

TRICOM
RESEARCH, INC.

OPERATOR'S MANUAL
TCR-MBA-50v2
WIDEBAND RF AMPLIFIER



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TCR-MBA-50v2 OPERATOR'S MANUAL

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1.0 INTRODUCTION

1.1 GENERAL INFORMATION

The TCR-MBA-50v2, shown in Figure 1-1, is a Next Generation RF Power Amplifier (PA) designed to enhance communications range for existing and emerging handheld and manpack radios. The PA includes support for wideband and traditional narrowband waveforms.

- Transmit amplification for the 30-512 MHz frequency range
- Five cosite filtered receive bands: 30-512MHz, 30-118 MHz, 118-174 MHz, 174-512 MHz, and 240-270 MHz
- Low Noise High Dynamic Range Receive Pre-Amplifier (LNA) for all bands
- Three user-configurable antenna ports: Line of Sight (LOS), SATCOM (SAT), Wideband (WB)
- 30 MHz - 2.7 GHz bypass path to all antenna ports
- Carrier Detect Keying and Automatic Frequency Detection
- UHF SATCOM, DAMA/IW
- SINCGARS, HAVEQUICK II, and SATURN
- ANW2C and SRW Wideband Networking
- Tactical Waveforms mode for advanced waveforms
- Advanced Special Communications Mode (ASCM)
- RS-485, USB, and Ethernet connectivity for end-user devices and optional Remote Face Plate and Bias Tee
- Simple, three-button menu-based user interface
- Night Vision Goggle (NVG) compatible display
- MIL-STD-810G, MIL-STD-461, MIL-STD-464 (Near Strike Lightning)
- Excessive temperature, voltage, and current protection



Figure 1-1. TCR-MBA-50v2 Amplifier

1.2 ABBREVIATIONS AND GLOSSARY

AGC	Automatic Gain Control
ALC	Automatic Level Control
AM	Amplitude Modulation
ANT	Antenna
ANW2C	Adaptive Networking Wideband Waveform Revision C
APCO	Association of Public Safety Communication Officials
ATAK	Android Tactical Assault Kit
ATC	Air Traffic Control
BPS	Bits Per Second
CT	Cipher Text
CW	Continuous Wave
COMSEC	Communications Security
DAMA	Demand Assigned Multiple Access
dB	Decibel
dBm	Decibel referenced to 1 milliwatt (0 dBm = 1 mW)
FM	Frequency Modulation
Hz	Hertz
IW	Integrated Waveform
JITC	Joint Interoperability Test Center (DISA)
kHz	Kilohertz
LED	Light Emitting Diode
LMR	Land Mobile Radio
LNA	Low Noise Amplifier
LOS	Line of Sight
MHz	Megahertz
mW	Milliwatt
PSK	Phase-Shift Keying
PT	Plain Text
PTT	Push to Talk
RCV	Receive
SATCOM	Satellite Communications
SF	Single Frequency
SRW	Soldier Radio Waveform
TW	Tactical Waveforms
UHF	Ultra-High Frequency
VDC	Volts, Direct Current
VSWR	Voltage Standing Wave Ratio
W	Watt
WB	Wideband
XMT	Transmit

1.3 EQUIPMENT DESCRIPTION

The TCR-MBA-50v2 (Tricom PN: 11000-00882) is a bi-directional half duplex RF Power Amplifier (PA) designed to enhance communications in vehicular, airborne, maritime, man-portable, or fixed-station applications. All current military and commercial waveforms are supported including Narrowband LOS, Frequency Hopping, DAMA/IW SATCOM, Wideband Networking and Special Communications Modes. Five individual receive band co-site filters with high dynamic range low noise amplifiers (LNAs) are used to cover the lower VHF, upper VHF, UHF, SATCOM receive band, and VHF/UHF broadband ranges to greatly improve reliable communications in high co-site installations. Harmonic filters and a dedicated SATCOM co-site transmit filter are used to control harmonic and spurious emissions. Bypass modes suppress frequencies below 30 MHz. An intuitive menu driven user interface simplifies operation of the PA and provides status to the operator.

1.3.1 MODES AND RECEIVE FILTER SELECTION

Listed below are the receive band filter ranges with the associated PA modes. The PA modes are listed in the format that they are displayed. Mode selection is accomplished using the TCR-MBA-50v2 front panel push buttons, further described in Section 2.3:

<u>RCV FILTER</u>	<u>MODES</u>
VHF LOW	VLO FM, VLO AM, SINC (SINGGARS)
VHF HIGH	VHI FM and VHI AM
UHF	UHF FM, UHF AM, HQ (HAVEQUICK), SATURN, WB (WIDEBAND), and TW (TACTICAL WAVEFORMS)
VHF/UHF	VU FM and VU AM
DEDICATED SATCOM	SAT
BYPASS	BYP LOS, BYP SAT, and BYP WB

1.3.2 TRANSMIT POWER LEVELS

The PA has 10, 15, 20, 35, and 50 Watt RF output power levels for all operating modes with a 75 Watt output burst mode for SATCOM operations.

The PA will limit power settings to 10, 15, and 20 Watts when the input voltage is less than 22 VDC or when the power cable is set for battery configuration, regardless of input voltage. 35, 50 and 75 W settings are only available when the input voltage is above 22 VDC and the power cable is not set for battery configuration. In battery configuration, the PA will automatically limit current draw to protect the battery's internal fuse (e.g. BA-5590) which may result in decreased output power.

1.3.3 OLED DISPLAY

The TCR-MBA-50v2 NVG compatible OLED display is used to indicate the mode of operation, power level, antenna selection, DC input power, internal temperature, and RCV/TX when in the Home Display. During use of the Menu function, the display provides clear user instructions. Examples of the Home Display and Menu functions are shown in Figures 1-2 and 1-3.



Figure 1-2. Home Display

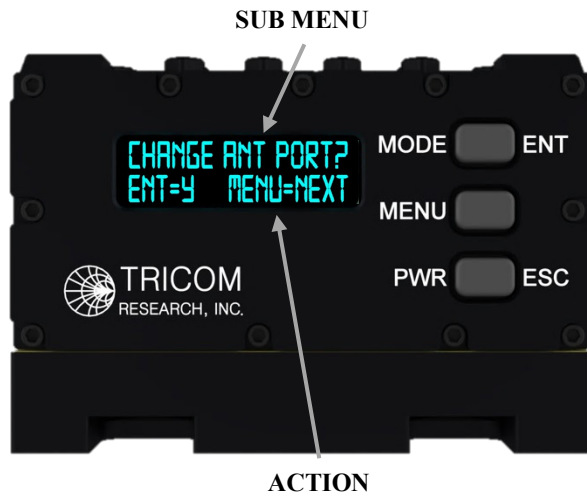


Figure 1-3. Menu Function Display

1.4 AMPLIFIER COMPONENTS

The TCR-MBA-50v2 Power Amplifier has a sealed, rugged enclosure finished in black anodize and designed to withstand the elements and resist corrosion. The enclosure houses all electronic subassemblies including printed circuit board assemblies, filter and switching networks, and interconnects.

1.5 POWER CABLE

A multi-conductor cable connects the amplifier with an external DC power source. A cable wiring diagram cable is shown in Section 3.3 of this manual. The DC power cable used with the widely fielded TCR-MBA-50-WB Power Amplifier may be used to power the TCR-MBA-50v2.

1.6 SPECIFICATIONS

Note: Information in Section 1.6 is included for reference only and does not constitute a warranty of performance.

Table 1-1. Nominal Performance Specifications

TRANSMIT:

VLO FM and VLO AM

Frequency Range 30-118 MHz

VHI FM and VHI AM

Frequency Range 118-174 MHz

UHF FM and UHF AM

Frequency Range 174-512 MHz

VU FM and VU AM

Frequency Range 30-512 MHz

SINC

Frequency Range 30-88 MHz

HQ

Frequency Range 225-400 MHz

SATURN

Frequency Range 225-400 MHz

SAT
Frequency Range 290-320 MHz

WB
Frequency Range 225-450 MHz (ANW2C and SRW)

TW
Frequency Range 225-450 MHz

ALL TRANSMIT MODES

RF Power Input 1-5W (10W without damage)
RF Power Output Battery Config. (reduced current): 10, 15, 20W
Standard Config.:
12-22 VDC: 10, 15, 20W
22-32 VDC: 10, 15, 20, 35, 50, 75W (SAT)

RECEIVE:

VLO FM and VLO AM

Frequency Range 30-118 MHz with co-site filtering
Receive Gain 15 dB, 3.5 dB NF

VHI FM and VHI AM

Frequency Range 118-174 MHz with co-site filtering
Receive Gain 15 dB, 3.5 dB NF

UHF FM and UHF AM

Frequency Range 174-512 MHz with co-site filtering
Receive Gain 15 dB, 3.5 dB NF

VU FM and VU AM

Frequency Range 30-512 MHz with co-site filtering
Receive Gain 15 dB, 3.5 dB NF

SINC

Frequency Range 30-118 MHz with co-site filtering
Receive Gain 15 dB, 3.5 dB NF

HQ

Frequency Range 174-512 MHz with co-site filtering
Receive Gain 15 dB, 3.5 dB NF

SATURN

Frequency Range 174-512 MHz with co-site filtering
Receive Gain 15 dB, 3.5 dB NF

SAT

Frequency Range 240-270 MHz with co-site filtering
Receive Gain 15 dB, 3.5 dB NF

WB

Frequency Range 225-450 MHz
Receive Gain 15 dB, 3.5 dB NF

TW

Frequency Range 225-450 MHz
Receive Gain 15 dB, 3.5 dB NF

BYPASS (LOS, SAT, or WB):

