	1	0	0	1
31	573.25	619.00	1	1	1	0	0	0	1	1	0	1	0	1	1	0	0	1
32	579.25	625.00	1	1	1	0	0	0	1	0	0	0	1	1	1	0	0	1
33	585.25	631.00	1	1	1	0	0	0	1	1	1	0	1	1	1	0	0	1
34	591.25	637.00	1	1	1	0	0	0	1	0	1	1	1	1	1	0	0	1
35	597.25	643.00	1	1	1	0	0	0	1	1	0	0	0	0	0	1	0	1
36	603.25	649.00	1	1	1	0	0	0	1	0	0	1	0	0	0	1	0	1
37	609.25	655.00	1	1	1	0	0	0	1	1	1	1	0	0	0	1	0	1
38	615.25	661.00	1	1	1	0	0	0	1	0	1	0	1	0	0	1	0	1
39	621.25	667.00	1	1	1	0	0	0	1	1	0	1	1	0	0	1	0	1
40	627.25	673.00	1	1	1	0	0	0	1	0	0	0	0	1	0	1	0	1
41	633.25	679.00	1	1	1	0	0	0	1	1	1	0	0	1	0	1	0	1
42	639.25	685.00	1	1	1	0	0	0	1	0	0	1	0	1	0	1	0	1
43	645.25	691.00	1	1	1	0	0	0	1	1	0	0	1	1	0	1	0	1
44	651.25	697.00	1	1	1	0	0	0	1	0	0	1	1	1	0	1	0	1
45	657.25	703.00	1	1	1	0	0	0	1	1	1	1	1	1	0	1	0	1
46	663.25	709.00	1	1	1	0	0	0	1	0	1	0	0	0	1	1	0	1
47	669.25	715.00	1	1	1	0	0	0	1	1	0	1	0	0	1	1	0	1
48	675.25	721.00	1	1	1	0	0	0	1	0	0	0	1	0	1	1	0	1
49	681.25	727.00	1	1	1	0	0	0	1	1	1	0	1	0	1	1	0	1
50	687.25	733.00	1	1	1	0	0	0	1	0	0	1	1	0	1	1	0	1
51	693.25	739.00	1	1	1	0	0	0	1	1	0	0	0	1	1	1	0	1
52	699.25	745.00	1	1	1	0	0	0	1	0	0	1	0	1	1	1	0	1
53	705.25	751.00	1	1	1	0	0	0	1	1	1	1	0	1	1	1	0	1
54	711.25	757.00	1	1	1	0	0	0	1	0	1	0	1	1	1	1	0	1
55	717.25	763.00	1	1	1	0	0	0	1	1	0	1	1	1	1	1	0	1
56	723.25	769.00	1	1	1	0	0	0	1	0	0	0	0	0	0	0	1	1
57	729.25	775.00	1	1	1	0	0	0	1	1	1	0	0	0	0	0	1	1
58	735.25	781.00	1	1	1	0	0	0	1	0	0	1	0	0	0	0	1	1
59	741.25	787.00	1	1	1	0	0	0	1	1	0	0	1	0	0	0	1	1
60	747.25	793.00	1	1	1	0	0	0	1	0	0	1	1	0	0	0	1	1
61	753.25	799.00	1	1	1	0	0	0	1	1	1	1	1	0	0	0	1	1
62	759.25	805.00	1	1	1	0	0	0	1	0	1	0	0	1	0	0	1	1
63	765.25	811.00	1	1	1	0	0	0	1	1	0	1	0	1	0	0	1	1
64	771.25	817.00	1	1	1	0	0	0	1	0	0	0	1	1	0	0	1	1
65	777.25	823.00	1	1	1	0	0	0	1	1	1	0	1	1	0	0	1	1
66	783.25	829.00	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	1
67	789.25	835.00	1	1	1	0	0	0	1	1	0	0	0	0	1	0	1	1
68	795.25	841.00	1	1	1	0	0	0	1	0	0	1	0	0	1	0	1	1
69	801.25	847.00	1	1	1	0	0	0	1	1	1	1	0	0	1	0	1	1

OUTPUT CHANNEL SELECTION

CHNL NO	VIDEO	LO	SWITCH ONE 1 = ON = DOWN										SWITCH TWO 1 = ON = DOWN							
			1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8
2	55.2500	101.00	1	0	0	0	0	0	0	1	1	1	0	0	1	1	1	1	0	1
3	61.2500	107.00	0	1	0	1	1	1	1	0	1	1	0	0	1	1	1	1	0	0
4	67.2500	113.00	0	1	0	0	1	1	1	0	1	1	0	0	1	1	1	1	0	1
5	77.2500	123.00	0	1	1	0	0	1	1	0	1	1	0	0	1	1	1	1	0	0
6	83.2500	129.00	0	1	1	1	1	0	1	0	1	1	0	0	1	1	1	1	0	1
98	109.2750	155.03	0	1	1	1	1	1	0	0	1	1	0	0	1	0	1	1	0	0
99	115.2750	161.03	0	1	1	0	1	1	0	0	1	1	0	0	1	0	1	1	0	1
14	121.2625	167.01	1	1	1	1	0	1	0	0	1	1	0	0	0	1	1	1	0	0
15	127.2625	173.01	1	1	1	0	0	1	0	0	1	1	0	0	0	1	1	1	0	1
16	133.2625	179.01	0	0	0	0	0	1	0	0	1	1	0	0	0	1	1	1	0	0
17	139.2500	185.00	0	0	0	1	1	0	0	0	1	1	0	0	1	1	1	1	0	1
18	145.2500	191.00	1	0	0	0	1	0	0	0	1	1	0	0	1	1	1	1	0	0
19	151.2500	197.00	1	0	0	1	0	0	0	0	1	1	0	0	1	1	1	1	0	1
20	157.2500	203.00	0	1	0	0	0	0	0	0	1	1	0	0	1	1	1	1	0	0
21	163.2500	209.00	0	1	0	1	1	1	1	1	0	1	0	0	1	1	1	1	0	1
22	169.2500	215.00	1	1	0	0	1	1	1	1	0	1	0	0	1	1	1	1	0	0
7	175.2500	221.00	1	1	0	1	0	1	1	1	0	1	0	0	1	1	1	1	0	1
8	181.2500	227.00	0	0	1	0	0	1	1	1	0	1	0	0	1	1	1	1	0	0
9	187.2500	233.00	0	0	1	1	1	0	1	1	0	1	0	0	1	1	1	1	0	1
10	193.2500	239.00	1	0	1	0	1	0	1	1	0	1	0	1	1	1	1	1	0	0
11	199.2500	245.00	1	0	1	1	0	0	1	1	0	1	0	1	1	1	1	1	0	1
12	205.2500	251.00	0	1	1	0	0	0	1	1	0	1	0	1	1	1	1	1	0	0
13	211.2500	257.00	0	1	1	1	1	1	0	1	0	1	0	1	1	1	1	1	0	1
23	217.2500	263.00	1	1	1	0	1	1	0	1	0	1	0	1	1	1	1	1	0	0
24	223.2625	269.01	1	1	1	1	0	1	0	1	0	1	0	1	0	1	1	1	0	1
25	229.2625	275.01	0	0	0	1	0	1	0	1	0	1	0	1	0	1	1	1	0	0
26	235.2625	281.01	0	0	0	0	0	1	0	1	0	1	0	1	0	1	1	1	0	1
27	241.2625	287.01	1	0	0	1	1	0	0	1	0	1	0	1	0	1	1	1	0	0
28	247.2625	293.01	1	0	0	0	1	0	0	1	0	1	0	1	0	1	1	1	0	1
29	253.2625	299.01	0	1	0	1	0	0	0	1	0	1	0	1	0	1	1	1	0	0
30	259.2625	305.01	0	1	0	0	0	0	0	1	0	1	0	1	0	1	1	1	0	1
31	265.2625	311.01	1	1	0	1	1	1	1	0	0	1	0	1	0	1	1	1	0	0
32	271.2625	317.01	1	1	0	0	1	1	1	0	0	1	0	1	0	1	1	1	0	1
33	277.2625	323.01	0	0	1	1	0	1	1	0	0	1	0	1	0	1	1	1	0	0
34	283.2625	329.01	0	0	1	0	0	1	1	0	0	1	0	1	0	1	1	1	0	1
35	289.2625	335.01	1	0	1	1	1	0	1	0	0	1	0	1	0	1	1	1	0	0
36	295.2625	341.01	1	0	1	0	1	0	1	0	0	1	0	1	0	1	1	1	0	1
37	301.2625	347.01	0	1	1	1	0	0	1	0	0	1	0	1	0	1	1	1	0	0
38	307.2625	353.01	0	1	1	0	0	0	1	0	0	1	0	1	0	1	1	1	0	1
39	313.2625	359.01	1	1	1	1	1	1	0	0	0	1	0	1	0	1	1	1	0	0
40	319.2625	365.01	1	1	1	0	1	1	0	0	0	1	0	1	0	1	1	1	0	1
41	325.2625	371.01	0	0	0	0	1	1	0	0	0	1	0	1	0	1	1	1	0	0
42	331.2750	377.03	0	0	0	1	0	1	0	0	0	1	0	1	1	0	1	1	0	1
43	337.2625	383.01	1	0	0	0	0	1	0	0	0	1	0	1	0	1	1	1	0	0
44	343.2625	389.01	1	0	0	1	1	0	0	0	0	1	0	1	0	1	1	1	0	1
45	349.2625	395.01	0	1	0	0	1	0	0	0	0	1	0	1	0	1	1	1	0	0
46	355.2625	401.01	0	1	0	1	0	0	0	0	0	1	0	1	0	1	1	1	0	1
47	361.2625	407.01	1	1	0	0	0	0	0	0	0	1	0	1	0	1	1	1	0	0
48	367.2625	413.01	1	1	0	1	1	1	1	1	1	0	0	1	0	1	1	1	0	1
49	373.2625	419.01	0	0	1	0	1	1	1	1	1	0	0	1	0	1	1	1	0	0
50	379.2625	425.01	0	0	1	1	0	1	1	1	1	0	0	1	0	1	1	1	0	1
51	385.2625	431.01	1	0	1	0	0	1	1	1	1	0	0	1	0	1	1	1	0	0
52	391.2625	437.01	1	0	1	1	1	0	1	1	1	0	0	1	0	1	1	1	0	1
53	397.2625	443.01	0	1	1	0	1	0	1	1	1	0	0	1	0	1	1	1	0	0
54	403.2500	449.00	0	1	1	1	0	0	1	1	1	0	0	1	1	1	1	1	0	1

