Technical Service Bulletin 040307
Universal Module Replacement Table

This service bulletin provides a reference table of instructions and precautions for the removal and replacement of major subassemblies in certain Comark transmitters and exciters. The information contained in this table is compiled from various product manuals. If you require more detailed information, do not hesitate to contact Comark Customer Service department via e-mail at swikcsfeedback@Comarktv.com

ADAPT ATSC Exciter (MODAP)	
Subassembly	**Instructions and Precautions**
MODAP Power Supply	Switch to reserve exciter (where applicable). Turn off switch on rear of exciter chassis to remove AC power to exciter. Remove faulty module. Install replacement module. Turn on exciter. No further setup required.
8 VSB Module	Switch to reserve exciter (where applicable). Turn off switch on rear of exciter chassis to remove AC power to exciter. Remove faulty module. Install replacement module. Be careful to not crush inner pin on backplane for connector J9 while reinserting module. Turn on exciter. No further setup required.
DAP Module	Switch to reserve exciter (where applicable). Turn off switch on rear of exciter chassis to remove AC power to exciter. Remove faulty module. Install replacement module. Reduce MGC and/or AGC level on CUDC module to reduce possibility of overdriving power amplifiers. Turn on exciter. If OLDC module installed: Set OLDC frequency by issuing commands set_synthe_000000000, where zeroes represent exact center channel frequency in Hz (no decimal point). Perform exciter corrections to obtain satisfactory SNR and sideband performance. Consult Service Bulletin 040126 for more details. CUDC must be aligned as a pair with DAP module. Alignment performed either in factory, if modules shipped as matched pair, or in field using OLDC and OLMC routines and exciter output looped back to feedback input. Field alignment is only possible with an OLDC module present. DAP modules with version 5.0.3 code (**ADAPT Control…Software > Get Soft Release Version**) must have revision C or higher PIC chip in user interface module (46745034). Otherwise, user interface module will lose communication with DAP module and local controls will not work.
CUDC Module	Switch to reserve exciter (where applicable). Turn off switch on rear of exciter chassis to remove AC power to exciter. Remove faulty module. Install replacement module. Reduce MGC and/or AGC level to reduce possibility of overdriving power amplifiers. Turn on exciter. Perform exciter corrections to obtain satisfactory SNR and sideband performance. Consult Service Bulletin 040126 for more details. CUDC must be aligned as a pair with DAP module. Alignment performed either in factory, if modules shipped as matched pair, or in field using OLDC and OLMC routines and exciter output looped back to feedback input. Field alignment is only possible with an OLDC module present. NOTE: UHF CUDC module has HQ and non-HQ versions. Earlier “non-HQ” CUDC

ADAPT ATSC Exciter (MODAP)	
Subassembly	**Instructions and Precautions**
	modules have been largely superceded by the HQ variety, with superior performance specs. HQ CUDC modules will have HQ indicated on front panel of module. HQ modules are backwards compatible for non-HQ modules. Additionally, UHF CUDC modules used in Affinity and IOT transmitters have the front-panel MGC potentiometer disabled to allow remote power control via the user interface module. Modified CUDC modules generally have a white ID sticker with the modified part number 46744202 (non HQ) or 46744204 (HQ). CUDC module also has different models for VHF high and low band.
Output Preamplifier	Switch to reserve exciter (where applicable). Turn off switch on rear of exciter chassis to remove AC power to exciter. Remove faulty module. Install replacement module. Turn on exciter. Perform exciter corrections to obtain satisfactory SNR and sideband performance. Consult Service Bulletin 040126 for more details. NOTE: Preamplifier module comes in three different varieties: VHF (45335390), UHF low gain (45335390), and UHF GG high gain (45335233). The high gain UHF amplifier is typically used in DCX and Affinity transmitters, while the low gain UHF module is typically used in Optimum and Ultimate transmitters.
OLDC Module	Switch to reserve exciter (where applicable). Turn off switch on rear of exciter chassis to remove AC power to exciter. Remove faulty module. Install replacement module. Turn on exciter. Perform exciter corrections to obtain satisfactory SNR and sideband performance. Consult Service Bulletin 040126 for more details. NOTE: OLDC module comes in different varieties for VHF and UHF.
Synthesizer Module	Switch to reserve exciter (where applicable). Turn off switch on rear of exciter chassis to remove AC power to exciter. Remove faulty module. Install replacement module. LO frequency is preset at factory. If frequency is incorrect, setting may be changed with FOG version of ADAPT Control software. Optimum and Ultimate transmitters can also change frequency setting via the Synthesizer field on the PCL screen.
User Interface Module	Switch to reserve exciter (where applicable). Turn off switch on rear of exciter chassis to remove AC power to exciter. Remove faulty module. Configure jumper settings on new module to match old module. Install replacement module. NOTE: User Interface module not present in Optimum and Ultimate transmitters.