Frequency Range 30 MHz - 1 GHz
Typical Insertion Loss 1 dB

Frequency Range 1-2 GHz
Typical Insertion Loss 1.5 dB

Frequency Range 2-2.7 GHz
Typical Insertion Loss 4.5 dB

Table 1-2. Additional Specifications

ADDITIONAL SPECIFICATIONS:

Immersion	1 meter
RADIO/LOS/SAT/WB Connectors	TNC female (immersion rated without cap)
DC Connector	MS3112E10-6P
AUX 1 Connector	5 pin Fischer, DBPU 102 A054-139G
AUX 2 Connector	9 pin Fischer, DBPU 102 A059-239G
Protection	High temperature fold back, High VSWR High voltage, DC input Reverse polarity, DC input Near Strike Lightning
DC Off	Bypasses RF to LOS antenna port
Operating Temperature	-20°C to +60°C
Cooling	Natural convection
External Finish	Black anodize
Dimensions	2.5" H x 3.5" W x 8.15" D (including connectors)
Weight	3.7 lb



Figure 1-4. Rear Panel

Table 1-3. Interconnect Characteristics

CONN	SIGNAL/PIN	DETAIL
DC IN	DC Power Input	MS3112E10-6P (Mating connector MS3116F10-6S)
	Pin A	10-32 VDC
	Pin B	Electrical Ground (GND)
	Pin C	Reserved
	Pin D	Open for battery configuration (battery fuse current limit protection); GND for standard configuration (power supplies and vehicular use)
	Pin E	Reserved
	Pin F	Reserved
RADIO	TNC Female	RF from Radio
LOS	TNC Female	RF to LOS Antenna
SAT	TNC Female	RF to SATCOM Antenna
WB	TNC Female	RF to Wideband Antenna
AUX 1	Auxiliary	Fischer DBPU 102 A054-139G (Mating Connector Fischer S 102 A054 132+)
	Pin 1	Electrical Ground (GND)
	Pin 2	+5V (output to External Device)
	Pin 3	Keyline/PTT In (future use)
	Pin 4	RS-485 A (+)
	Pin 5	RS-485 B (-)
AUX 2	Auxiliary	Fischer DBPU 102 A059-239G (Mating Connector Fischer S 102 A059 232+)
	Pin 1	Electrical Ground (GND)
	Pin 2	+5V (output to External Device)
	Pin 3	USB +5V (input to PA from external host)
	Pin 4	USB + / (RS-485 A (+) future use)
	Pin 5	USB - / (RS-485 B (-) future use)
	Pin 6	Ethernet TX+
	Pin 7	Ethernet TX-
	Pin 8	Ethernet RX+
	Pin 9	Ethernet RX-

2.0 OPERATION

WARNING

ELECTROMAGNETIC RADIATION FROM THE ANTENNA CAN DAMAGE EYES AND OTHER BODY TISSUE WHEN THE SYSTEM IS TRANSMITTING. DO NOT STAND DIRECTLY IN FRONT OF THE ANTENNA OR IN CLOSE PROXIMITY TO THE SIDES OR BACK OF THE ANTENNA WHEN TRANSMITTING.

2.1 GENERAL INFORMATION

The TCR-MBA-50v2 can be used for operation once it has been installed as described in Section 3.

2.2 CONTROLS

The TCR-MBA-50v2 has a menu driven display controlled with three buttons as shown in Table 2-1:

Table 2-1. Front Panel Controls

CONTROLS	TYPE	FUNCTION
MODE/ENT	Pushbutton Switch	Select MODE "Affirmative" in Menu Function
MENU	Pushbutton Switch	Enter Menu Function Advance in Menu Function
PWR/ESC	Pushbutton Switch	Power On, Power Off Select Power Level "Negative" in Menu Function

2.3 POWER ON, INITIALIZATION, AND SET UP

Pressing the front panel PWR pushbutton initiates a Power On Self Test (POST) process after which the amplifier enters the Home Display. The TCR-MBA-50v2 has an auto-start configuration which is enabled as a factory default.

From the Home Display, the user can cycle through modes with momentary presses of the front panel MODE pushbutton. Modes cycle in the order depicted in Section 1.3.1.

Power levels are set using the front panel PWR pushbutton. A single press of the PWR pushbutton from the Home Display will cycle through the available power levels: 10, 15, 20, 35, 50W, and 75W (SATCOM Burst Mode). The default selection is 50W. See section 1.3.2 for additional information.

The corresponding antenna port is automatically selected based on mode. Alternatively, the user can force RF to any antenna port through settings in the Menu function. The display will show "CHANGE ANT PORT?" with clear instructions on menu navigation.

At all times within the Menu function: the ESC key functions as a “Negative” and returns to the Home Display or previous menu level; the ENT key functions as an “Affirmative” and results in a select action; the MENU key advances to the next Menu function.

Set Up is complete once the unit is powered on, mode selected, power level set, and antenna port selected (if applicable).

Power down (off/bypass) is accomplished by pressing and holding the PWR pushbutton for greater than three seconds.

Note: The auto-start configuration may be disabled or enabled within the user accessible menus and is enabled as a factory default. When enabled, the PA will automatically turn on with application of DC power. This feature is particularly useful in installations where the front panel is not easily accessible and DC power is controlled remotely. When disabled, the PA will return to its previous operating condition (on or off) if DC power is cycled.

2.3.1 PUSHBUTTON FUNCTIONS

PWR Pushbutton – Power On/Off - To turn the amplifier on, press the PWR button. The PA will turn on, complete a post process, and enter the Home Display in the same state as it was last powered off. Press and hold the PWR pushbutton for more than three seconds to power down the amplifier. While off, RF is routed to the LOS antenna port from the Radio Port.

PWR Pushbutton – Setting Power Level - To change transmit power level, press the PWR button momentarily from the Home Display. A single press of the PWR pushbutton will cycle through the available power levels: 10, 15, 20, 35, 50W, and 75W (SATCOM Burst Mode). The default selection is 50W. See section 1.3.2 for additional information.

ESC Pushbutton – Escape - A single press of the ESC Pushbutton acts as a “Negative” while in the Menu function and will return to the Home Display or previous menu while in the sub menus.

MENU Pushbutton – Menu - To enter the Menu function from the Home Display, press the MENU pushbutton momentarily. Subsequent presses will cycle through the MENU.

MODE Pushbutton – Mode - Momentary presses of the MODE pushbutton from the Home Display will cycle through available modes.

ENT Pushbutton – Enter - A single press of the ENT button acts as an “Affirmative” while in the Menu function and will result in selection of the action displayed.

The Menu function reverts back to the Home Display if no button is pressed for 10 seconds.

2.4 MODES OF OPERATION

2.4.1 VLO FM and VLO AM

From the Home Display, press the MODE button repeatedly until the display shows the desired mode (VLO FM or VLO AM). Default settings for VHF LOW modes are the LOS antenna port and 50W. The VHF LOW band is 30-118 MHz. Receive signals outside of this band will be attenuated. The user may select another antenna port or power level as described in Section 2.3.1.

2.4.2 VHI FM and VHI AM

From the Home Display, press the MODE button repeatedly until the display shows the desired mode (VHI FM or VHI AM). Default settings for VHF HIGH modes are the LOS antenna port and 50W. The VHF HIGH band is 118-174 MHz. Receive signals outside of this band will be attenuated. The user may select another antenna port or power level as described in Section 2.3.1.

2.4.3 UHF FM and UHF AM

From the Home Display, press the MODE button repeatedly until the display shows the desired mode (UHF FM or UHF AM). Default settings for UHF modes are the LOS antenna port and 50W. The UHF band is 174-512 MHz. Receive signals outside of this band will be attenuated. The user may select another antenna port or power level as described in Section 2.3.1.

2.4.4 VU FM and VU AM

From the Home Display, press the MODE button repeatedly until the display shows the desired mode (VU FM or VU AM). Default settings for VHF/UHF modes are the LOS antenna port and 50W. The VHF/UHF band is 30-512 MHz. Receive signals outside of this band will be attenuated. The user may select another antenna port or power level as described in Section 2.3.1.

2.4.5 SINC

From the Home Display, press the MODE button repeatedly until the display shows SINC mode. Default settings for SINGARS are the LOS antenna port and 50W. The SINGARS band is 30-88 MHz. Receive signals outside of this band will be attenuated. The user may select another antenna port or power level as described in Section 2.3.1.

2.4.6 HQ

From the Home Display, press the MODE button repeatedly until the display shows HQ. Default settings for HAVEQUICK are the LOS antenna port and 50W. The HAVEQUICK band is 225-400 MHz. Receive signals outside of this band will be attenuated. The user may select another antenna port or power level as described in Section 2.3.1.

2.4.7 SATURN

From the Home Display, press the MODE button repeatedly until the display shows SATURN. Default settings for SATURN are the LOS antenna port and 50W. The SATURN band is 225-400 MHz. Receive signals outside of this band will be attenuated. The user may select another antenna port or power level as described in Section 2.3.1.