OUTPUT CHANNEL SELECTION

CHNL NO	VIDEO	LO	SWITCH ONE 1 = ON = DOWN										SWITCH TWO 1 = ON = DOWN							
			1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8
55	409.2500	455.00	1	1	1	0	0	0	1	1	1	0	0	1	1	1	1	1	0	0
56	415.2500	461.00	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	1	0	1
57	421.2500	467.00	0	0	0	1	1	1	0	1	1	0	0	1	1	1	1	1	0	0
58	427.2500	473.00	0	0	0	0	1	1	0	1	1	0	0	1	1	1	1	1	0	1
59	433.2500	479.00	1	0	0	1	0	1	0	1	1	0	0	1	1	1	1	1	0	0
60	439.2500	485.00	1	0	0	0	0	1	0	1	1	0	0	1	1	1	1	1	0	1
61	445.2500	491.00	0	1	0	1	1	0	0	1	1	0	0	1	1	1	1	1	0	0
62	451.2500	497.00	0	1	0	0	1	0	0	1	1	0	0	1	1	1	1	1	0	1
63	457.2500	503.00	1	1	0	1	0	0	0	1	1	0	0	1	1	1	1	1	0	0
64	463.2500	509.00	1	1	0	0	0	0	0	1	1	0	1	1	1	1	1	1	0	1
65	469.2500	515.00	0	0	1	1	1	1	1	0	1	0	1	1	1	1	1	1	0	0
66	475.2500	521.00	0	0	1	0	1	1	1	0	1	0	1	1	1	1	1	1	0	1
67	481.2500	527.00	1	0	1	1	0	1	1	0	1	0	1	1	1	1	1	1	0	0
68	487.2500	533.00	1	0	1	0	0	1	1	0	1	0	1	1	1	1	1	1	0	1
69	493.2500	539.00	0	1	1	1	1	0	1	0	1	0	1	1	1	1	1	1	0	0
70	499.2500	545.00	0	1	1	0	1	0	1	0	1	0	1	1	1	1	1	1	0	1
71	505.2500	551.00	1	1	1	1	0	0	1	0	1	0	1	1	1	1	1	1	0	0
72	511.2500	557.00	1	1	1	0	0	0	1	0	1	0	1	1	1	1	1	1	0	1
73	517.2500	563.00	0	0	0	0	0	0	1	0	1	0	1	1	1	1	1	1	0	0
74	523.2500	569.00	0	0	0	1	1	1	0	0	1	0	1	1	1	1	1	1	0	1
75	529.2500	575.00	1	0	0	0	1	1	0	0	1	0	1	1	1	1	1	1	0	0
76	535.2500	581.00	1	0	0	1	0	1	0	0	1	0	1	1	1	1	1	1	0	1
77	541.2500	587.00	0	1	0	0	0	1	0	0	1	0	1	1	1	1	1	1	0	0
78	547.2500	593.00	0	1	0	1	1	0	0	0	1	0	1	1	1	1	1	1	0	1
79	553.2500	599.00	1	1	0	0	1	0	0	0	1	0	1	1	1	1	1	1	0	0
80	559.2500	605.00	1	1	0	1	0	0	0	0	1	0	1	1	1	1	1	1	0	1
81	565.2500	611.00	0	0	1	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0
82	571.2500	617.00	0	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	1
83	577.2500	623.00	1	0	1	0	1	1	1	1	0	0	1	1	1	1	1	1	0	0
84	583.2500	629.00	1	0	1	1	0	1	1	1	0	0	1	1	1	1	1	1	0	1
85	589.2500	635.00	0	1	1	0	0	1	1	1	0	0	1	1	1	1	1	1	0	0
86	595.2500	641.00	0	1	1	1	1	0	1	1	0	0	1	1	1	1	1	1	0	1
87	601.2500	647.00	1	1	1	0	1	0	1	1	0	0	1	1	1	1	1	1	0	0
88	607.2500	653.00	1	1	1	1	0	0	1	1	0	0	1	1	1	1	1	1	0	1
89	613.2500	659.00	0	0	0	1	0	0	1	1	0	0	1	1	1	1	1	1	0	0
90	619.2500	665.00	0	0	0	0	0	0	1	1	0	0	1	1	1	1	1	1	0	1
91	625.2500	671.00	1	0	0	1	1	1	0	1	0	0	1	1	1	1	1	1	0	0
92	631.2500	677.00	1	0	0	0	1	1	0	1	0	0	1	1	1	1	1	1	0	1
93	637.2500	683.00	0	1	0	1	0	1	0	1	0	0	1	1	1	1	1	1	0	0
94	643.2500	689.00	0	1	0	0	0	1	0	1	0	0	1	1	1	1	1	1	0	1
100	649.2500	695.00	1	1	0	1	1	0	0	1	0	0	1	1	1	1	1	1	0	0
101	655.2500	701.00	1	1	0	0	1	0	0	1	0	0	1	1	1	1	1	1	0	1
102	661.2500	707.00	0	0	1	1	0	0	0	1	0	0	1	1	1	1	1	1	0	0
103	667.2500	713.00	0	0	1	0	0	0	0	1	0	0	1	1	1	1	1	1	0	1
104	673.2500	719.00	1	0	1	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0
105	679.2500	725.00	1	0	1	0	1	1	1	0	0	0	1	1	1	1	1	1	0	1
106	685.2500	731.00	0	1	1	1	0	1	1	0	0	0	1	1	1	1	1	1	0	0
107	691.2500	737.00	0	1	1	0	0	1	1	0	0	0	1	1	1	1	1	1	0	1
108	697.2500	743.00	1	1	1	1	1	0	1	0	0	0	1	1	1	1	1	1	0	0
109	703.2500	749.00	1	1	1	0	1	0	1	0	0	0	1	1	1	1	1	1	0	1
110	709.2500	755.00	0	0	0	0	1	0	1	0	0	0	1	1	1	1	1	1	0	0
111	715.2500	761.00	0	0	0	1	0	0	1	0	0	0	1	1	1	1	1	1	0	1
112	721.2500	767.00	1	0	0	0	0	0	1	0	0	0	1	1	1	1	1	1	0	0
113	727.2500	773.00	1	0	0	1	1	1	0	0	0	0	1	1	1	1	1	1	0	1
114	733.2500	779.00	0	1	0	0	1	1	0	0	0	0	1	1	1	1	1	1	0	0

OUTPUT CHANNEL SELECTION

CHNL NO	VIDEO	LO	SWITCH ONE 1 = ON = DOWN 1	2	3	4	5	6	7	8	9	10	SWITCH TWO 1 = ON = DOWN 1	2	3	4	5	6	7	8
115	739.2500	785.00	0	1	0	1	0	1	0	0	0	0	1	1	1	1	1	1	0	1
116	745.2500	791.00	1	1	0	0	0	1	0	0	0	0	1	1	1	1	1	1	0	0
117	751.2500	797.00	1	1	0	1	1	0	0	0	0	0	1	1	1	1	1	1	0	1
									UHF											
14	471.2500	517.00	1	0	0	1	1	1	1	0	1	0	1	1	1	1	1	1	0	1
15	477.2500	523.00	0	1	0	0	1	1	1	0	1	0	1	1	1	1	1	1	0	0
16	483.2500	529.00	0	1	0	1	0	1	1	0	1	0	1	1	1	1	1	1	0	1
17	489.2500	535.00	1	1	0	0	0	1	1	0	1	0	1	1	1	1	1	1	0	0
18	495.2500	541.00	1	1	0	1	1	0	1	0	1	0	1	1	1	1	1	1	0	1
19	501.2500	547.00	0	0	1	0	1	0	1	0	1	0	1	1	1	1	1	1	0	0
20	507.2500	553.00	0	0	1	1	0	0	1	0	1	0	1	1	1	1	1	1	0	1
21	513.2500	559.00	1	0	1	0	0	0	1	0	1	0	1	1	1	1	1	1	0	0
22	519.2500	565.00	1	0	1	1	1	1	0	0	1	0	1	1	1	1	1	1	0	1
23	525.2500	571.00	0	1	1	0	1	1	0	0	1	0	1	1	1	1	1	1	0	0
24	531.2500	577.00	0	1	1	1	0	1	0	0	1	0	1	1	1	1	1	1	0	1
25	537.2500	583.00	1	1	1	0	0	1	0	0	1	0	1	1	1	1	1	1	0	0
26	543.2500	589.00	1	1	1	1	1	0	0	0	1	0	1	1	1	1	1	1	0	1
27	549.2500	595.00	0	0	0	1	1	0	0	0	1	0	1	1	1	1	1	1	0	0
28	555.2500	601.00	0	0	0	0	1	0	0	0	1	0	1	1	1	1	1	1	0	1
29	561.2500	607.00	1	0	0	1	0	0	0	0	1	0	1	1	1	1	1	1	0	0
30	567.2500	613.00	1	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	1
31	573.2500	619.00	0	1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0
32	579.2500	625.00	0	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	0	1
33	585.2500	631.00	1	1	0	1	0	1	1	1	0	0	1	1	1	1	1	1	0	0
34	591.2500	637.00	1	1	0	0	0	1	1	1	0	0	1	1	1	1	1	1	0	1
35	597.2500	643.00	0	0	1	1	1	0	1	1	0	0	1	1	1	1	1	1	0	0
36	603.2500	649.00	0	0	1	0	1	0	1	1	0	0	1	1	1	1	1	1	0	1
37	609.2500	655.00	1	0	1	1	0	0	1	1	0	0	1	1	1	1	1	1	0	0
38	615.2500	661.00	1	0	1	0	0	0	1	1	0	0	1	1	1	1	1	1	0	1
39	621.2500	667.00	0	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	0	0
40	627.2500	673.00	0	1	1	0	1	1	0	1	0	0	1	1	1	1	1	1	0	1
41	633.2500	679.00	1	1	1	1	0	1	0	1	0	0	1	1	1	1	1	1	0	0
42	639.2500	685.00	1	1	1	0	0	1	0	1	0	0	1	1	1	1	1	1	0	1
43	645.2500	691.00	0	0	0	0	0	1	0	1	0	0	1	1	1	1	1	1	0	0
44	651.2500	697.00	0	0	0	1	1	0	0	1	0	0	1	1	1	1	1	1	0	1
45	657.2500	703.00	1	0	0	0	1	0	0	1	0	0	1	1	1	1	1	1	0	0
46	663.2500	709.00	1	0	0	1	0	0	0	1	0	0	1	1	1	1	1	1	0	1
47	669.2500	715.00	0	1	0	0	0	0	0	1	0	0	1	1	1	1	1	1	0	0
48	675.2500	721.00	0	1	0	1	1	1	1	0	0	0	1	1	1	1	1	1	0	1
49	681.2500	727.00	1	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	0	0
50	687.2500	733.00	1	1	0	1	0	1	1	0	0	0	1	1	1	1	1	1	0	1
51	693.2500	739.00	0	0	1	0	0	1	1	0	0	0	1	1	1	1	1	1	0	0
52	699.2500	745.00	0	0	1	1	1	0	1	0	0	0	1	1	1	1	1	1	0	1
53	705.2500	751.00	1	0	1	0	1	0	1	0	0	0	1	1	1	1	1	1	0	0
54	711.2500	757.00	1	0	1	1	0	0	1	0	0	0	1	1	1	1	1	1	0	1
55	717.2500	763.00	0	1	1	0	0	0	1	0	0	0	1	1	1	1	1	1	0	0
56	723.2500	769.00	0	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	0	1
57	729.2500	775.00	1	1	1	0	1	1	0	0	0	0	1	1	1	1	1	1	0	0
58	735.2500	781.00	1	1	1	1	0	1	0	0	0	0	1	1	1	1	1	1	0	1
59	741.2500	787.00	0	0	0	1	0	1	0	0	0	0	1	1	1	1	1	1	0	0
60	747.2500	793.00	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1	0	1
61	753.2500	799.00	1	0	0	1	1	0	0	0	0	0	1	1	1	1	1	1	0	0

BASIC TRANSMITTER MAINTENANCE

Contents:

1. GENERAL

When the transmitter was installed and commissioned it was in proper operating condition. During final tests, all circuits were checked for optimum adjustment to ensure both peak performance and conservative operation of components, and test results were recorded for future reference.

Given reasonable care and attention the transmitter will provide efficient and reliable service for many years.

Experience indicates that equipment which is regularly and carefully maintained is far less likely to be subject to sudden failure than that which is operated continuously without regard to basic maintenance requirements. It is therefore desirable that a detailed preventive maintenance program be established to ensure that the original efficiency and picture quality is maintained throughout the life of the equipment.

Preventive maintenance techniques do not necessarily involve extensive dismantling of the various assemblies; on the contrary, this practice is to be discouraged unless a valid reason exists for doing so. Preventive maintenance is more concerned with detailed physical inspection and the general observation of the equipment during and after operation, to detect the presence of any abnormality which if not corrected might later develop more serious proportions, resulting in operational failure.

In preparing any maintenance program, the frequency and scope of the inspections must be determined, and to a great degree will be influenced by site location and the station's market parameters consequently its hours of operation, equipment configuration, and technical personnel deployment. For example, is the station on the air for 24 hours a day, are there main/standby transmitters, and are they attended or unattended? In general, the following routines should form the basis of any maintenance program.

2. DAILY

At an attended site, the operator is afforded the opportunity to make daily or more frequent checks on the equipment and thereby increase his/her familiarity with its operation. The "transmitter log" entries made during these checks would include all meter readings, also any irregularity in performance, or in picture quality, for later analysis. An unattended site where equipment is operated by remote control, and monitored by telemetry and a high quality off-air receiver or demodulator located within the primary coverage area at the studio site, can also be continuously checked for performance by studio technical personnel, using VITS or VBI test signals encoded into the video signal vertical blanking interval.

3. WEEKLY

If the site is unattended, and VITS or VBI test equipment is not available, many broadcasters schedule their operational tests and transmitter inspections to be performed once a week during weekend hours, such as from midnight Sunday to six AM Monday, depending on their market conditions.

If there is an emergency alternator, it should be checked out completely, and run for at least an hour under full load. The checking of this unit should include the condition of its battery, its ease of starting (and its Winter starting enhancers such as block heater, battery warmer, fuel antifreeze), its engine oil level and condition (see "Monthly" below), its radiator coolant condition and level; and its fuel tank should be topped up. This simple check will serve as a reminder to order more fuel if necessary.

4. MONTHLY

In addition to the normal operational tests, thorough physical inspection of every piece of equipment should be made, with all power turned off. All surfaces should be dusted off or wiped down, terminal boards checked for loose connections, and all components examined for any evidence of overheating. Air filter media should be inspected and replaced if necessary. High pressure air, not over 20 psi, may be used with discretion to dislodge dust from inaccessible places.

Change the engine oil and oil filter in the emergency alternator, if it has been operated longer than its manufacturer's recommended time since this was last done. In the absence of recommendations, don't let it run more than about 100 hours between oil changes. When put into perspective, 100 hours is the time logged by a vehicle running 6000 miles at 60 mph. Oil is cheap, when compared with engine parts.

5. SEMI-ANNUALLY and ANNUALLY

Check all external RF connections for tightness. Test the antenna and transmission line with a transmission test set or network analyzer if one is available, to identify any potential problems with the antenna or line. Inspect and clean contacts on all switches and contactors; carefully redress contact surfaces if pitted.

Change the engine oil in the emergency alternator to summer or winter grade, depending on the season. Also inspect and if necessary replace, its fuel filter and air filters.

Inspection and maintenance (tighten all bolts, replace obstruction light bulbs) of the tower, antenna, and grounding system, should be conducted annually.

6. TRANSMITTER COOLING SYSTEM

Air filter material supplied with some transmitter cabinets has been impregnated with a polyester coating, which is designed to attract and hold very fine particles that may be in the air flow. This air filter material should be inspected every month or oftener, and replaced when dirty. Frequency of inspection and replacement, of course, will depend on your particular local environmental conditions.

All cooling fans in the transmitter are Rotron™ or equivalent, and all are fitted with sealed bearings requiring no lubrication during the lifetime of the motor.

7. STATIC 1, EQUIPMENT 0: Static vs Sensitive devices...

Care must be taken at all times because this equipment contains static-sensitive CMOS and FET devices. Here is a brief tutorial on static, particularly pertinent to CMOS and other MOS device handling:

1. It is important to avoid surroundings or situations in which static can be generated. The building floor should have grounded conductive floor coverings, or a grounded conductive mat placed on the floor in front of the bench. Then, the bench itself should also have a grounded conductive mat on which the equipment is placed. Anybody working on the equipment should wear either a grounded wrist strap (preferably) or conductive overshoes. Vacuum cleaner tools should all be conductive and grounded to avoid static from air motion. (Vacuum cleaners made for computer servicing would be suitable). Soldering iron tips must be grounded. Use properly maintained soldering equipment that has a three wire, grounding plug, verifying low path resistance between ground and the tip with an ohmmeter every time this equipment is used.

2. The average person wearing rubber-soled shoes and walking across a woolen or synthetic carpet or untreated vinyl tiled floor is able to generate voltages in excess of 15 to 20 kV. Most MOS devices will suffer puncture of the oxide insulating their gates, at 20 to 40 V. Many CMOS devices are fabricated with built-in zeners which will clamp foreign voltages, but the amount of energy that must be dissipated may easily exceed the rating of this protection. It is therefore prudent to assume that little or no static protection exists in a CMOS device and therefore you must provide your own.

3. A typical unprotected gate of a CMOS logic IC has an input capacitance of about 5 pF and can self-immolate at 20 V, so the energy to destroy the IC is given by the expression $W = CV^2/2$ where W is in watt-seconds, C is in farads, and V is in volts. One watt-second is also known as a Joule. Substituting numeric quantities results in $W = 5 \times 10^{-12} \times 20 \times 20 \div 2 = 1 \times 10^{-9}$ Joule per gate. Stored energy in the approximately 100 pF capacitance of the human body charged to 15 kV, becomes $W = 100 \times 10^{-12} \times 15000 \times 15000 \div 2 = 11.25 \times 10^{-3}$ Joule. *Eleven and a quarter **million** times more energy than is needed to destroy one gate input!* Some of us may therefore be led to conclude that a body can annihilate more than eleven million CMOS gate oxides all at once.

4. This is serious stuff. To avoid destroying CMOS devices, the human body must be grounded first. That is the reason for all the "grounded surroundings" we suggest in paragraph 1. Don't forget, though, that a circuit board has conductive metallic paths connecting into the CMOS parts, which makes them all susceptible to mass devastation as easily as would be the destruction of any one CMOS chip all by itself. Always ground yourself first, then the board.

5. Avoidance of static exposure of boards and CMOS devices is easier. Ensure that boards are always kept in conductive bags or boxes when not in place in the equipment, and that spare CMOS ICs are in conductive chip carriers or plugged into conductive foam. Be careful about this point; many plastic foams can be coloured black, but may still be an insulator. Use your ohmmeter to be sure.

   Don't accept any devices whose pins are punched through aluminum foil into foam plastic. People who don't know better have used this method for shipment and storage of devices, but it cannot be depended upon, because many times the holes made in the foil by the device pins become enlarged simply from the motion of pressing the pins into the foam, and won't make contact any longer. When the device is withdrawn from the foam, the friction of the plastic against the pin can generate enough charge to cause puncture and consequent failure of the CMOS gate insulation.

6. Identical statements to those made in the above paragraphs apply to RF power MOSFETs, and although the gates of these devices might appear to be considerably more robust than those of the average CMOS logic device, this is due only to the much greater gate area and consequently greater input capacitance. The same order of magnitude of gate oxide breakdown voltage exists for RF power FETs as for small CMOS devices, therefore use the same order of care in handling.

7. STATIC 1, EQUIPMENT 0: Static vs Sensitive devices... (continued).

7. Believe it or not, ordinary analog meters can also be affected by static. Years ago, meters were made with glass faceplates and had movements that were relatively insensitive, so were affected little by stray static charges accumulating on the glass. Today, almost all meters are made with clear plastic faceplates and many of these, such as the sensitive 50 µA ones we use, have extremely compliant moving parts, thus can be easily caused to read incorrectly from a static charge on their front surfaces. This charge can be readily generated by simply cleaning the meter face.

It is important that meter accuracy be maintained within reasonable tolerances, because you as a broadcaster are responsible for ensuring that the transmitter complies with all regulations pertinent to its operation, and the easiest way of tracking its performance is from its meter readings.

It is recommended for better accuracy that meter faces be given an anti-static treatment, either by cleaning with an antistatic cleaning agent, or sprayed with an antistatic coating, or both.

Suitable antistatic chemicals should be available through your nearest electronics parts distributor, and typically carry such names as *"Zero Charge"* from Tech Spray™, *"Destaticizing Lens Cleaner"* from G-C™, and *"420 Antistatic Screen Cleaner"* from M.G. Chemicals™. Check them out. Similar brands should also be available in most reputable computer shops or office supply stores.

CAUTION: Antistatic cleaners or treatment chemicals must not contain organic solvents such as acetone, MEK, methyl isobutyl ketone, benzene, toluene, xylene, ethyl cellosolve acetate, or many of the chlorinated hydrocarbons including ethylene dichloride and 1,1,1 trichloroethane, as these solvents will etch or even dissolve most of the plastics used for meter faceplates.

Our meter supplier recommends and uses a harmless coating treatment which it keeps in stock under its catalog number FS 681. This coating is otherwise known to the trade as *ANSTAC 2-M.*

ANSTAC 2-M is made by *Chemical Development Corp.*
22 Portsmouth Rd.
Amesbury MA 01913 U.S.A.
Phone (508) 388-2221.

8. FIELD REPLACEMENT OF FETs and SURFACE MOUNT COMPONENTS:

TOXIC MATERIALS WARNING... Thermal management in certain RF devices in this equipment is accomplished through the use of Beryllium Oxide ceramic material. Beryllium Oxide is a hard white ceramic used as insulation for heatsinking of RF power semiconductors. *Beryllium Oxide is a POISON if taken into the body. In case of accidental breakage, DO NOT INHALE THE RESULTING BERYLLIUM DUST and AVOID GETTING BERYLLIUM DUST IN YOUR MOUTH. DO NOT LET BERYLLIUM DUST INTO YOUR BLOOD STREAM THROUGH CUTS OR OPEN WOUNDS !! Seek and get IMMEDIATE medical attention if the dust enters your body in any manner.* Avoid cuts by wearing gloves while picking up the broken pieces. Be careful - do not inhale dust while replacing or emptying vacuum cleaner filter bags, and wash your hands thoroughly afterward. Wash your hands thoroughly after replacing RF power devices. Dispose of defective RF power devices only through approved toxic waste facilities.

If for any reason it should become necessary to change a FET in the field, we strongly recommend following the handling precautions outlined on the next few pages:

Any FET can be damaged by static discharge. It is therefore mandatory that static-free handling techniques as discussed in the foregoing "static 1, equipment 0" tutorial should be routine, and that soldering equipment must be suitable for insulated gate MOSFET work, and must be properly maintained.

a) Keep FETs in their anti-static containers until ready to install. The module and the technician should both be earthed/grounded. Observe the handling procedures discussed in Part 7 above, including the use of antistatic bench coverings, conductive overshoes, grounded wrist straps, etc.

b) The soldering iron tip MUST be at earth/ground potential at all times, that is, absolutely no AC voltage must be available on the tip. Test with an ohmmeter each time the iron is used; the test must indicate continuity from tip to ground. Special battery operated soldering irons are also available to avoid any chance of AC voltage being present on the tip, but these are not satisfactory for RF FET work as they do not heat to sufficiently high temperatures. Use an accurately controlled temperature regulated low voltage soldering iron, and set it for about 700° to 750°F.

8.1 FET Replacement Hints and Advice:

a) Back off the FET pressure plate grub screw until the pressure plate under the clamping bridge is able to move freely. Certain IPA boards use different FETs that have a different mounting flange, thus do not require pressure plate nor clamping bridge.

b) Remove the two screws holding the clamping bridge and FET to the heatsink, then salvage the clamping bridge, pressure plate, screws, and spring lockwashers.

c) If you are repairing a High Band module with pushpull amplifier(s), make careful note of the location of hairpin inductor L9 in relation to the FET, measuring the spacing of its two legs and its distance from the FET case. (Low Band modules do not use L9). To minimize board damage, use a sharp "screwdriver" tip on the soldering iron, and carefully help it along with a solder pick tool, working it under one tab first, then once that tab is free and FET mounting screws have been removed, the FET can be rocked gently, allowing other tabs to be easily unsoldered in turn. The defective FET can now be lifted out. Remove excess solder with "no clean" fluxed copper braid wick.

d) Clean the FET heatsink area thoroughly with alcohol ***(CAUTION:- ALCOHOL VAPOUR IS TOXIC),*** and inspect to ensure that there are no defects nor debris present and that all old thermal compound has been completely removed. The board solder areas should be lightly and uniformly pre-tinned.

e) Apply only enough heatsink thermal compound (supplied with the transmitter) to the new FET base and to the heatsink, that will result in a thin uniform coating on the FET base and heatsink. The metal should be faintly visible through the coating on both surfaces. Apply it sparingly; too much compound is every bit as bad for thermal transfer as an insufficient amount would be. To refresh your memory: thermal compound fills the tiny little tool marks left by the milling machine on the heatsink surface, but only enough that no microscopic air spaces remain between FET and heatsink. Heat transfer depends partly on the distance through which the heat must travel from the FET to the heatsink; too much compound effectively adds more distance, which could result in overheating.

f) Lightly pre-tin and gently bend the FET tabs upward slightly, so that the tabs and the circuit board do not prevent the FET from making proper thermal contact with the heatsink.

g) Install the pressure plate and the clamping bridge over the new FET. ***Install the pressure plate so that the raised marks left by its grub screw are facing AWAY from the FET ceramic case, otherwise the case could crack.*** Be sure that screw holes in the clamping bridge, the FET, and the heatsink are all in line and clear; you will know, because the screws should turn easily while being installed.

8.1 FET Replacement Hints and Advice: (continued).

g) When all holes are lined up properly, carefully finger-tighten the two screws and spring lockwashers.

h) Torque the clamping bridge screws evenly to 4.5 inch-pounds. This amount is recommended by the FET manufacturer to allow for thermal expansion of the device. 4.5 inch-pounds also will avoid the possibility of stripping the threads in the heatsink, or breaking the screws. *Use only the special screwdriver-handle torque wrench and its two keys that came with the transmitter for this work; if that wrench becomes lost or strayed, then obtain one that is intended only for use on delicate electronic or aircraft assemblies. Do not get an automotive torque wrench because it is not capable of being adjusted to small torque values. Do not under any circumstances use a regular Allen key or screwdriver, nor depend on the feeling in your fingertips to judge the applied torque. Your hands may be much stronger than you think.*

i) Ensure that the pressure plate is centered evenly, between the clamping bridge and the FET, and tighten the grub screw. Torque it also to 4.5 inch-pounds.

j) Solder each tab to the board in turn, using a solder-pick tool to hold each tab in contact with the board while soldering; apply enough heat to ensure that the pre-tin solder on the boards flows, and apply just enough new solder to give a "butt" free joint. Set the bias resistances at their highest values to get minimum startup current (see step "l" below), and then set the stage bias currents as described in the applicable PA module, Visual Driver, or IPA section of this manual. For a High Band module, position and solder L9 as accurately as possible in its original location.

k) Use eutectic tin-lead 63/37 solder (preferred, but if 63/37 is not available, 60/40 is acceptable). Current manufacturing process at LARCAN uses AIM™ (American Iron & Metal Company Inc.) 63/37 solder containing a "no clean" flux which becomes inert during soldering, therefore does not require subsequent board cleaning. Other good brands are Kester™ and Ersin Multicore™; equivalent 63/37 or 60/40 "no clean" tin-lead solders also should be available from other vendors. If "no-clean" is unavailable, "RMA" (Resin Mildly Activated) core solder can be used; carefully clean the flux residue from the board with an environmentally friendly board cleaning solvent, applied sparingly.

Most commercially available alcohols are reasonable flux solvents that are harmless to circuit boards, and are CFC free and environment-friendly. Proprietary circuit board cleaning solvents are available that also meet these objectives; check with your local electronics parts dealer.

Inexpensive cotton swabs (available in drug stores or supermarkets) can be used for wiping the solvent over the area to be cleaned, then a stiff bristle brush (an old toothbrush) can be used to scrub if necessary. Use the swabs for mopping up the residue. Clean the board thoroughly, then inspect and clean it again; don't merely rearrange the residue. *Be careful - do not allow solvent to run under power transistors where it can dilute the heatsink compound.*

CAUTION: VAPOURS FROM ALCOHOLS AND OTHER SOLVENTS ARE TOXIC AND FLAMMABLE... DO NOT INHALE! IF YOU ARE A SMOKER, DO NOT SMOKE WHILE USING FLAMMABLE SOLVENTS! USE ALL SOLVENTS ONLY IN A PROPERLY VENTILATED LOCATION!

l) Finally, if you have not already done so, set the bias potentiometers for the stage to maximum resistance so that when power is applied, the FET will start at its lowest current. Then set the bias as described in the RF Power Amplifier, Visual/Vision Driver, and IPA RF amplifier sections of this manual. We mentioned this procedure during step "j" above as well, because some circumstances may make it simpler to set the bias in a High Band PA before replacing L9. When L9 is in place, each half of the stage will need to be adjusted concurrently with a bias short on the opposite side (to turn off the side not being set), otherwise the DC path through L9 makes the procedure impossible. This is explained in the applicable PA, Visual Driver, or IPA section of the manual.