2.4.8 SAT

From the Home Display, press the MODE button repeatedly until the display shows SAT. Default settings for SATCOM are the SAT antenna port and 50W. The SATCOM band is 240-270 MHz (receive) and 290-320 MHz (transmit). Signals outside of these bands will be attenuated. The user may select another antenna port or power level as described in Section 2.3.1.

2.4.9 WB

From the Home Display, press the MODE button repeatedly until the display shows WB. Default settings for WIDEBAND are the WB antenna port and 50W. The WIDEBAND band is 225-450 MHz. Receive signals outside of this band will be attenuated. The user may select another antenna port or power level as described in Section 2.3.1.

2.4.10 TW

From the Home Display, press the MODE button repeatedly until the display shows TW. Default settings for TACTICAL WAVEFORMS are the WB antenna port and 50W. The TACTICAL WAVEFORMS band is 225-450 MHz. Receive signals outside of this band will be attenuated. The user may select another antenna port or power level as described in Section 2.3.1.

**TACTICAL WAVEFORMS is designed to be compatible with emerging narrow and wideband constant envelope MANET waveforms with very fast switching speed requirements. Full operational testing is advised prior to use.*

2.4.11 BYP LOS

From the Home Display, press the MODE button repeatedly until the display shows BYP LOS. When the BYPASS LOS mode is selected, RF is routed to the LOS antenna port with no amplification. The bypass band is 30 MHz to 2.7 GHz. Signals outside of this band will be attenuated.

2.4.12 BYP WB

From the Home Display, press the MODE button repeatedly until the display shows BYP WB. When the BYPASS WIDEBAND mode is selected, RF is routed to the WB antenna port with no amplification. The bypass band is 30 MHz to 2.7 GHz. Signals outside of this band will be attenuated.

2.4.13 BYP SAT

From the Home Display, press the MODE button repeatedly until the display shows BYP SAT. When the BYPASS SATCOM mode is selected, RF is routed to the SAT antenna port with no amplification. The bypass band is 30 MHz to 2.7 GHz. Signals outside of this band will be attenuated.

2.4.14 MODE SELECTION NOTE

When a new mode is selected the PA automatically reverts back to the default power setting (50W, except in bypass) and the appropriate default antenna as shown Table 2-2:

Table 2-2. Mode Selection Default Antenna

LOS ANTENNA	VLO FM and VLO AM VHI FM and VHI AM UHF FM and UHF AM VU FM and VU AM SINC HQ SATURN BYP LOS
WB ANTENNA	WB TW BYP WB
SATCOM ANTENNA	SAT BYP SAT

2.5 FREQUENCY FAULT AND RECOVERY

The TCR-MBA-50v2 has built-in frequency fault protection.

2.5.1 OUT OF BAND FREQUENCY FAULT

If the RF input frequency is outside of the frequency range of the selected mode but within 30-512 MHz, the amplifier automatically switches to the applicable VHF/UHF mode (VU FM or VU AM) with no change to the current antenna port or power level. The display will show “FREQUENCY ALERT, MODE NOW VU FM (or VU AM)” until the end of transmit or two seconds, whichever is less.

2.5.2 OUT OF RANGE FREQUENCY FAULT

If the RF input frequency is outside of the actively amplified frequency range of the TCR-MBA-50v2 (30-512 MHz), the amplifier automatically switches to the Bypass mode on the current antenna connector. The display will show “FREQUENCY FAULT, PA IN BYPASS” until the end of transmit or two seconds, whichever is less. The message will reappear every six seconds until a manual recovery occurs.

2.5.3 RECOVERY

The TCR-MBA-50v2 will not revert to the previous mode when an out of band or out of range RF input is removed; to return to the desired operating mode, press the MODE button repeatedly until the display shows the desired operating mode. Frequency fault settings are not saved as the last mode; therefore, a power cycle returns the amplifier to its operating state prior to the frequency fault.

2.6 BYPASS OPERATION (POWER OFF)

In an off state or with DC power removed, the amplifier defaults to LOS Bypass Mode and RF is routed to the LOS antenna port. The bypass band is 30 MHz to 2.7 GHz. Signals outside of this band will be attenuated.

2.7 LNA OPERATION PRECAUTIONS

There may be an interoperability issue when operating certain radios that have a receive Low Noise Amplifier (LNA). It is recommended to turn off the radio LNA for best receive sensitivity when using the PA and its internal LNA.

2.8 SYSTEM WARNINGS

The TCR-MBA-50v2 has built-in monitoring for voltage, current, and temperature. This section identifies warnings which are indications of improper operating conditions and may cause the amplifier to limit output power or shut down, as described.

2.8.1 HIGH TEMP ALERT

If the amplifier internal temperature sensor detects excessive heat, the warning message “HIGH TEMP ALERT, TX PWR REDUCED” will be displayed for two seconds and repeated every six seconds until the condition is cleared. Upon clearing, “HIGH TEMP CLEAR, TX PWR NORMAL” will be displayed for two seconds and the amplifier will return to normal operations.

2.8.2 HIGH TEMP FAULT

If the amplifier is in a high temp alert and continues to increase internal temperature beyond safe operating conditions, the warning message “HIGH TEMP FAULT, PA IN BYPASS UNTIL TEMP IS REDUCED <65 C” will be displayed for two seconds and repeated every six seconds until the condition is cleared. Upon clearing, “HIGH TEMP CLEAR, TX PWR NORMAL” will be displayed for two seconds and the amplifier will return to the previous operating mode.

2.8.3 HIGH CURRENT ALERT

If the amplifier high current protection circuit detects high current, the warning message “HIGH CURRENT, CHECK SYSTEM” will be displayed until the end of transmit or two seconds, whichever is less. Transmit power may be automatically reduced when high current is detected but the PA will otherwise continue to operate normally.

2.8.4 HIGH CURRENT FAULT

If the amplifier high current protection circuit detects high current and cannot reduce the current sufficiently by reducing TX power, the PA will switch to Bypass Mode and the warning message “HIGH CURRENT, PA IN BYPASS” will be displayed for two seconds and repeated every six seconds until the condition is cleared by changing modes or with a DC power cycle. If in bypass or receive modes and excessive current draw is detected, the PA will automatically power itself off and set the auto-start configuration to off. Auto-start will not be enabled until selected again in the user accessible menu.

2.9 TROUBLESHOOTING

In the event of an amplifier malfunction, check to make sure that the equipment is configured in accordance with Section 3. If the problem persists, refer to the troubleshooting guide in Table 2-3.

Table 2-3. Troubleshooting Guide

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
“HIGH TEMP ALERT”	The amplifier has exceeded its normal operating temperature.	Provide additional airflow or reduce transmission time.
"HIGH TEMP FAULT"	The amplifier has exceeded its normal operating temperature limit.	Provide additional airflow or reduce transmission time.
“HIGH CURRENT, CHECK SYSTEM”	The amplifier high current protection circuit has detected high current.	Reduce input power, check antenna connections, reduce output power setting.
“HIGH CURRENT, PA IN BYPASS”	The amplifier high current protection circuit has detected high current beyond the factory determined threshold.	Reduce input power, check antenna connections, reduce output power setting.

3.0 INSTALLATION

3.1 PREPARATION FOR USE

After unpacking the system and inspecting for physical damage, select an appropriate location for the amplifier. Although the TCR-MBA-50v2 is weather-resistant, placing it in a location where it is protected from rain, sunlight, and salt spray will increase its service life. Make sure that adequate air flow is available to allow proper natural convection cooling.

3.2 MOUNTING PROVISIONS

The TCR-MBA-50v2 can be mounted using existing mounting holes for the TCR-MBA-50 family of power amplifiers (refer to Figure 3-1). These holes accommodate #10-32 screws, which screw into tapped 10-32 X 0.220 deep holes on the amplifier. Ensure the proper length screw is used to prevent damage to the threaded holes on the amplifier.

The power amplifier can also be mounted by using two (optional) mounting tabs in the front and two mounting holes on flanges in the rear. The tabs must be mounted first using 100° #8 flat head screws. To mount the power amplifier, simply slide the two slots on the front of the power amplifier onto the two tabs and secure the rear flanges with two #8 pan head screws. Other mounting points are included on the sides of the amplifier to accommodate a variety of mounting options.

See Figure 3-1 for details.