8.2 Surface-mount Components Hints and Advice:

Failures of small surface mounted resistors on boards where they were companion to other components having leads, were traced to mechanical overstress of their end caps as a result of the soldering procedure to the component. Our manufacturing procedure has since been altered to fix this problem, and despite our embarrassment, we think it is important that you should know about it. For your information:

1. It is critical that surface mount components are soldered onto a clean flat surface. Use a suction device followed by fluxed braid wick material to ensure that all old solder is removed from pads of the board.

2. If this is not possible due to the presence of other components, try to clean at least one of the pads so it is flat (don't solder this end yet), then solder the other (solder-laden) pad FIRST, pressing the component down into the puddle of solder. (Plain wooden toothpicks will serve well as tools to apply pressure to components while soldering them). The remaining flat pad then can be soldered.

   To ensure minimum stress on any SM component, always be certain that the component is laying flat in contact with the board before soldering except as above when it is necessary to melt the solder on a pad first, and *never force it unless both ends of the component are free to move.*

3. If all the pads are loaded with solder, it will be necessary to heat all terminals of the component simultaneously. Check with your local electronic parts dealer for special soldering iron tips and/or other attachments (in addition to toothpicks) that will aid in surface-mount work.

4. Always keep the tip of your iron clean and freshly tinned (wetted), for maximum heat transfer.

9. REPLACEMENT PARTS

All component parts in the transmitter are available from:

LARCAN Inc., 228 Ambassador Drive, Mississauga, Ontario, Canada L5T 2J2;
Phone (905)-564-9222, or FAX (905)-564-9244, during and after normal working hours.

To expedite delivery of your order, especially if you call after hours and get our answering service, please leave a number where we can return your call, and please identify the parts requested as specifically and completely as possible.

Our Renewal Parts Department may be able to more quickly identify your requirement if the assembly name and number where the part is used, and any applicable revision number for that assembly, are stated in addition to the part's symbol number, description, and its drawing and part number as listed.

Although LARCAN can supply any part when required, in many instances it may be more conveniently obtained from a local source. Part numbers of replaceable components used in LARCAN equipment are almost always the catalog numbers of the various parts manufacturers, with the rare exception of proprietary items such as tightly specified RF power FETs, crystals, or analog 50 µA meters. If your local dealer or distributor should encounter problems and you require further information, please feel free to call upon anyone in our customer service department at the telephone number given above. We have assumed that reliable dealers of electronic components are located in or near your station market area, and that they maintain adequate stocks of "commodity" items such as resistors and capacitors. We have further assumed that you prefer to obtain most non-proprietary replacement parts from your local dealer, therefore we have listed very few such commodity items here, but we believe the following information might be useful to you during your spares requirements planning:

9. REPLACEMENT PARTS (continued).

Capacitors: Generally, most ceramic or film capacitors are reliable, and "5% spares" (1 spare for each 20 identical parts, and 1 each if less than 20) will be found to be a satisfactory inventory level. This includes ceramic, polystyrene, polyester, polycarbonate, polypropylene, and (usually) solid electrolyte tantalums.

Reliability notwithstanding, it is worth the trouble to know exactly what is inside your replacement capacitors. Use a bridge if available, to measure their capacitance (especially for electrolytics), stray inductance, and ESR (equivalent series resistance). Measure leakage current at rated voltage.

Aluminum electrolytics require further consideration. When you consider aluminum electrolytics, usually you will need to consider their operating temperature as well:

The transmitter cooling system was designed to provide worst-case internal temperatures no higher than 60°C, in all modules of the transmitter. This cooling is based on 45°C maximum ambient air temperature and normal air flow through the intakes of the transmitter cabinet.

Most capacitor vendors state that 60°C or lower operating temperatures can be expected to give service lifetimes for their aluminum electrolytic capacitors of ten years or longer, but as their operating temperature increases to the specified maximum of 85°C, the specified service lifetime decreases to a mere 1000 hours.

You may therefore wish to increase your spares level for aluminum electrolytic capacitors if site ambient temperatures are consistently higher than 40°C, because if cooling air flow becomes restricted due to filter saturation, it is entirely possible for on-board temperatures to reach or exceed 85°C. This is why your maintenance program MUST include the regular inspection and replacement of filter media.

Resistors: Experience has shown that a spares stock to the 5% spares level (1 spare for each 20 of the same thing, and 1 of each when less than 20) for each value and size of resistor, is usually sufficient.

Incidentally, when a molded carbon composition resistor (as specified on LARCAN drawings 3R152, 3R77, 3R78, or 3R79) such as those made by Ohmite™ or Allen-Bradley™, is used in an RF circuit, it is not necessarily good practice to make substitution without knowing exactly what the replacement resistor is; in the past, certain makes of FILM resistors have been touted as replacements for molded composition, but unless the resistors are specifically made to be non-inductive, they may be unsuitable because some film resistors are laser-trimmed on a lathe to final value. The resulting helix has significant inductance which can make the resistor unsatisfactory for use in VHF circuits.

It is worth the trouble to know exactly what is inside your replacement components. Use an RF bridge if available, to measure any stray inductance and/or capacitance associated with your replacement resistors.

Spare Parts: The list on the following pages began as computer output listings "STS10B, STS50B, etc." from our database used to compile the parts list data for each Section of the manual, and the computer has classified recommended spare parts and suggested their quantities, by part number. Because the manual is written to apply to the entire low powered basic series of transmitters, we have made a composite suggested spares list by simply combining the computer's Low Band and High Band recommendations.

Because we believe that you are smarter than our computer, we suggest that the parts lists in each Section booklet comprising the manual should be thoroughly and rigorously scrutinized, with the intention of taking your specific local conditions, and your usual dealers or suppliers inventories and order turnaround times into account, before commitment to a sizable inventory of replacement parts.

10. SPARE PARTS RECOMMENDATIONS:

Although it is our sincere hope that they will never be found necessary, it is recommended that a minimum spares stock of the following items be kept on hand.

The STS50B recommendation which follows is for a minimum parts inventory, mostly semiconductors, for a 50 W transmitter built to operate from 105-120 VAC, 1 ϕ, 50/60 Hz, in the frequency ranges encompassing Band I (Low Band channels 2 thru 6) and Band III (High Band channels 7 thru 13). The 10 watt unit uses the same parts as the 50 watt, so the list also applies to the TTS10B and TRS10B models, except for the AC fuse. In the list, the AC fuse for the 50W is marked with a † and the AC fuse for the 10W with a ‡.

The STS50BG1 High Band suggested spares list has one part specific to High Band that naturally does not appear in the STS50BG2 (chans 2-4) or in the STS50BG3 (chans 5&6) Low Band lists, so we have marked that specific part in our composite list with "*" for identification. If your transmitter is High Band (channels 7-13), you may wish to stock all the parts listed; if you have a Low Band unit, simply leave out the "*" part. You may also wish to add more items to the list. Page 10 is available for you to do this.

Recommended quantities for fuses are based on actual usage, but you may find it more economical to purchase them in standard boxes of quantity 5 per value, and replenish when the quantity on hand is equal to the quantity on the list.

LARCAN INC.
Parts List

Level	Parent No.	Description	Quantity
0	40D2168	10 VHF AMPLIFIER COMPOSITE LIST - SUGGESTED SPARES	1 EA

Symbol	Part No.	Description	Quantity
	1N4001	DIODE 1A 50V	2 EA
	1N4148	DIODE SWITCHING	2 EA
	1N5357B	DIODE ZENER 20V 5W	1 EA
	312 007	FUSE 7A 250V <FAST> for RF amplifier	2 EA
	DS2E-SL2-DC12V	RELAY 2 FORM C LATCHING 12VDC	1 EA
	DS2E-S-DC12V	RELAY 2 FORM C MOMENTARY 12VDC	1 EA
	HP5082-2800	DIODE SCHOTTKY see ECG503 or 1N5711	2 EA
	ILQ1	IC OPTO ISOLATOR	1 EA
	LM358N	IC OP AMP DUAL	2 EA
	MC1455P	IC TIMER see 555	1 EA
	MC48B3	FAN, 48 VDC ROTRON	1 EA
	MC7812CT	IC +12 VOLT REG	1 EA
	MC7824CT	IC +24 VOLT REG	1 EA
	MDL-3	FUSE 3A 250V GLASS <SLOW>	1 EA
	MDL 1/4	FUSE 1/4A 250V GLASS <SLOW> for control ps	1 EA
	MHW6185	IC RF AMP	1 EA
	MPS8598	TRANSISTOR PNP GEN PURP	2 EA
	MSC154K	THERMISTOR	2 EA
	MWA330	IC RF AMP in HB preamplifier only	1 EA
	RXE090	PROTECTOR RAYCHEM (control board fuse)	1 EA
	SRF3943-2	TRANSISTOR N-ch DUAL RF POWER FET	1 EA

Larcan Communication
Final Handbook Parts List

Level	Item No.	Description		Quantity
0	40D218061	1 WATT AMP ASSY VHF LB	R-3	1 EA

Line	Symbol	Item No.	Description		Quantity
1		40D2180	ASSEMBLY DRAWING	R-0	0 EA
10		40D2176P1	FRONT PANEL	R-1	1 EA
11		40D2178P1	CHASSIS	R-1	1 EA
12		40D2179P1	REAR PANEL	R-0	1 EA
13		40D2177P1	COVER TOP	R-0	1 EA
15		10A2078P1	SPACER PLATE	R-0	1 EA
16		10A2075P1	KEEPER PLATE	R-0	1 EA
17		XRM-210N-00	SWITCH		1 EA
18		559-0201-001	LED GREEN		1 EA
20		HB24-1.2-A	POWER SUPPLY 24V 1.2A POWER 1		1 EA
22		10A145366	PCB PHASE SHIFT ASSY (MX1V)	R13	1 EA
23		10A125064	DIR COUPLER ASSY	R-6	1 EA
26		20B123565	METERING BOARD FOR MX1V	R-11	1 EA
29		20B71262	BANDPASS FILTER ASM LB	R-3	1 EA
34		86350	CONNECTOR BNC BULKHEAD		2 EA
36		2001-5032-00	CONNECTOR		3 EA
38		216B8880P22	METER	R-9	1 EA
39		MDL-1	FUSE 1A 230V SLOW		1 EA
40		6J4	LINE FILTER, 120/240V		1 EA
42		20B2449	WIRING DIAGRAM	R-0	0 EA
43		RL10A207261	RUNNING LIST	R-0	0 EA

Larcan Communication
Final Handbook Parts List

Level	Item No.	Description		Quantity
0	40D218061	1 WATT AMP ASSY VHF LB	R-3	1 EA
1	10A145366	PCB PHASE SHIFT ASSY (MX1V)	R13	1 EA

Line	Symbol	Item No.	Description		Quantity
6		10A1453P1	PCB PHASE SHIFTER	R-4	1 EA
7		10A1453	ASM DWG/PATT/SILKSCRN/SCH	R-7	0 EA
8		10A1453	ASM DWG/PATT/SILKSCRN/SCH	R-7	0 EA
9		10A1453	ASM DWG/PATT/SILKSCRN/SCH	R-7	0 EA
10		10A1453	ASM DWG/PATT/SILKSCRN/SCH	R-7	0 EA
14		B1570-B-1/4-05	SPACER TIN PLATED		4 EA
18		1280B	TURRET		1 EA
20		10A1453 SH12	SCHEMATIC	R-0	0 EA
42		PR37J-200 OHMS	SEE PR37J 200 OHMS		1 EA
43		PR37J 100 OHMS	RES 1.6W 5% 100		1 EA
	C5	681-09478	CAP 4p7 100V CERAMIC		1 EA
	C7	030-38108	CAP 1u 63V ELECT		1 EA
	C8	630-09472	CAP 4700p 100V CERAMIC		1 EA
	C9	630-09472	CAP 4700p 100V CERAMIC		1 EA
	C10	630-09472	CAP 4700p 100V CERAMIC		1 EA
	C11	630-09472	CAP 4700p 100V CERAMIC		1 EA
	L3	10A212P1	COIL 7t FAB IN HOUSE	R-6	1 EA
	L4	10A212P1	COIL 7t FAB IN HOUSE	R-6	1 EA
	R4	MWA330	IC RF AMP		1 EA
	U2	MHW6185	HYBRID		1 EA

Larcan Communication
Final Handbook Parts List

Level	Item No.	Description		Quantity
0	400218061	1 WATT AMP ASSY VHF LB	R-3	1 EA
1	10A125064	DIR COUPLER ASSY	R-6	1 EA