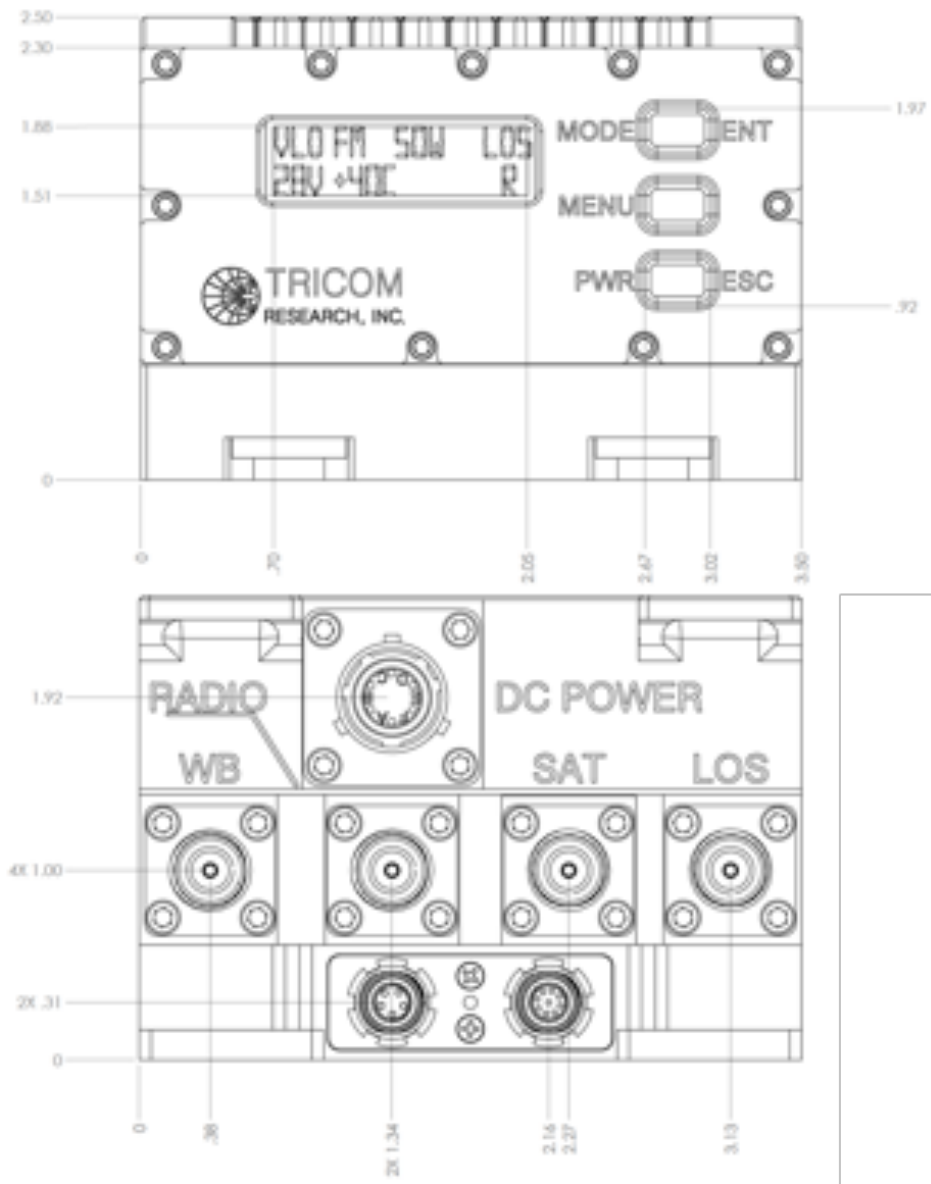


Figure 3-1. TCR-MBA-50v2 Outline Drawing

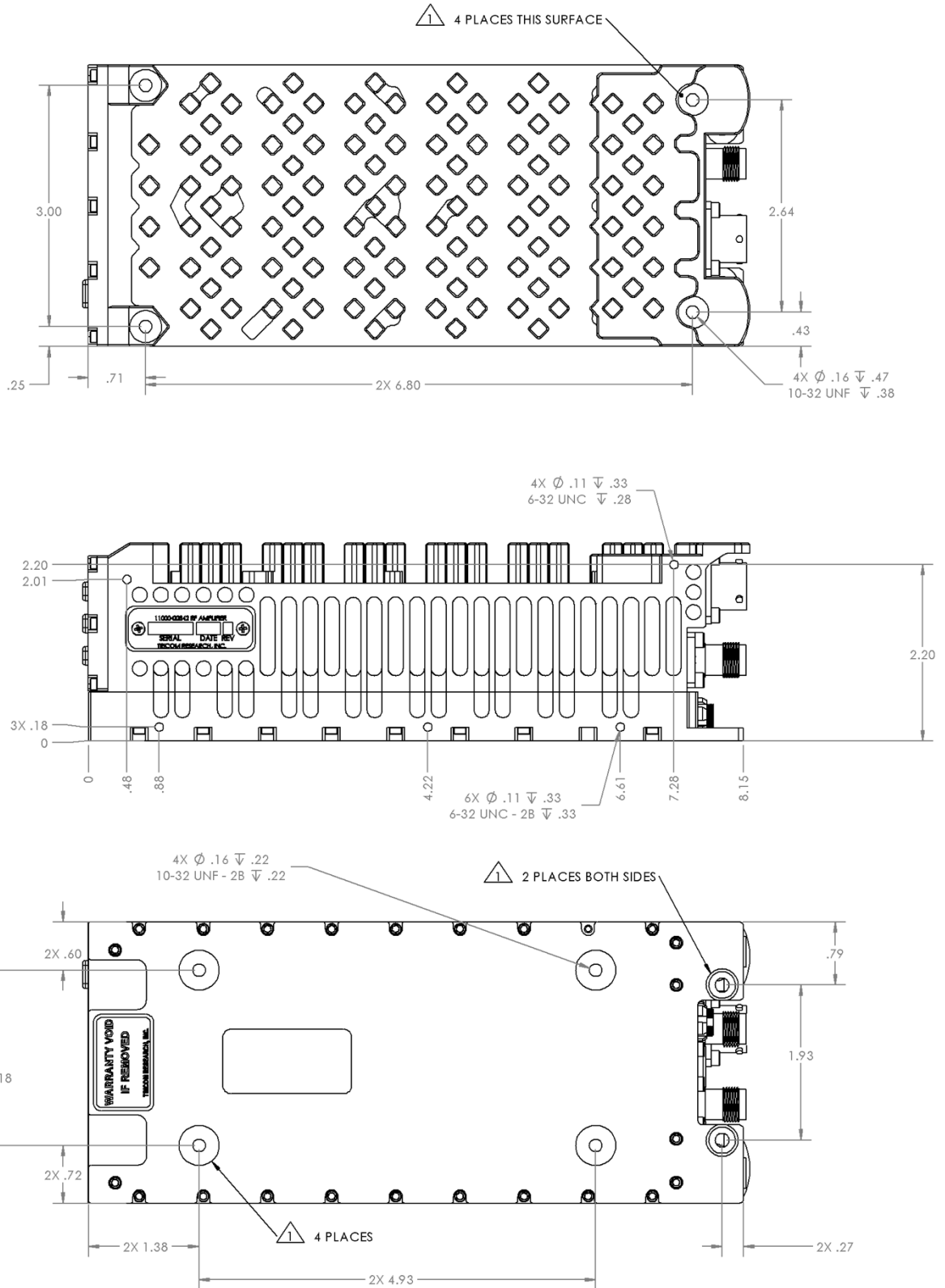


Figure 3-1. TCR-MBA-50v2 Outline Drawing (cont.)

3.3 DC INPUT POWER

The DC input power connector, shown in Figure 3-2, is compatible with a variety of power cables (custom made or available for purchase from Tricom Research Inc.). A typical power cable is shown in Figure 3-3. Note that the PA has true reverse polarity protection, including protection from connecting the positive voltage input to Pin B (GND) with a grounded chassis. Note that the keyway for PIN A is oriented towards the bottom of the PA.

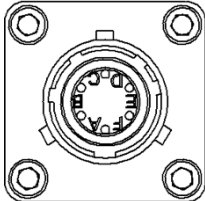


Figure 3-2. DC Input Power Connector (MS3112E10-6P)

Table 3-1. DC Input Power Connector Pinout

Pin	I/O	Description
A	I	10-32 VDC
B	I	Electrical Ground (GND)
C	I	Reserved
D	I	Open for battery configuration (battery fuse current limit protection); GND for standard configuration (power supplies and vehicular use)
E	I	Reserved
F	I/O	Reserved

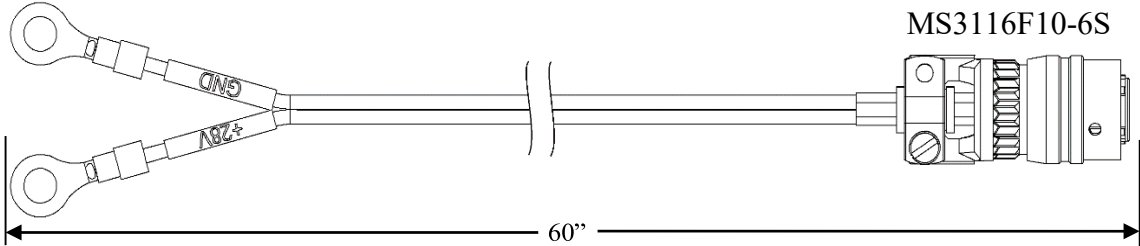


Figure 3-3. DC Power Cable (Part Number 77500-00412)

3.4 RF CONNECTIONS

Attach an RF cable from the transceiver to the Radio input connector. Attach RF cables/antennas to the applicable antenna connections located on the rear of the amplifier.

3.5 AUXILIARY INTERFACES

Auxiliary interfaces AUX 1 and AUX 2 (shown in Figure 1-4) provide access to enhanced capabilities and firmware updates. The connectors are waterproof and have a silicone dust cap. The connectors should be inspected to verify there is no dirt or contaminants present before mating a cable.

3.5.1 AUX 1 Interface

AUX 1 provides a +5VDC regulated output (shared with AUX 2), an external Keyline/PTT for future use, and an RS-485 interface for remote control.

Table 3-2. AUX 1 Interface Pinout

Pin	I/O	Description
1	I	Electrical Ground (GND)
2	O	+5V (output to External Device)
3	I	Keyline/PTT In (future use)
4	I/O	RS-485 A (+)
5	I/O	RS-485 B (-)

3.5.2 AUX 2 Interface

AUX 2 provides a +5VDC regulated output (shared with AUX 1), a USB interface for remote control, a second RS-485 interface for future use, and a 4-wire Ethernet connection. The USB interface is automatically selected when the USB external host sources +5VDC to the PA.

Table 3-3. AUX 2 Interface Pinout

Pin	I/O	Description
1	I	Electrical Ground (GND)
2	O	+5V (output to External Device)
3	I	USB +5V (input to PA from external host)
4	I/O	USB + / (RS-485 A (+) future use)
5	I/O	USB - / (RS-485 B (-) future use)
6	O	Ethernet TX+
7	O	Ethernet TX-
8	I	Ethernet RX+
9	I	Ethernet RX-

3.6 FIRMWARE UPDATES

The Power Amplifier firmware can be updated via the rear panel AUX 2 interface.

3.7 OPTIONAL FUNCTIONALITY AND ACCESSORIES

The TCR-MBA-50v2 supports optional accessories and functionality through the AUX 1 and AUX 2 interfaces. The two interfaces offer a combination of USB, RS-485, and Ethernet connectivity. Contact Tricom Research at support@tricomresearch.com for additional information.

3.7.1 REMOTE FACE PLATE

An optional Remote Face Plate is available for the TCR-MBA-50v2. The Remote Face Plate connects to the AUX 1 interface and offers full functionality from a remote location. The Remote Face Plate is particularly useful when operator controls are not easily accessible due to mounting location.

3.7.2 BIAS-TEE

Optional Bias-Tee units are available for the TCR-MBA-50v2 with a basic and enhanced version available. The Bias-Tee places the amplifier near the antenna while maintaining control of the PA near the operator. The basic version allows the user to turn the PA on or off remotely while the enhanced version offers full remote control.

3.7.3 WEBSERVER

The TCR-MBA-50v2 has a built-in webserver designed for remote control and monitoring over IP using a standard browser. The webserver is accessed through the AUX 2 interface.

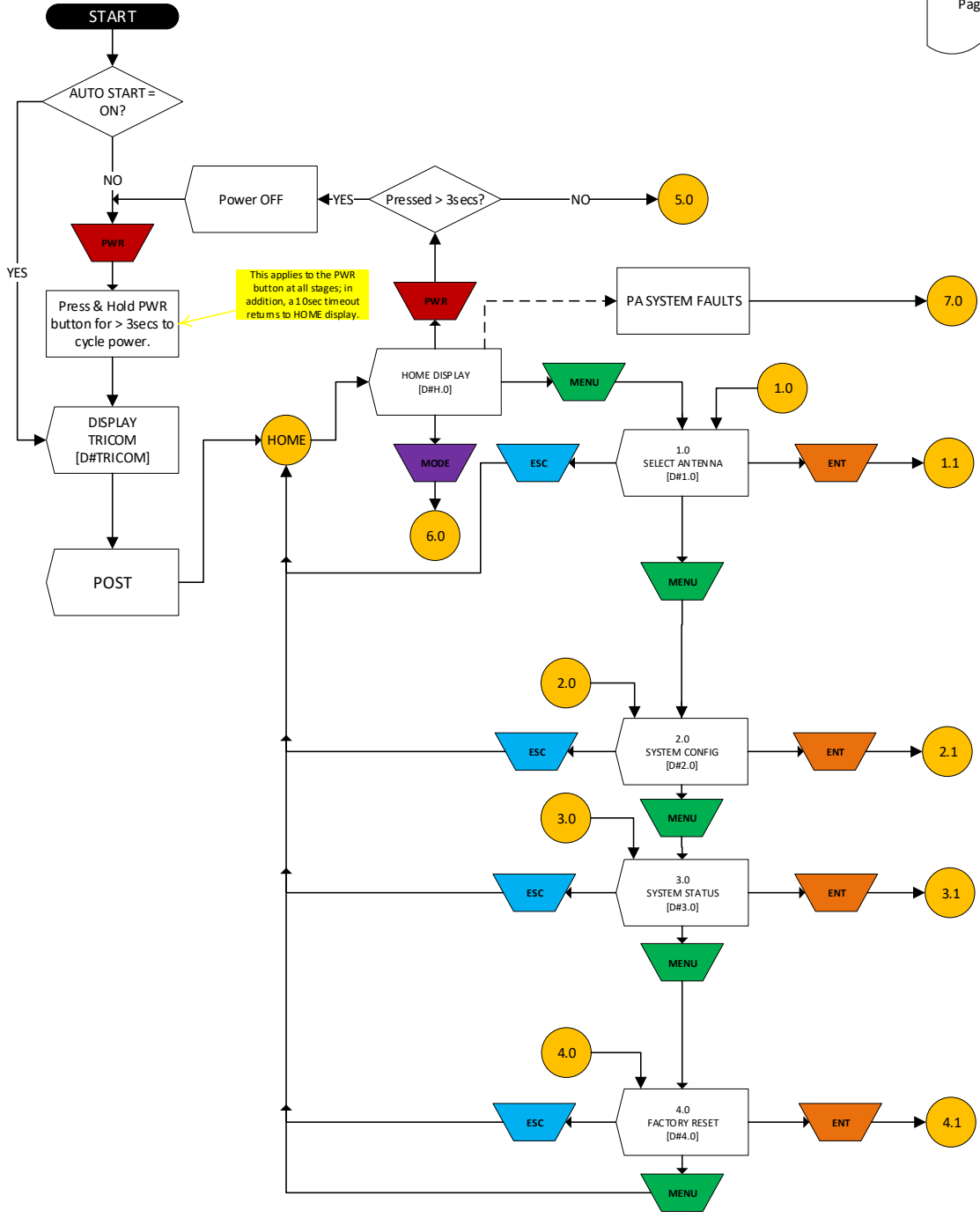
3.7.4 ATAK PLUG-IN

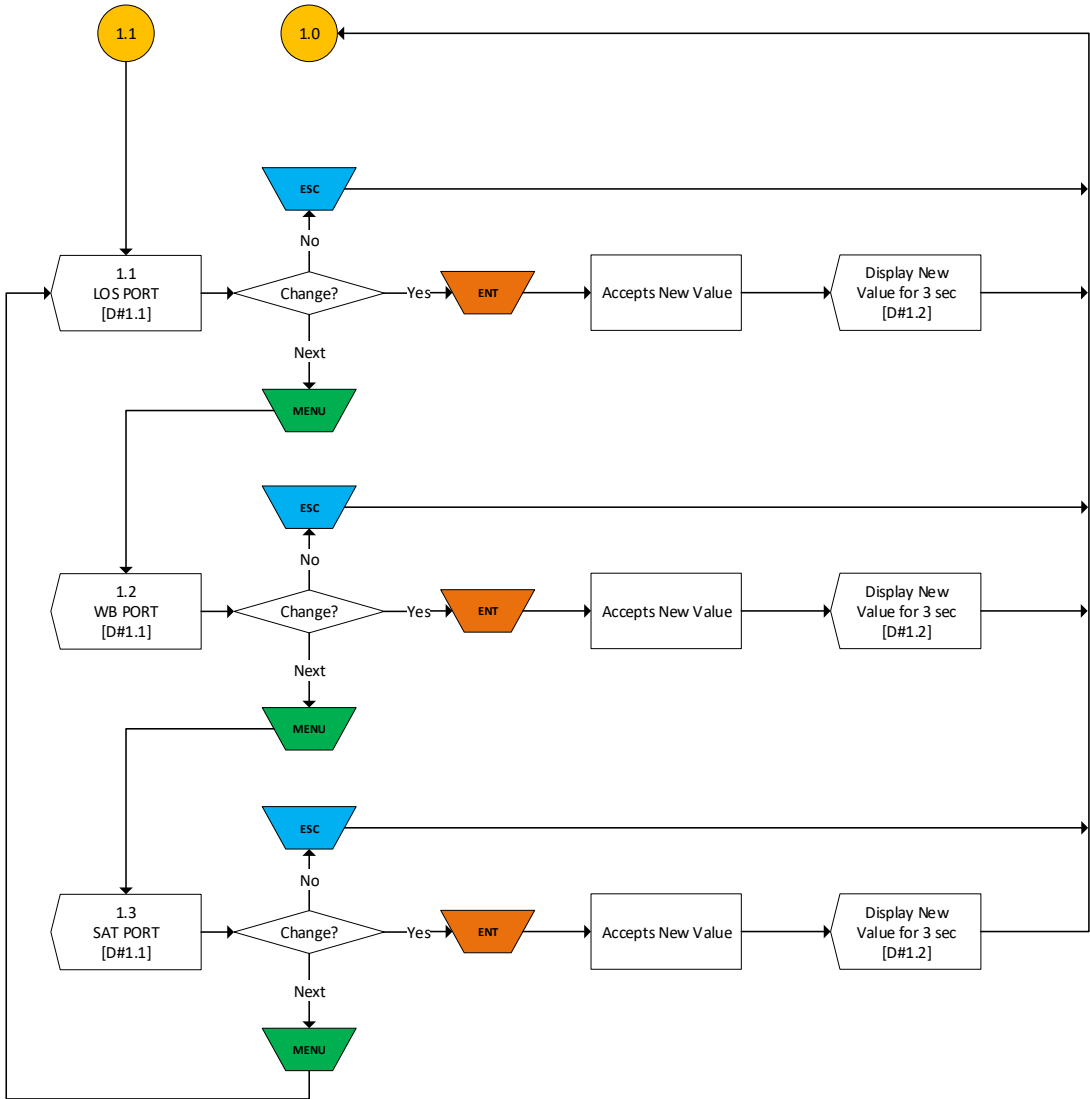
An ATAK Plug-In for remote control of the TCR-MBA-50v2 is in development. The end-user device connects to the amplifier via the AUX 2 interface.