Line	Symbol	Item No.	Description		Quantity
10		10A1248P1	PCB DIR COUPLER	R-3	1 EA
11		10A1249	P.C. PATTERN	R-3	0 EA
12		10A1251	SILKSCREEN	R-3	0 EA
14		B1571-B-1/4-05	SPACER TIN PLATED		2 EA
16		10A1252	SCHEMATIC	R-3	0 EA
20		2062-0000-00	RECEPTACLE SEE 50-651-0000-31		1 EA
36		3R152P510J	RES 1/4W 5% 51		1 EA
	J2	2062-0000-00	RECEPTACLE SEE 50-651-0000-31		1 EA
	T1	10A213P1	DIRECTIONAL COUPLER	R-5	1 EA

Larcan Communication
Final Handbook Parts List

Level	Item No.	Description		Quantity
0	40D218061	1 WATT AMP ASSY VHF LB	R-3	1 EA
1	20B123565	METERING BOARD FOR MX1V	R-11	1 EA

Line	Symbol	Item No.	Description		Quantity
10		20B1233P1	PCB	R-4	1 EA
11		20B1234	PATTERN	R-3	0 EA
12		20B1236	SILKSCREEN	R-3	0 EA
13		20B2448	ASSEMBLY DRAWING	R-0	0 EA
15		CE100F24-11	END CONNECTORS		1 EA
16		B1570-B-1/4-05	SPACER TIN PLATED		4 EA
17		EC100F-11	COVER		1 EA
18		MLSS100-11	LOCKING HEADER		1 EA
19		1280B	TURRET		1 EA
20		2062-0000-00	RECEPTACLE SEE 50-651-0000-31		1 EA
22		508-AG11D	IC SOCKET 8 PIN		1 EA
	C1	630-09472	CAP 4700p 100V CERAMIC		1 EA
	C3	681-10689	CAP 68p 100V CERAMIC		1 EA
	C4	681-10689	CAP 68p 100V CERAMIC		1 EA
	C7	344-15474	CAP u4763V FILM SEE 372-21474		1 EA
	C9	TAP2.2M16	CAP 2u2 16V TANT		1 EA
	C10	630-09472	CAP 4700p 100V CERAMIC		1 EA
	C11	630-09472	CAP 4700p 100V CERAMIC		1 EA
	C12	630-09472	CAP 4700p 100V CERAMIC		1 EA
	C13	630-09472	CAP 4700p 100V CERAMIC		1 EA
	CR1	HP5082-2800	DIODE SEE EG&#503 OR 1N5711		1 EA
	CR3	HP5082-2800	DIODE SEE EG&#503 OR 1N5711		1 EA
	L1	550-3640-450200	INDUCTOR 10uH SEE 1537-36		1 EA
	Q1	MPS8598	TRANSISTOR PNP GEN PURP		1 EA
	R1	3R152P911J	RES 1/4W 5% 910		1 EA
	R2	3R152P510J	RES 1/4W 5% 51		1 EA
	R5	3R152P472J	RES 1/4W 5% 4K7		1 EA
	R7	3R152P472J	RES 1/4W 5% 4K7		1 EA
	R9	3R152P102J	RES 1/4W 5% 1K		1 EA
	R11	3R152P275J	RES 1/4W 5% 2M7		1 EA
	R13	3R152P101J	RES 1/4W 5% 100		1 EA
	R17	3R152P122J	RES 1/4W 5% 1K2		1 EA
	R18	3329H-1-102	POT 1K		1 EA
	R21	3R152P104J	RES 1/4W 5% 100K		1 EA
	R27	3R152P513J	RES 1/4W 5% 51K		1 EA
	R29	3R152P102J	RES 1/4W 5% 1K		1 EA
	R32	3329H-1-104	POT 100K		1 EA
	R33	3R152P123J	RES 1/4W 5% 12K		1 EA
	R34	3R152P472J	RES 1/4W 5% 4K7		1 EA
	R38	3R152P393J	RES 1/4W 5% 39K		1 EA
	R39	3R152P101J	RES 1/4W 5% 100		1 EA
	U1	LM358N	IC OP AMP		1 EA
	VR1	MC78L12CP	IC VOLT REG		1 EA

Larcan Communication
Final Handbook Parts List

Level	Item No.	Description		Quantity
0	400218061	1 WATT AMP ASSY VHF LB	R-3	1 EA
1	20B71262	BANDPASS FILTER ASM LB	R-3	1 EA

Line	Symbol	Item No.	Description	Quantity
2		20B712P2	ASSEMBLY DRAWING	0 EA
10		20B713G1	BAND PASS FILTER PCB ASSY R-4	1 EA
11		20B719P2	BOX RE-WORK	1 EA
12		1DA774P1	MOUNTING BRACKET	2 EA
13		PP58	POP RIVET	4 EA
14		1590B	HAMMOND DIECAST BOX	0 EA
16		30C956	SILKSCREEN	0 EA
17		UG-625B/U	RECEPTACLE BNC. Sub 31-236	1 EA
18		UG-625B/U	RECEPTACLE BNC. Sub 31-236	1 EA
22		20B720	SCHEMATIC	0 EA

Larcan Communication
Final Handbook Parts List

Level	Item No.	Description		Quantity
0	40D218061	1 WATT AMP ASSY VHF LB	R-3	1 EA
1	20B71262	BANDPASS FILTER ASM LB	R-3	1 EA
2	20B71361	BAND PASS FILTER PCB ASSY	R-4	1 EA

Line	Symbol	Item No.	Description	Quantity
1		20B713P1	PCB BANDPASS FILTER LB ASM DWG	0 EA
10		20B714P1	PCB BANDPASS FILTER LB R-0	1 EA
11		20B715	PRINTED CIRCUIT PATTERN	0 EA
13		B1543-B-1/8-05	SPACER TIN PLATED	4 EA
22		20B716	SILKSCREEN DRAWING	0 EA
	C1	681-10121	CAP 120p 100V CERAMIC	1 EA
	C2	681-10279	CAP 27p 100V CERAMIC	1 EA
	C3	808-11229	CAP 2-22p 250V TRIM	1 EA
	C4	808-31409	CAP 5p5-40p 250V TRIM	1 EA
	C5	681-10569	CAP 56p 100V CERAMIC	1 EA
	C6	808-11229	CAP 2-22p 250V TRIM	1 EA
	C7	808-31409	CAP 5p5-40p 250V TRIM	1 EA
	C8	681-10569	CAP 56p 100V CERAMIC	1 EA
	C9	808-11229	CAP 2-22p 250V TRIM	1 EA
	C10	681-10279	CAP 27p 100V CERAMIC	1 EA
	C11	681-10121	CAP 120p 100V CERAMIC	1 EA
	C12	681-09338	CAP 3p3 100V CERAMIC	1 EA
	C13	808-11229	CAP 2-22p 250V TRIM	1 EA
	L1	20B268P2	INDUCTOR 7-1/2t R-1	1 EA
	L2	20B268P2	INDUCTOR 7-1/2t R-1	1 EA
	L3	20B268P2	INDUCTOR 7-1/2t R-1	1 EA
	L4	20B268P1	INDUCTOR 5-1/2t R-1	1 EA

Larcan Communication
Final Handbook Parts List

Page	Item No.	Description	
1	400218061	1 WATT AMP ASSY VHF LB	R-3
2	10A145366	PCB PHASE SHIFT ASSY (MX1V)	R13
3	10A125064	DIR COUPLER ASSY	R-6
4	20B123565	METERING BOARD FOR MX1V	R-11
5	20B71262	BANDPASS FILTER ASM LB	R-3
6	20B71361	BAND PASS FILTER PCB ASSY	R-4

Larcan Communication
Final Handbook Parts List

Level	Item No.	Description		Quantity
0	400218062	1 WATT AMP ASSY VHF HB	R-3	1 EA

Line	Symbol	Item No.	Description		Quantity
2		400218D	ASSEMBLY DRAWING	R-0	0 EA
10		400217GP1	FRONT PANEL	R-1	1 EA
11		400217BP1	CHASSIS	R-1	1 EA
12		400217PP1	REAR PANEL	R-0	1 EA
13		400217TP1	COVER TOP	R-0	1 EA
15		10A207BP1	SPACER PLATE	R-0	1 EA
16		10A207SP1	KEEPER PLATE	R-0	1 EA
17		XRM-210N-00	SWITCH		1 EA
18		559-0201-001	LED GREEN		1 EA
20		HB24-1.2-A	POWER SUPPLY 24V 1.2A POWER 1		1 EA
22		10A145366	PCB PHASE SHIFT ASSY (MX1V)	R13	1 EA
23		10A125064	DIR COUPLER ASSY	R-6	1 EA
26		20B123565	METERING BOARD FOR MX1V	R-11	1 EA
30		20B70461	BANDPASS FILTER ASSY	R-2	1 EA
34		86350	CONNECTOR BNC BULKHEAD		2 EA
35		31-371	CONNECTOR		2 EA
36		2001-5032-00	CONNECTOR		5 EA
38		216B8880P22	METER	R-9	1 EA
39		MDL-1	FUSE 1A 230V SLOW		1 EA
40		6J4	LINE FILTER, 120/240V		1 EA
42		20B2449	WIRING DIAGRAM	R-0	0 EA
44		RL10A207262	RUNNING LIST	R-0	0 EA

Larcan Communication
Final Handbook Parts List

Level	Item No.	Description		Quantity
0	40D218062	1 WATT AMP ASSY VHF HB	R-3	1 EA
1	10A145366	PCB PHASE SHIFT ASSY (MX1V)	R13	1 EA

Line	Symbol	Item No.	Description		Quantity
6		10A1453P1	PCB PHASE SHIFTER	R-4	1 EA
7		10A1453	ASM DWG/PATT/SILKSCRN/SCH	R-7	0 EA
8		10A1453	ASM DWG/PATT/SILKSCRN/SCH	R-7	0 EA
9		10A1453	ASM DWG/PATT/SILKSCRN/SCH	R-7	0 EA
10		10A1453	ASM DWG/PATT/SILKSCRN/SCH	R-7	0 EA
14		B1570-B-1/4-05	SPACER TIN PLATED		4 EA
18		1280B	TURRET		1 EA
20		10A1453 SH12	SCHEMATIC	R-0	0 EA
42		PR37J-200 OHMS	SEE PR37J 200 OHMS		1 EA
43		PR37J 100 OHMS	RES 1.6W 5% 100		1 EA
	C5	681-09478	CAP 4p7 100V CERAMIC		1 EA
	C7	030-38108	CAP 1u 63V ELECT		1 EA
	C8	630-09472	CAP 4700p 100V CERAMIC		1 EA
	C9	630-09472	CAP 4700p 100V CERAMIC		1 EA
	C10	630-09472	CAP 4700p 100V CERAMIC		1 EA
	C11	630-09472	CAP 4700p 100V CERAMIC		1 EA
	L3	10A212P1	COIL 7t FAB IN HOUSE	R-6	1 EA
	L4	10A212P1	COIL 7t FAB IN HOUSE	R-6	1 EA
	R4	MWA330	IC RF AMP		1 EA
	U2	MHW6185	HYBRID		1 EA

Larcan Communication
Final Handbook Parts List

Level	Item No.	Description		Quantity
0	40D218062	1 WATT AMP ASSY VHF HB	R-3	1 EA
1	10A125064	DIR COUPLER ASSY	R-6	1 EA

Line	Symbol	Item No.	Description		Quantity
10		10A1248P1	PCB DIR COUPLER	R-3	1 EA
11		10A1249	P.C. PATTERN	R-3	0 EA
12		10A1251	SILKSCREEN	R-3	0 EA
14		B1571-B-1/4-05	SPACER TIN PLATED		2 EA
16		10A1252	SCHEMATIC	R-3	0 EA
20		2062-0000-00	RECEPTACLE SEE 50-651-0000-31		1 EA
36		3R152P510J	RES 1/4W 5% 51		1 EA
	J2	2062-0000-00	RECEPTACLE SEE 50-651-0000-31		1 EA
	T1	10A213P1	DIRECTIONAL COUPLER	R-5	1 EA

Larcan Communication
Final Handbook Parts List

Level	Item No.	Description		Quantity
0	400218062	1 WATT AMP ASSY VHF HB	R-3	1 EA
1	20B123565	METERING BOARD FOR MX1V	R-11	1 EA

Line	Symbol	Item No.	Description		Quantity
10		20B1233P1	PCB	R-4	1 EA
11		20B1234	PATTERN	R-3	0 EA
12		20B1236	SILKSCREEN	R-3	0 EA
13		20B2448	ASSEMBLY DRAWING	R-0	0 EA
15		CE100F24-11	END CONNECTORS		1 EA
16		B1570-B-1/4-05	SPACER TIN PLATED		4 EA
17		EC100F-11	COVER		1 EA
18		MLSS100-11	LOCKING HEADER		1 EA
19		1280B	TURRET		1 EA
20		2062-0000-00	RECEPTACLE SEE 50-651-0000-31		1 EA
22		508-AG11D	IC SOCKET 8 PIN		1 EA
	C1	630-09472	CAP 4700p 100V CERAMIC		1 EA
	C3	681-10689	CAP 68p 100V CERAMIC		1 EA
	C4	681-10689	CAP 68p 100V CERAMIC		1 EA
	C7	344-15474	CAP u4763V FILM SEE 372-21474		1 EA
	C9	TAP2.2M16	CAP 2u2 16V TANT		1 EA
	C10	630-09472	CAP 4700p 100V CERAMIC		1 EA
	C11	630-09472	CAP 4700p 100V CERAMIC		1 EA
	C12	630-09472	CAP 4700p 100V CERAMIC		1 EA
	C13	630-09472	CAP 4700p 100V CERAMIC		1 EA
	CR1	HP5082-2800	DIODE SEE ECG#503 OR 1N5711		1 EA
	CR3	HP5082-2800	DIODE SEE ECG#503 OR 1N5711		1 EA
	L1	550-3640-450200	INDUCTOR 10uH SEE 1537-36		1 EA
	Q1	MPS8598	TRANSISTOR PNP GEN PURP		1 EA
	R1	3R152P911J	RES 1/4W 5% 910		1 EA
	R2	3R152P510J	RES 1/4W 5% 51		1 EA
	R5	3R152P472J	RES 1/4W 5% 4K7		1 EA
	R7	3R152P472J	RES 1/4W 5% 4K7		1 EA
	R9	3R152P102J	RES 1/4W 5% 1K		1 EA
	R11	3R152P275J	RES 1/4W 5% 2M7		1 EA
	R13	3R152P101J	RES 1/4W 5% 100		1 EA
	R17	3R152P122J	RES 1/4W 5% 1K2		1 EA
	R18	3329H-1-102	POT 1K		1 EA
	R21	3R152P104J	RES 1/4W 5% 100K		1 EA
	R27	3R152P513J	RES 1/4W 5% 51K		1 EA
	R29	3R152P102J	RES 1/4W 5% 1K		1 EA
	R32	3329H-1-104	POT 100K		1 EA
	R33	3R152P123J	RES 1/4W 5% 12K		1 EA
	R34	3R152P472J	RES 1/4W 5% 4K7		1 EA
	R38	3R152P393J	RES 1/4W 5% 39K		1 EA
	R39	3R152P101J	RES 1/4W 5% 100		1 EA
	U1	LM358N	IC OP AMP		1 EA
	VR1	MC78L12CP	IC VOLT REG		1 EA

Larcan Communication
Final Handbook Parts List

Level	Item No.	Description		Quantity
0	400218062	1 WATT AMP ASSY VHF HB	R-3	1 EA
1	20B70461	BANDPASS FILTER ASSY	R-2	1 EA

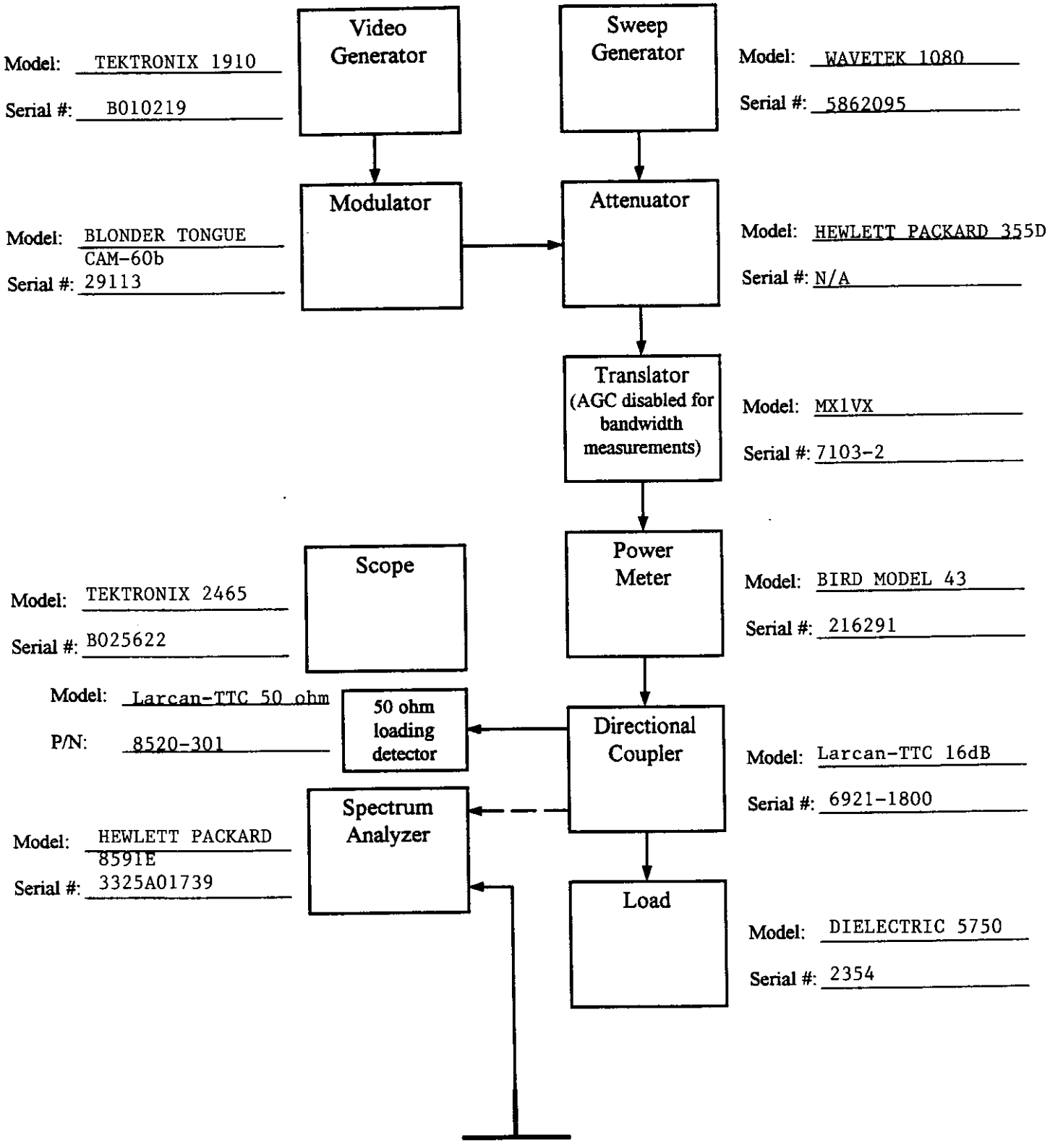
Line	Symbol	Item No.	Description		Quantity
1		20B704P1	BANDPASS FILTER ASM DWG	R-1	0 EA
9		20B2181P1	NAMEPLATE	R-0	1 EA
10		1590B	HAMMOND DIECAST BOX		0 EA
11		20B705P1	BOX REWORK	R-1	1 EA
12		10A234P1	FILTER BOX MOUNTING BRKT	R-0	2 EA
13		PR-5B	POP RIVET		4 EA
14		#4	HARNESS		5 EA
15		6-32 1-1/2 SCRW	SCREW		4 EA
16		#6 INT	LOCKWASHER		4 EA
22		10A769	SCHEMATIC		0 EA
23		5402	CAPACITOR 5402PC		1 EA
24		5402	CAPACITOR 5402PC		1 EA
25		5402	CAPACITOR 5402PC		1 EA
26		5402	CAPACITOR 5402PC		1 EA
27		5402	CAPACITOR 5402PC		1 EA
30		10A766P1	AIR COIL-6T 14GA 3/8" D	R-1	1 EA
31		10A766P1	AIR COIL-6T 14GA 3/8" D	R-1	1 EA
32		10A766P1	AIR COIL-6T 14GA 3/8" D	R-1	1 EA
33		10A766P1	AIR COIL-6T 14GA 3/8" D	R-1	1 EA
34		10A766P2	AIR COIL 8T 18GA 5/16"	R-1	1 EA
38		2056-0000-00	CONNECTOR		1 EA
39		2056-0000-00	CONNECTOR		1 EA

Larcan Communication
Final Handbook Parts List

Page	Item No.	Description	
1	40D218062	1 WATT AMP ASSY VHF HB	R-3
2	10A145366	PCB PHASE SHIFT ASSY (MX1V)	R13
3	10A125064	DIR COUPLER ASSY	R-6
4	20B123565	METERING BOARD FOR MX1V	R-11
5	20B70461	BANDPASS FILTER ASSY	R-2

APPLICATION FOR FCC CERTIFICATION
BZ5MX1VX
HETERODYNE PROCESSOR INPUT
1 WATT VHF TRANSLATOR

EXHIBIT 3
TEST SET-UP



APPLICATION FOR FCC CERTIFICATION
BZ5MX1VX
HETERODYNE PROCESSOR INPUT
1 WATT VHF TRANSLATOR

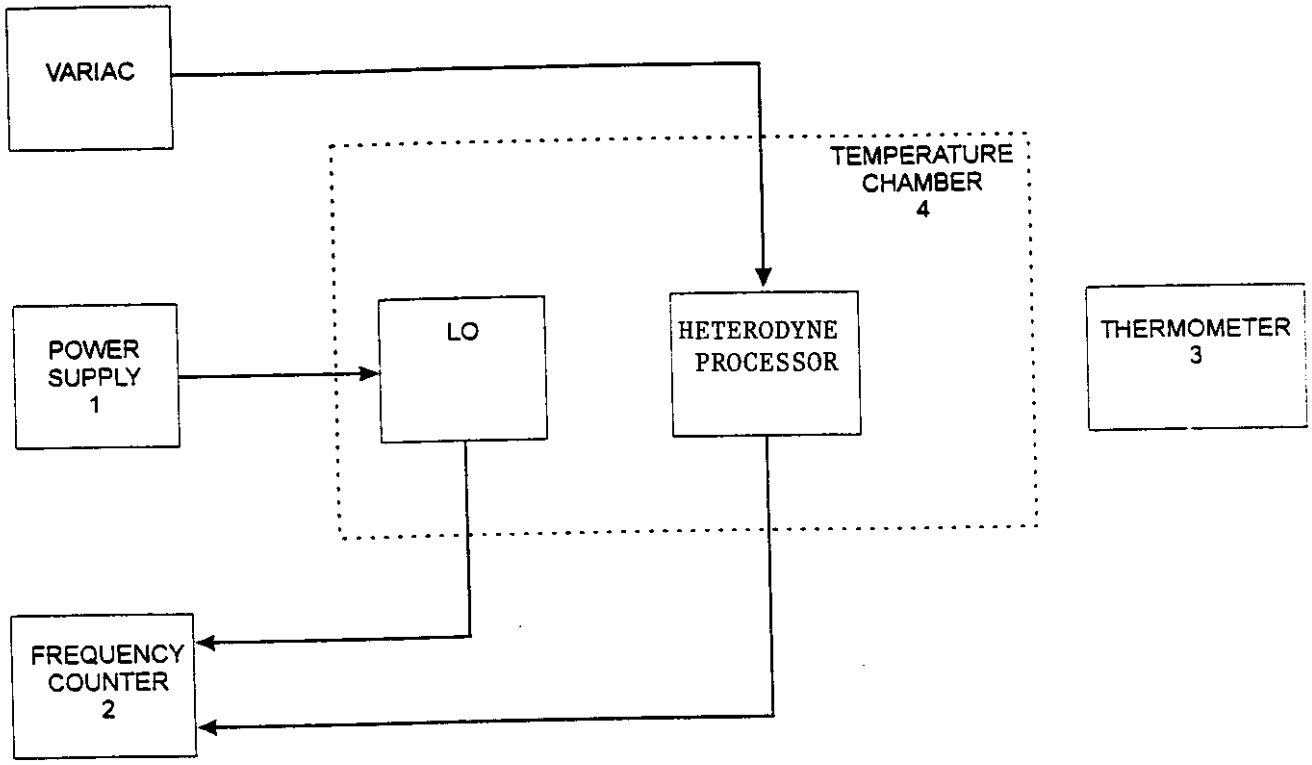
EXHIBIT 4a

FREQUENCY DRIFT VS. TEMPERATURE
SAIP-60-750 HETERODYNE PROCESSOR

DEGREES C	MEASURED LO FREQUENCY(Hz)	DEVIATION(Hz)	DEVIATION(%)
+50	181,246,502	-1193	-0.000658
+40	181,246,883	-812	-0.000448
+30	181,247,268	-427	-0.000236
+25	181,247,695	0	0.0000
+20	181,247,958	263	0.000145
+10	181,248,200	505	0.000279
0	181,248,650	995	0.000527
-10	181,249,853	2158	0.001191
-20	181,250,604	2909	0.001605
-30	181,251,220	3525	0.001945

APPLICATION FOR FCC CERTIFICATION
BZ5MX1VX
HETERODYNE PROCESSOR INPUT
1 WATT VHF TRANSLATOR

EXHIBIT 4b
TEMPERATURE



NOTES AND EQUIPMENT LIST

1. POWER SUPPLY - HP6012A - SERIAL NUMBER 2329A-02181
2. FREQUENCY COUNTER - HP5334B - SERIAL NUMBER 2937A05503
3. THERMOMETER - FLUKE 77/80T-150U
4. THERMOSTATICALLY CONTROLLED TEMPERATURE CHAMBER, ASSOCIATED

APPLICATION FOR FCC CERTIFICATION
BZ5MX1VX
HETERODYNE PROCESSOR INPUT
1 WATT VHF TRANSLATOR

EXHIBIT 5

TABULATED AGC DATA

INPUT LEVEL(dB)	RELATIVE OUTPUT dB=100% OUTPUT POWER
-20	-0.1
-15	-0.1
-10	-0.1
-5	0
500uV=0dB	0.0
+5	0
+10	0
+15	0
+20	-0.1
-20	-0.1
-15	0
-10	0
-5	0
1000uV=0dB	0.0
+5	0
+10	0
+15	0
+20	-0.1
+25	-0.1
-20	0
-15	0
-10	0
-5	0
5000uV=0dB	0.0
+5	0
+10	0
+15	-0.1
+20	-0.1