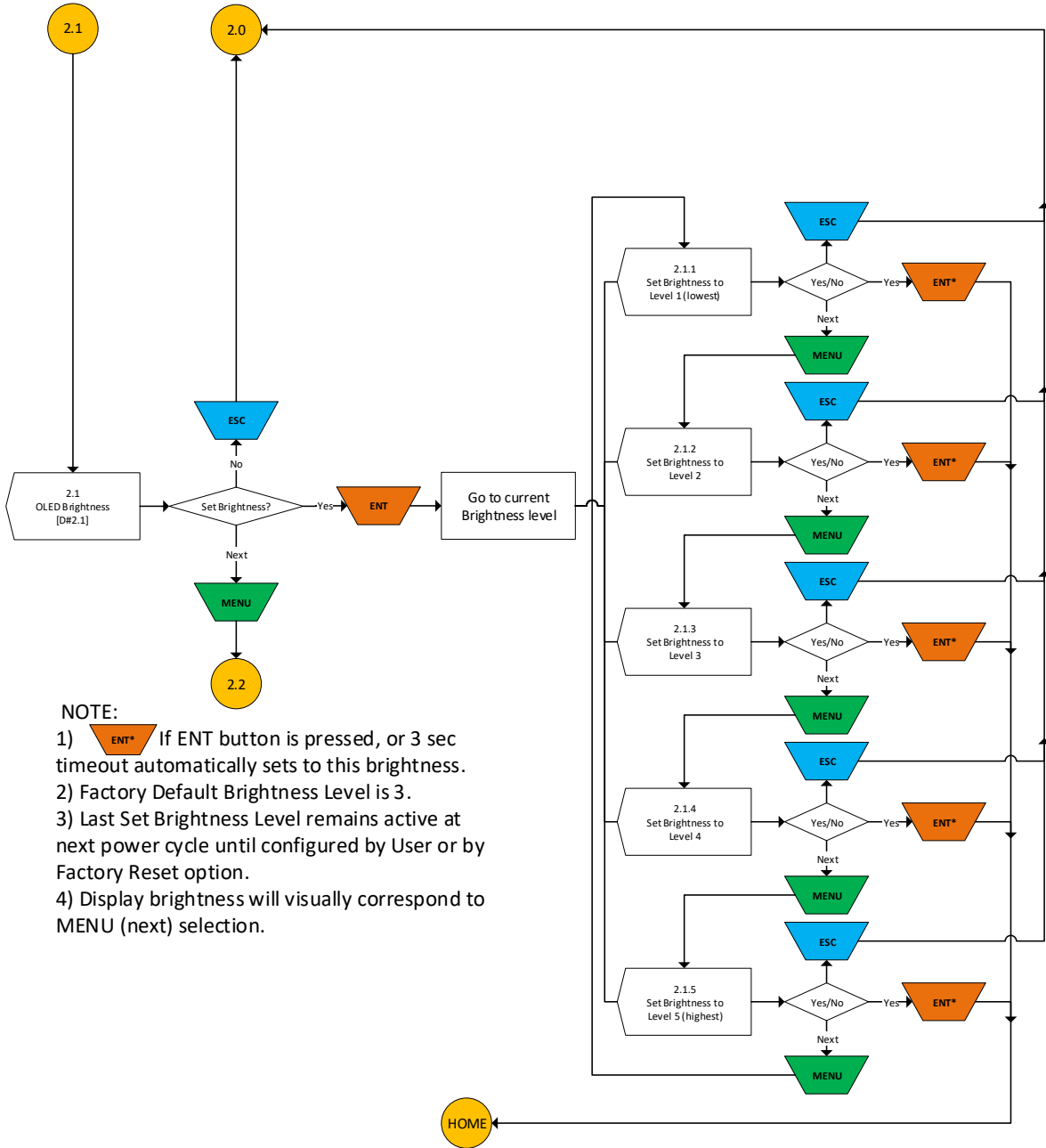
APPENDIX A

PA MENU STRUCTURE

Page 0



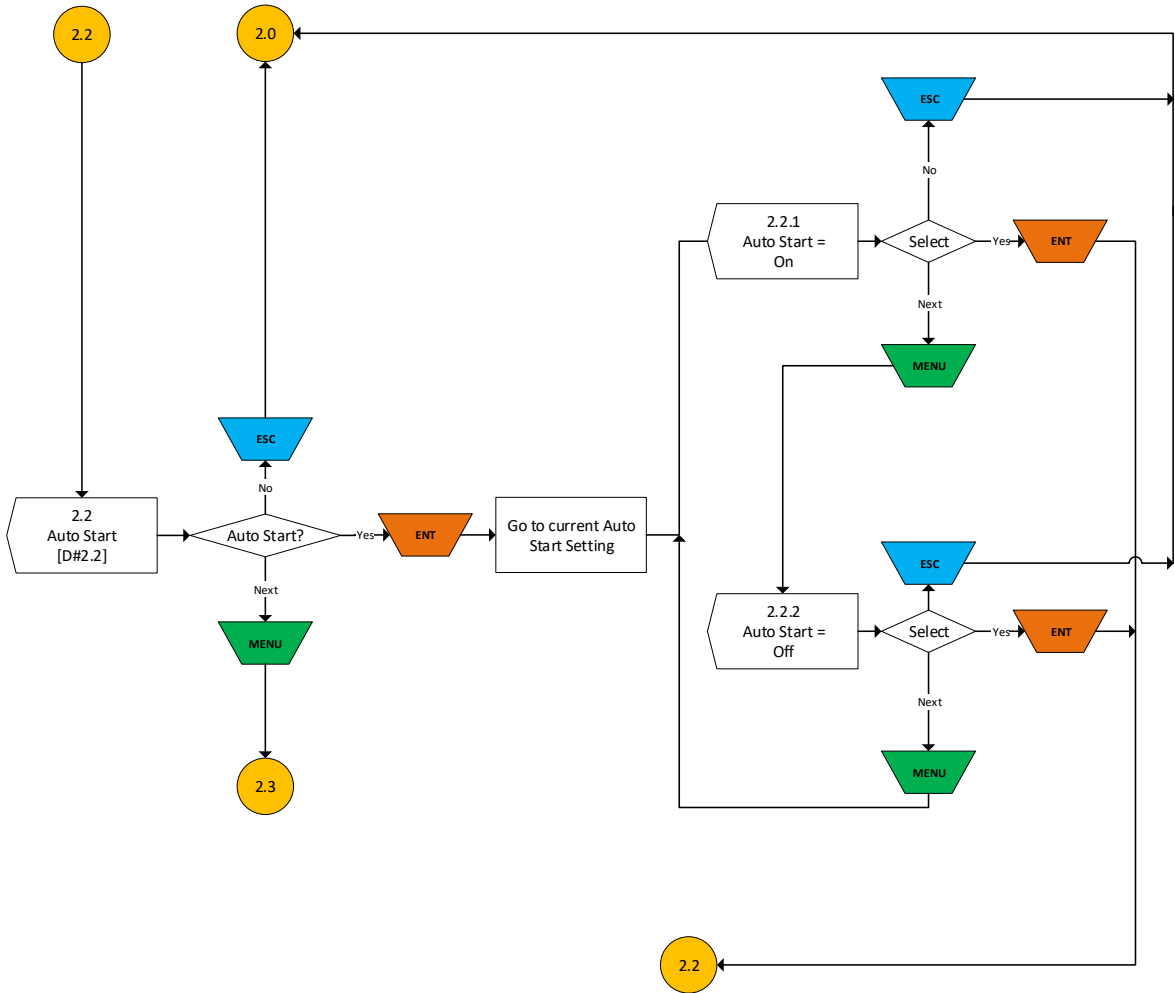


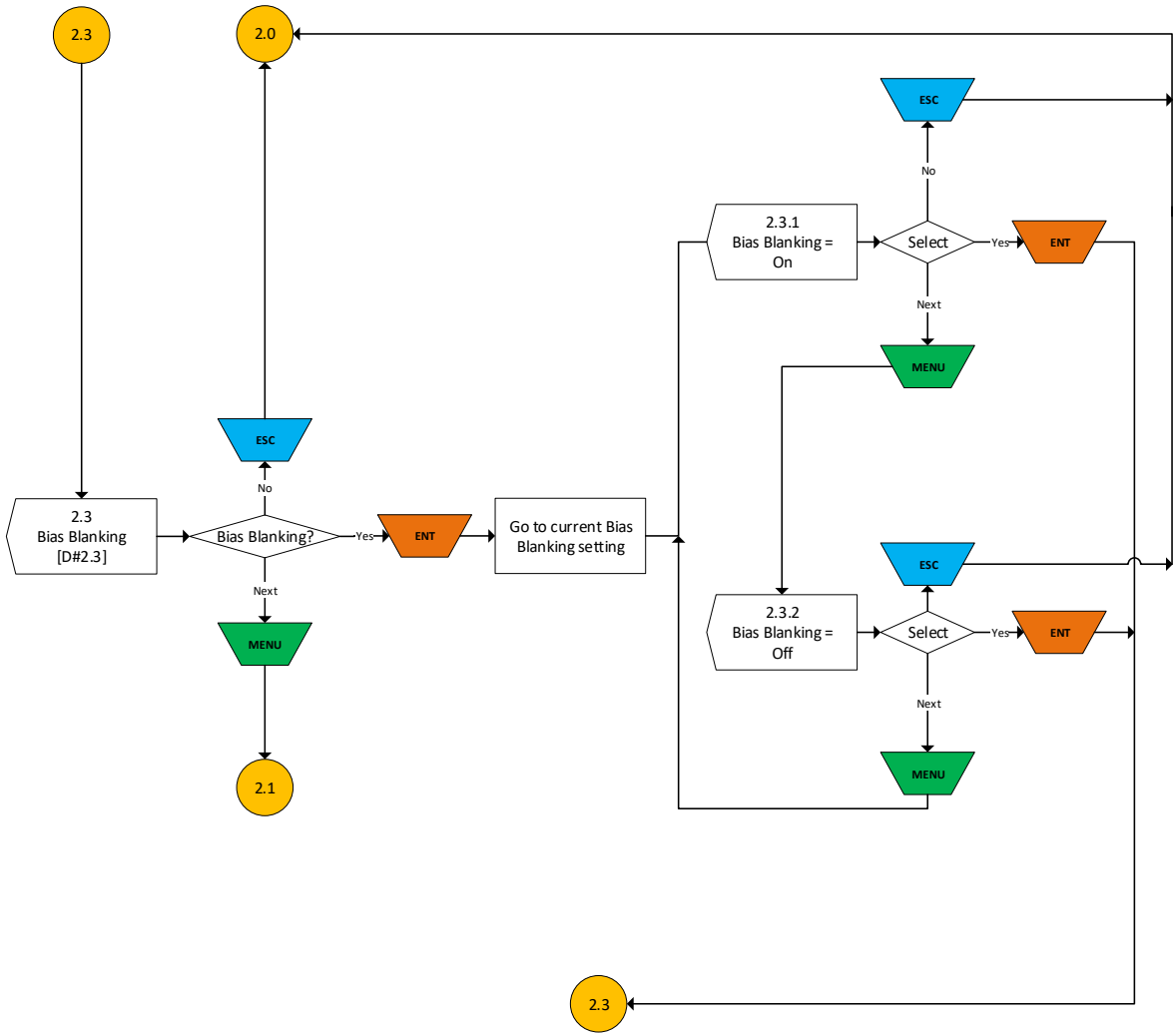


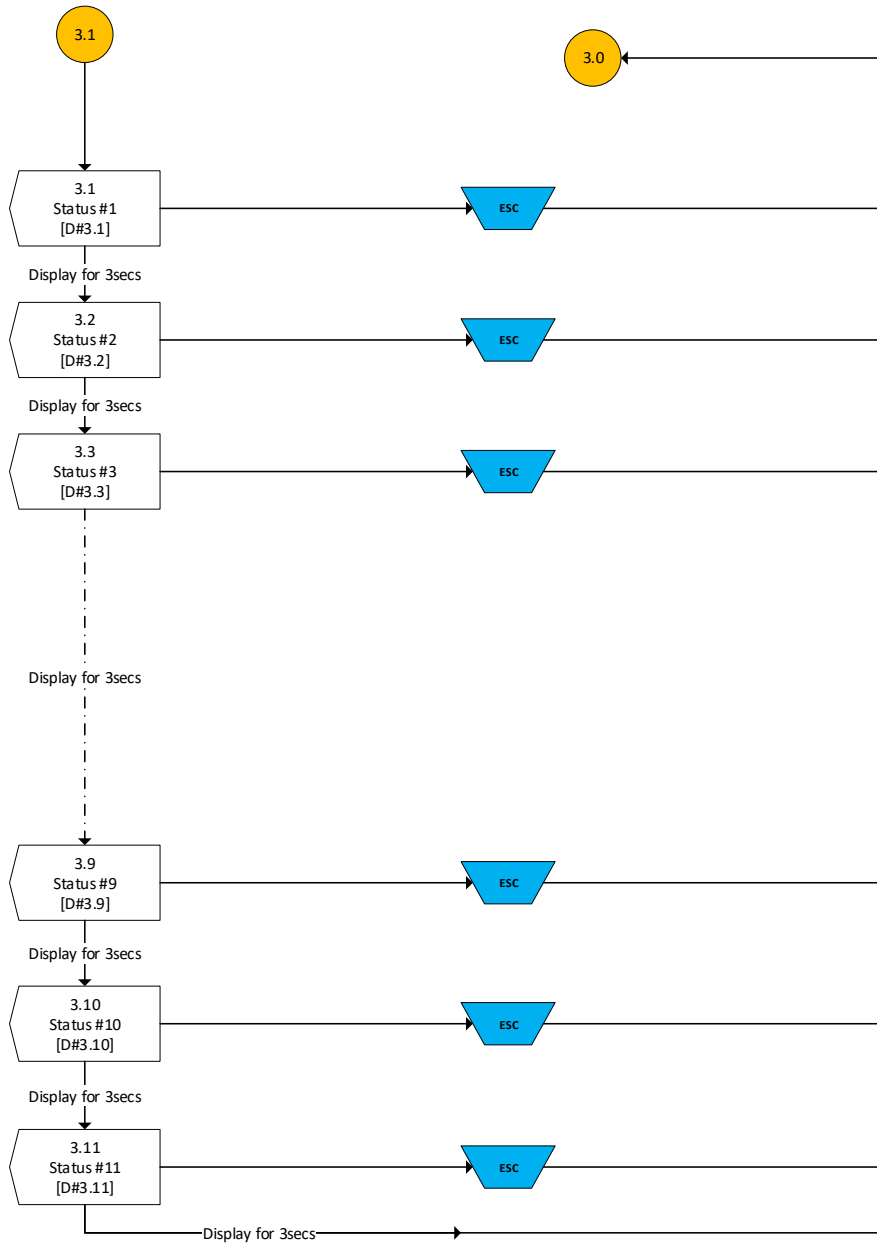
NOTE:

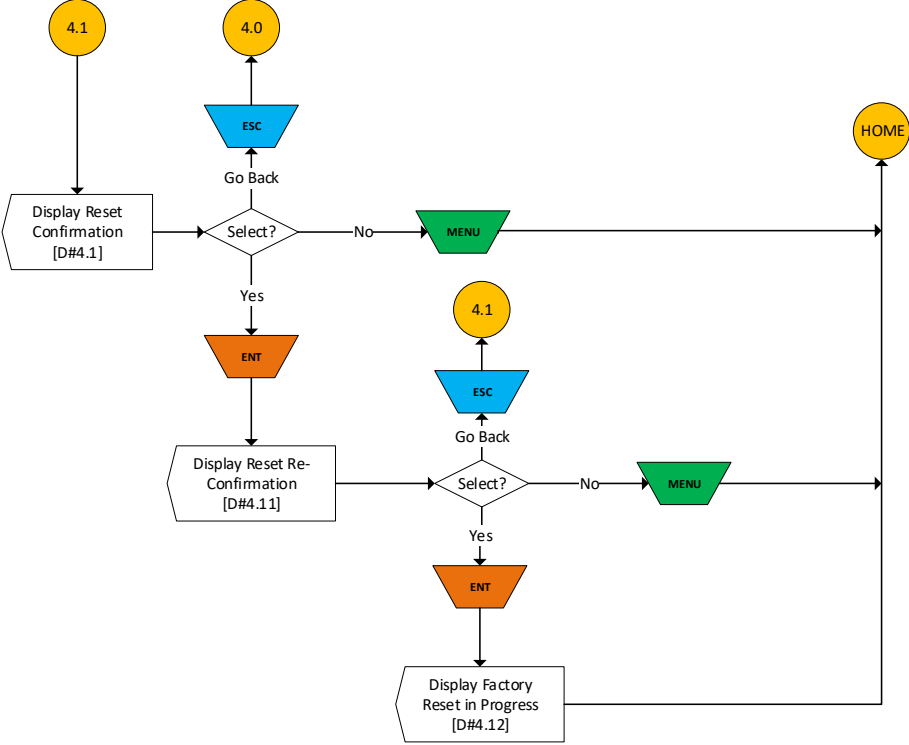
- 1) **ENT*** If ENT button is pressed, or 3 sec timeout automatically sets to this brightness.
- 2) Factory Default Brightness Level is 3.
- 3) Last Set Brightness Level remains active at next power cycle until configured by User or by Factory Reset option.
- 4) Display brightness will visually correspond to MENU (next) selection.

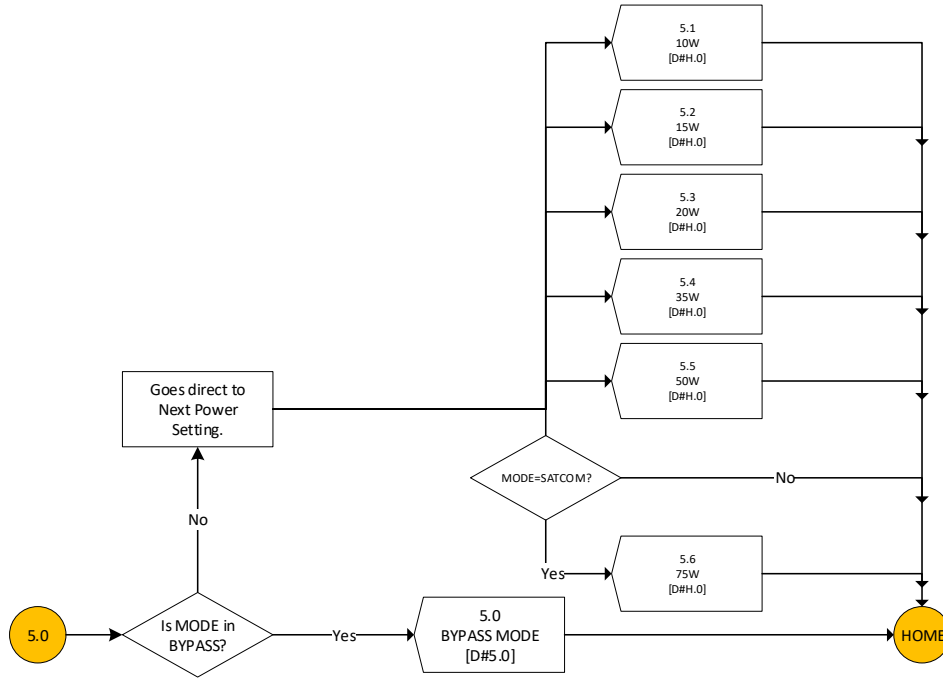
SYSTEM CONFIGURATION
Set Auto Start



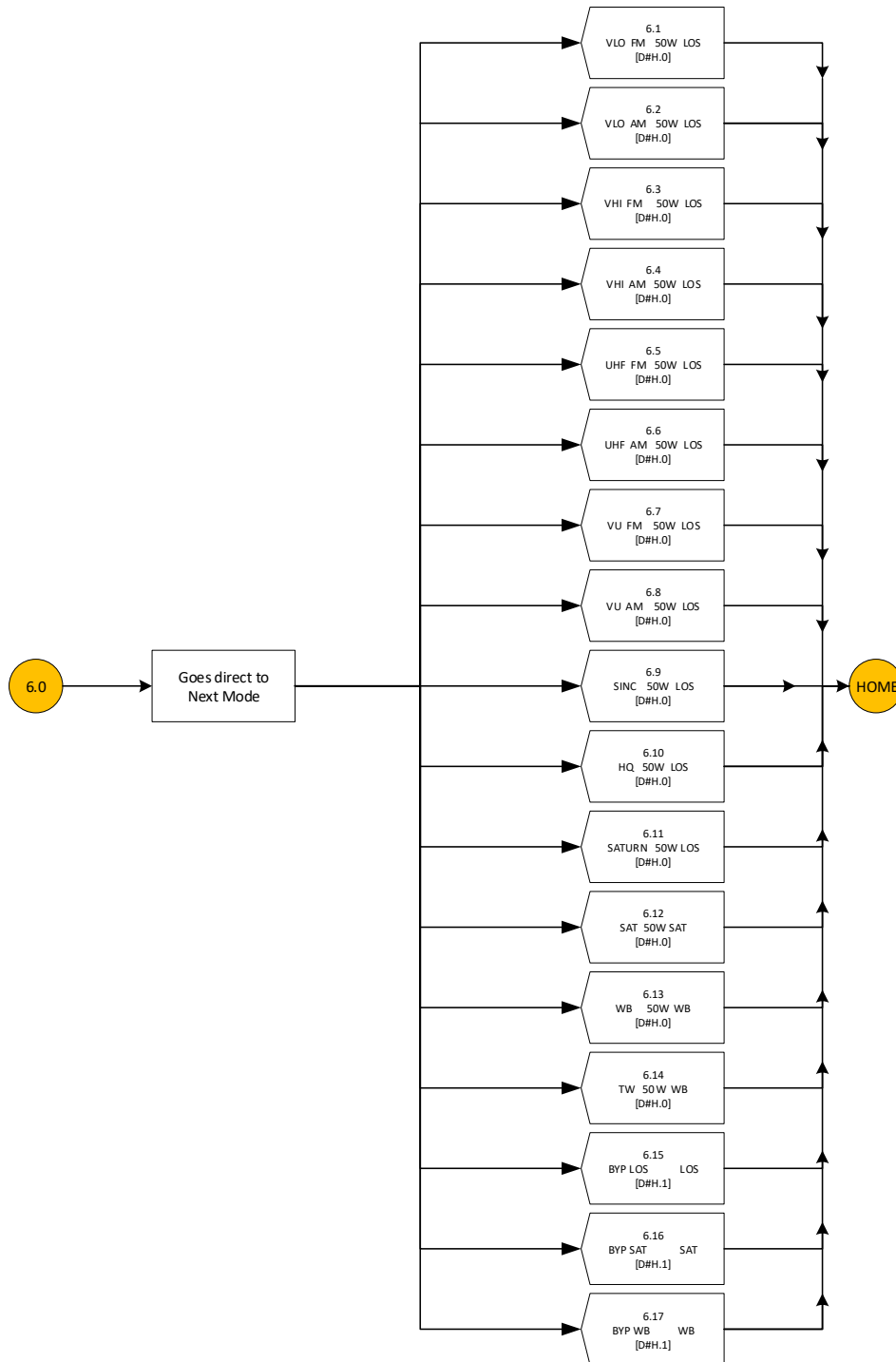


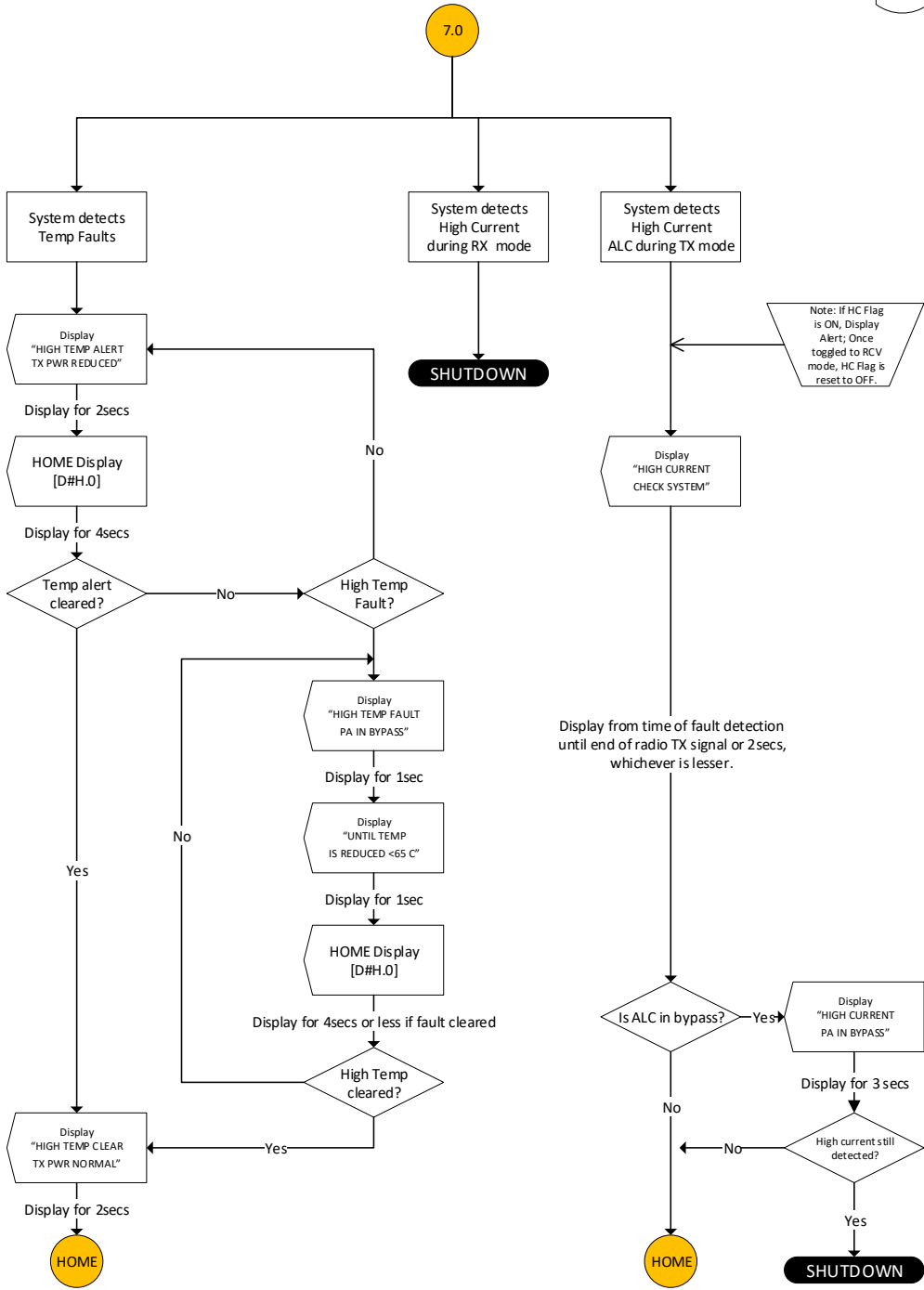






QUICK SET MODE





Note: For Tx and Rx High Current Fault, after amplifier shutdown, Auto Start is set to OFF until user sets it to ON within software.