APPLICATION FOR FCC CERTIFICATION
BZ5MX1VX
HETERODYNE PROCESSOR INPUT

EXHIBIT 6a

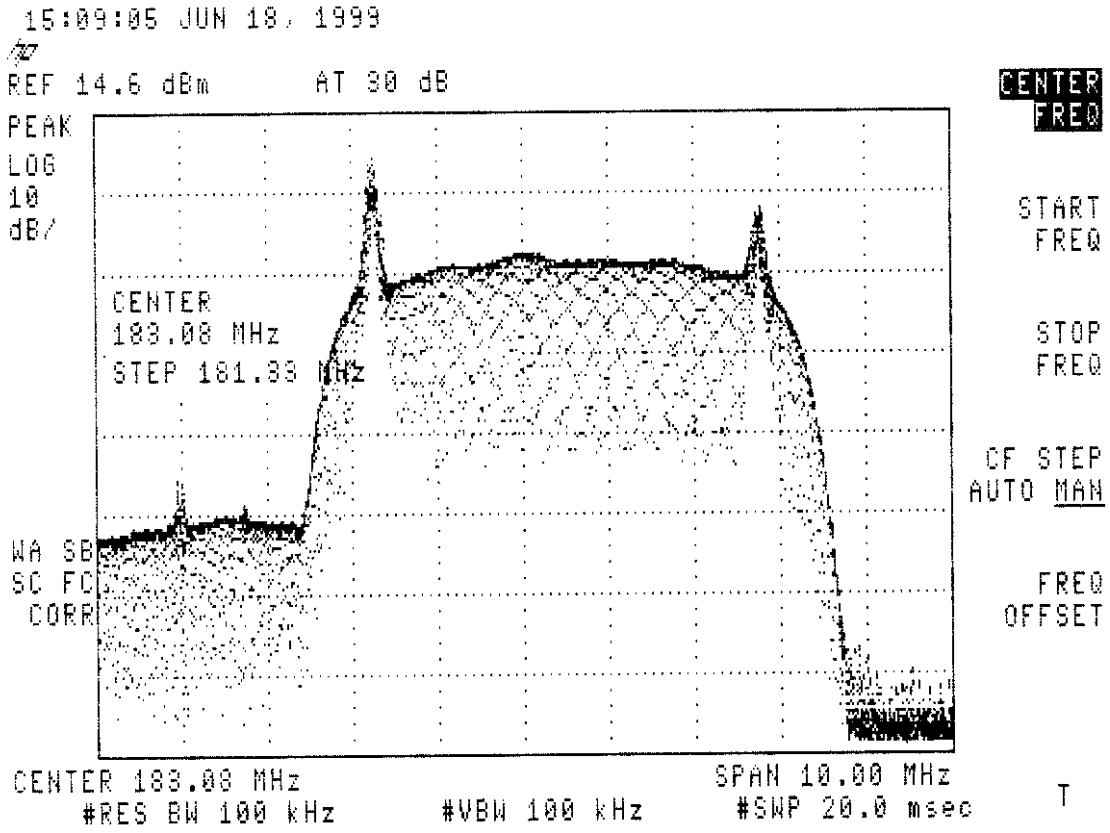
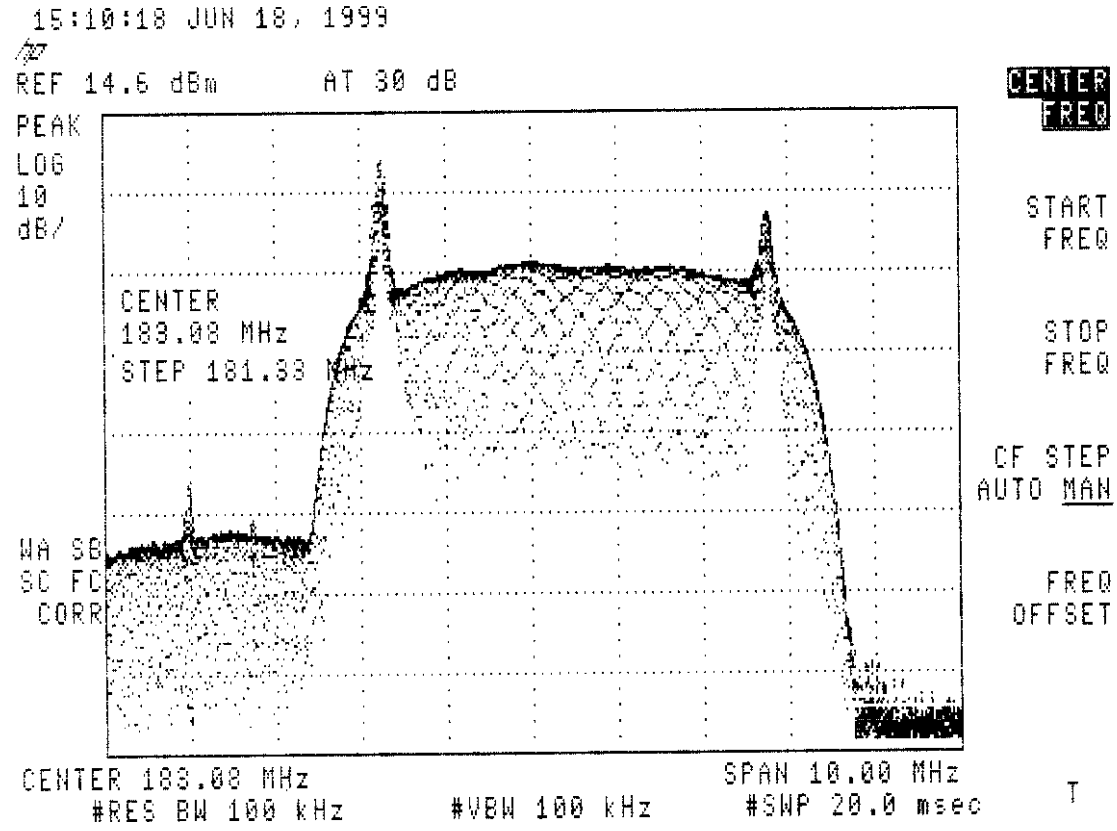
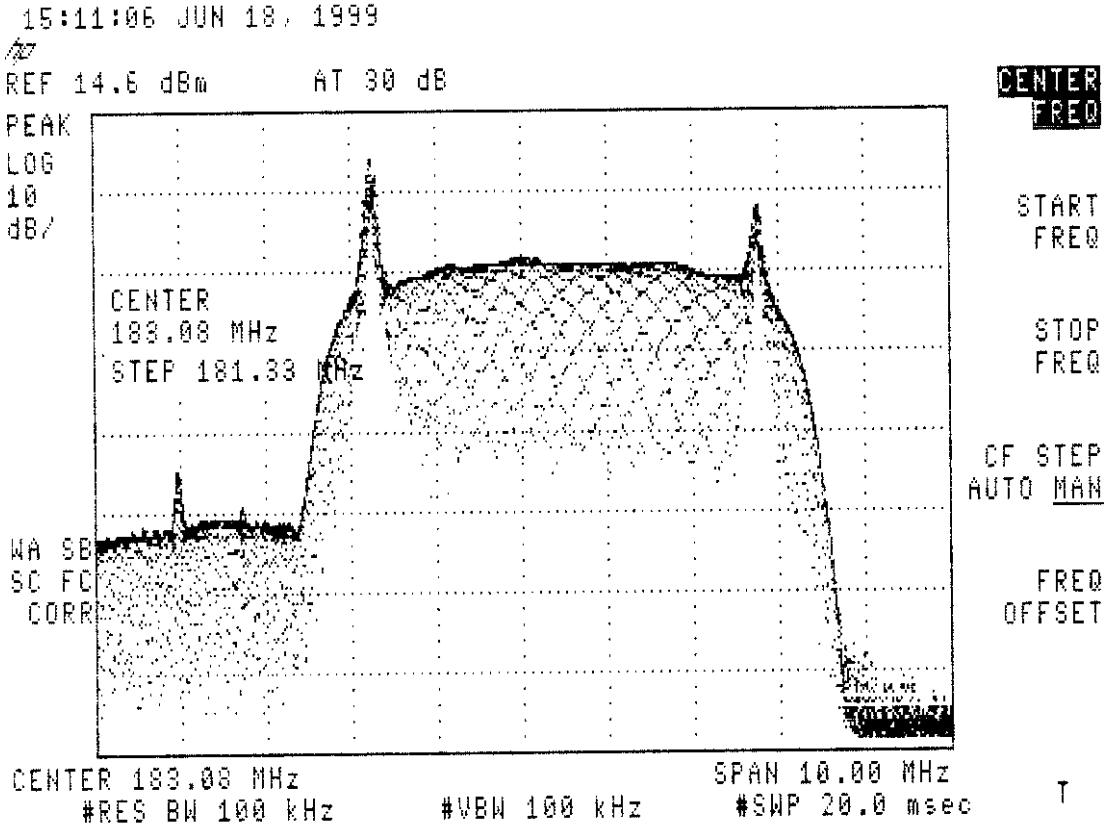


EXHIBIT 6b



APPLICATION FOR FCC CERTIFICATION
BZ5MX1VX
HETERODYNE PROCESSOR INPUT

EXHIBIT 6c



APPLICATION FOR FCC CERTIFICATION
BZ5MX1VX
HETERODYNE PROCESSOR INPUT
1 WATT VHF TRANSLATOR

EXHIBIT 7

ACTIVE DEVICES AND FUNCTION LIST

MODULE: PHASE SHIFTER #10A1453G6

DEVICE	TYPE	FUNCTION
U2	MHW6185	Hybrid Amplifier
U3	MWA330	RF Amplifier

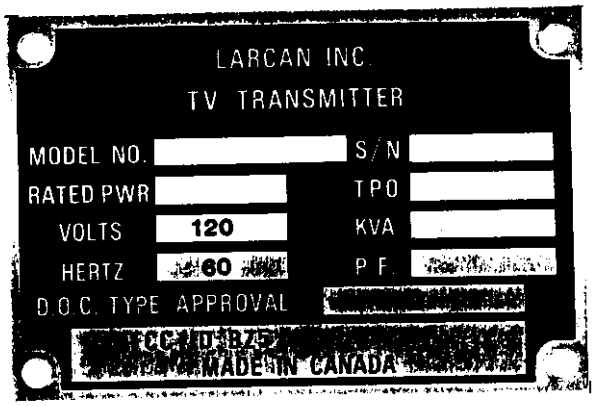
MODULE: METERING BOARD #20B1235G5

DEVICE	TYPE	FUNCTION
Q1	MPS8598	Amplifier
VR1	MC78L12CP	Voltage Regulator
U1	LM358N	Operational Amplifier

APPLICATION FOR FCC CERTIFICATION
BZ5MX1VX
HETERODYNE PROCESSOR INPUT
1 WATT VHF TRANSLATOR

EXHIBIT 8

FCC IDENTIFICATION LABEL



APPLICATION FOR FCC CERTIFICATION
BZ5MX1VX
HETERODYNE PROCESSOR INPUT
1 WATT VHF TRANSLATOR

EXHIBIT 9 PAGE 1

Power requirements for the 1 Watt VHF Translator were determined as follows:

1. The translator's visual power meter measures the peak visual power by reading the average levels of a detected sample of the output. The meter is calibrated by multiplying the above visual power reading by 168%. The visual metering circuitry has a negligible response to the aural power due to the large (>10MHz) detector bandwidth. When the detector bandwidth is this large, the detector does not peak detect the intercarrier beat product.

2. The aural power is measured by reading the peak level of the detected 4.5MHz intercarrier product. The level of this product has a direct correspondence to the aural power level and is independent of the visual power as long as the peak visual power exceeds the aural power. This is always true for normal operation.

BZ5MX1VX
POWER MEASUREMENTS

MEASURED VISUAL POWER NOTE 1	MEASURED AURAL POWER NOTE 2	SUPPLY CURRENT TO OUTPUT DEVICES VISUAL ONLY NOTE 3	SUPPLY CURRENT TO OUTPUT DEVICES VISUAL & AURAL NOTE 3
0.595 WATTS	0.1 WATTS	0.50 AMPS	0.50 AMPS

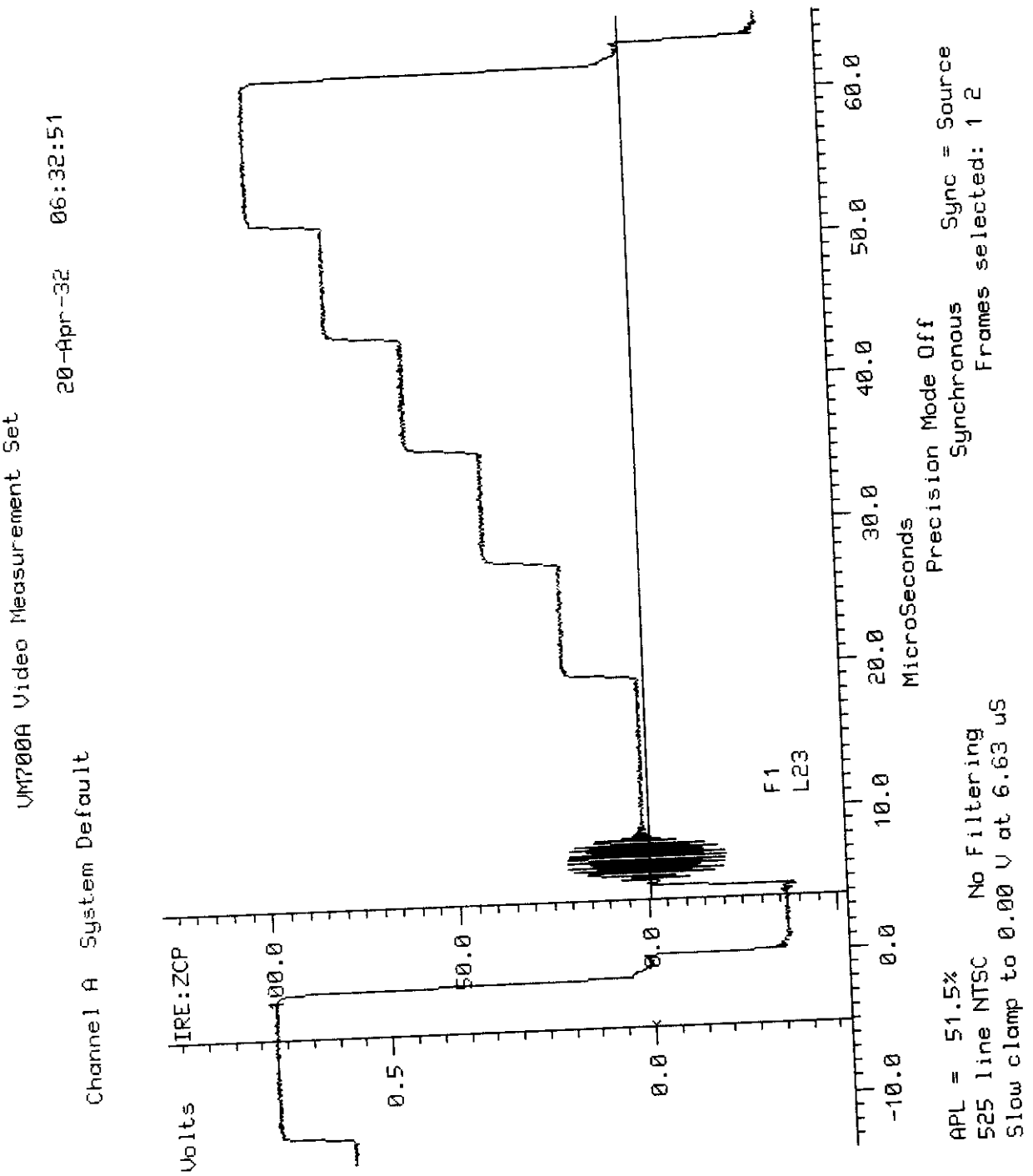
NOTE 1: Measured on the Model 43 Bird Wattmeter with the visual carrier modulated by the standard synchronizing signal at 75% of peak amplitude and the aural carrier disabled.

NOTE 2: Measured on the Model 43 Bird Wattmeter with the visual carrier disabled.

NOTE 3: The voltage across the output devices on all models is +24 volts. The output devices are operated Class A.

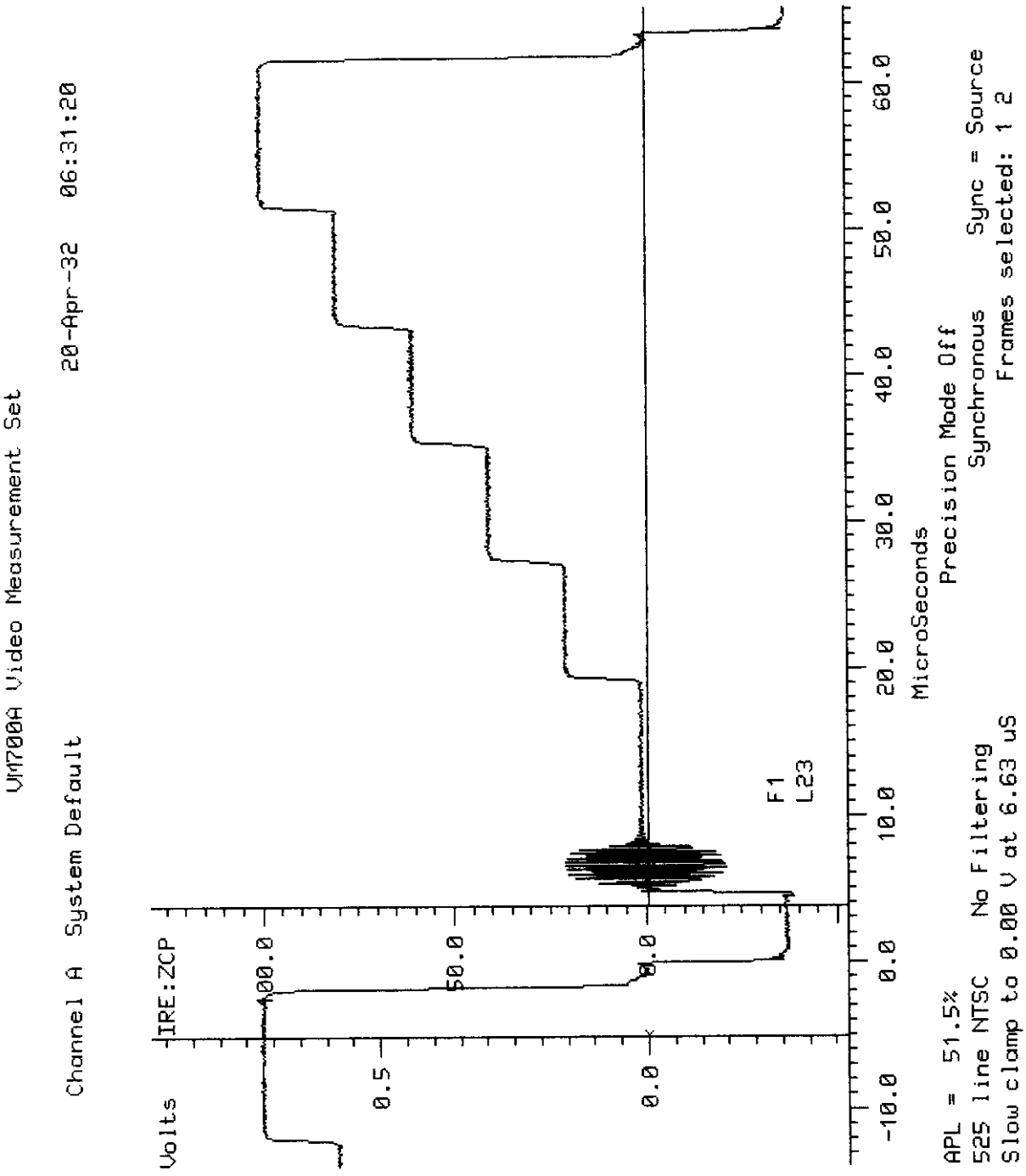
APPLICATION FOR FCC CERTIFICATION
BZ5MX1VX
HETERODYNE PROCESSOR INPUT
1 WATT VHF TRANSLATOR

EXHIBIT 10a



APPLICATION FOR FCC CERTIFICATION
BZ5MX1VX
HETERODYNE PROCESSOR INPUT
1 WATT VHF TRANSLATOR

EXHIBIT 10b



APPLICATION FOR FCC CERTIFICATION
BZ5MX1VX
HETERODYNE PROCESSOR INPUT
1 WATT VHF TRANSLATOR

EXHIBIT 10c

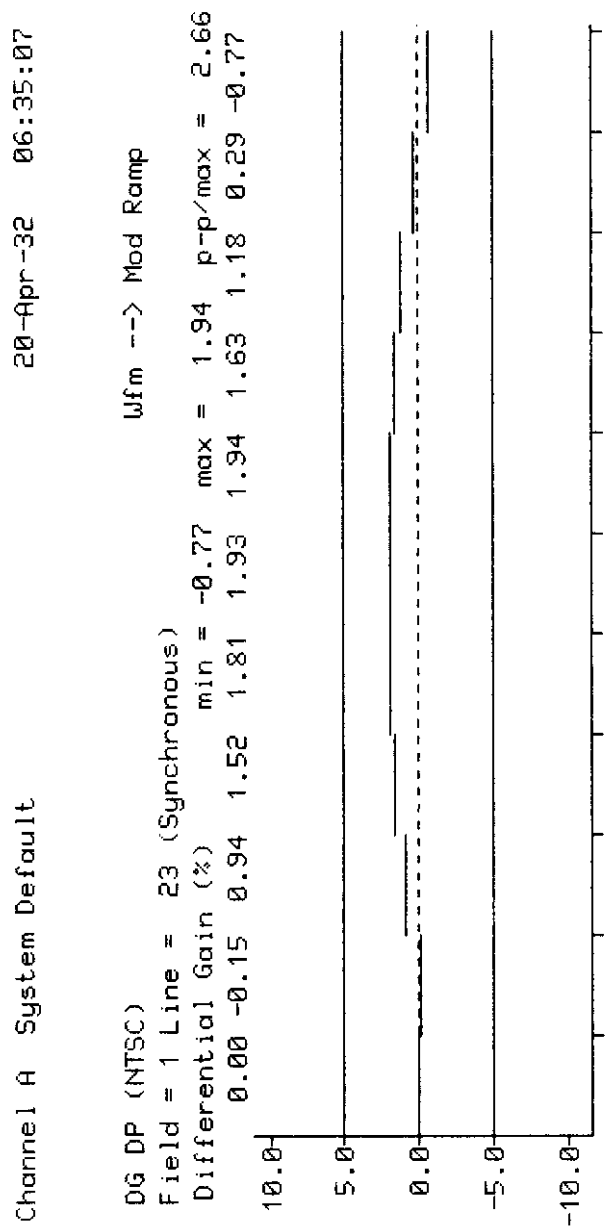
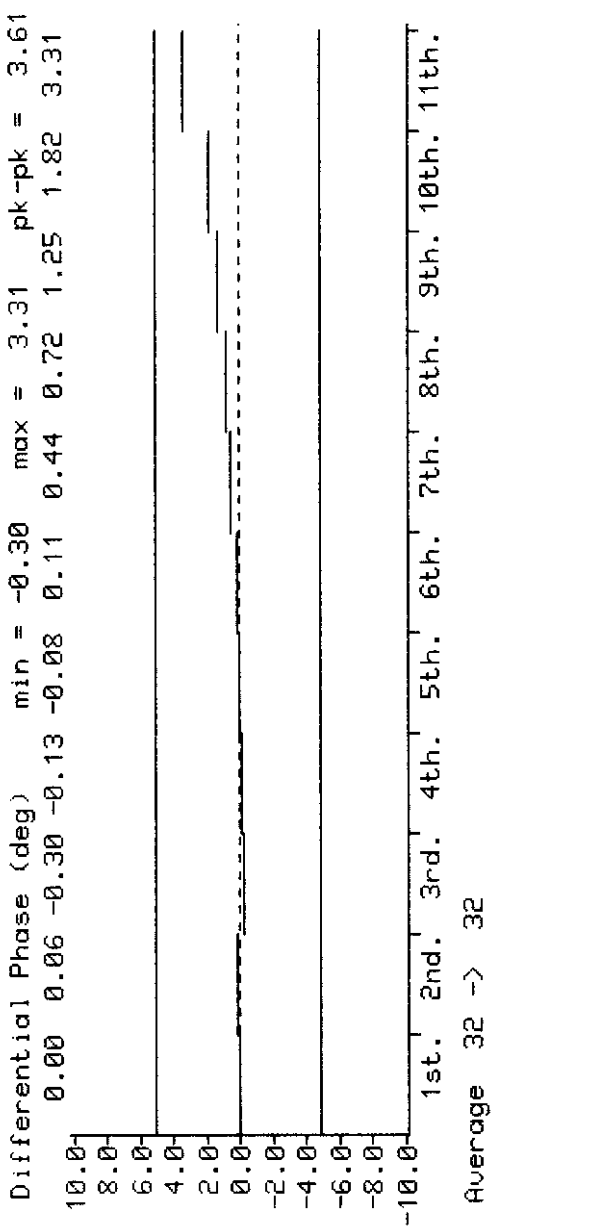


EXHIBIT 10d



APPLICATION FOR FCC CERTIFICATION
BZ5MX1VX
HETERODYNE PROCESSOR INPUT
1 WATT VHF TRANSLATOR

EXHIBIT 11a

OVERALL GROUP DELAY

FREQUENCY(MHz)	OVERALL DELAY(nS)
0.20	0 (Reference)
0.40	+30
0.60	0
0.80	-50
1.00	-20
1.20	-10
1.40	-20
1.60	-10
1.80	-20
2.00	-10
2.20	-30
2.40	-20
2.60	0
2.80	-10
3.00	-20
3.20	-50
3.40	-120
3.58	-180
3.80	-280
4.00	-300
4.18	-340

APPLICATION FOR FCC CERTIFICATION
BZ5MX1VX
HETERODYNE PROCESSOR INPUT
1 WATT VHF TRANSLATOR

EXHIBIT 11b