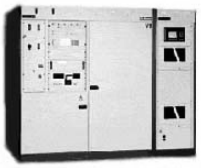
IOX NTSC/PAL Exciter	
Subassembly	**Instructions and Precautions**
B1 Module	Switch to reserve exciter (where applicable). Turn off switch on rear of exciter chassis to remove AC power to exciter. Remove faulty module. Install replacement module. Set B1 - 6 potentiometer fully anti-clockwise and set B1 - 2 switch to AGC = off position to minimize risk of overdrive. Turn on exciter. Align AGC system per Service Bulletin 030531. Align linearity correctors per Service Bulletin 030602. A small percentage of stations have the "Multi-level AGC" modification. A standard B1 module will not work at these sites. A B1 module with the Multi-level AGC modification must be installed by a Comark field engineer.
B2 Module	Switch to reserve exciter (where applicable). Turn off switch on rear of exciter chassis to remove AC power to exciter. Remove faulty module. Install replacement module. Turn on exciter. Requires realignment of differential gain and phase correctors and certain video parameters. Consult Service Bulletins 030523 and 030603 for more details. Stations using group delay correction, either due to a diplexer or an adjacent DTV channel combiner, should remove group delay corrector daughter board from old B2 module and reinstall it replacement module. Otherwise, group delay corrector will need to be readjusted.
B3 Module	Switch to reserve exciter (where applicable). Turn off switch on rear of exciter chassis to remove AC power to exciter. Remove faulty module. Install replacement module. Turn on exciter. Requires realignment of aural carrier correctors and certain video parameters. Consult Service Bulletins 030523 and 030604 for more details.
B4 Module	Switch to reserve exciter (where applicable). Turn off switch on rear of exciter chassis to remove AC power to exciter. Remove faulty module. Install replacement module. Turn on exciter. Reduce sound power level via potentiometer B4 - 17 and confirm correct sound-vision ratio at exciter output per Service Bulletin 030601 prior to applying power to HPA(s). Realign aural modulation level via potentiometer B4 - 6.
B5 Module	Switch to reserve exciter (where applicable). Turn off switch on rear of exciter chassis to remove AC power to exciter. Remove faulty module. Install replacement module. Two versions of B5 module exist: 407244-01-CHxx sound converter for separate amplification transmitters and 407745-01 AGC & IF level switch for the Multi-level AGC modification. A visit by a Comark field engineer is strongly recommended for installation of a 407745-01 B5 module. Depending on nature of problem, it may be necessary to transfer crystal oscillator and/or channel filter to new module from factory. Contact Comark for further details.
B6 Module	Switch to reserve exciter (where applicable). Turn off switch on rear of exciter chassis to remove AC power to exciter. Remove faulty module. Install replacement module. Depending on nature of problem, it may be necessary to transfer crystal oscillator and/or channel filter to new module from factory. Contact Comark for further details.
Exciter Power Supply	Switch to reserve exciter (where applicable). Turn off switch on rear of exciter chassis to remove AC power to exciter. Remove faulty power supply. Install replacement power supply.
Output Amplifier	Switch to reserve exciter (where applicable). Turn off switch on rear of exciter chassis to remove AC power to exciter. Remove faulty amplifier. Install replacement amplifier. If old amplifier had a 3dB SMB pad fitted to input, transfer pad to new amplifier.

Optimum / Ultimate NTSC/PAL Exciter	
Subassembly	**Instructions and Precautions**
Video + IF Module	Switch to reserve exciter (where applicable). Open EMB circuit breaker to remove power to exciter. Remove faulty module. Ensure that part number on replacement module exactly matches old module, including last two "variant" digits after decimal point. Configure jumper settings on new module to match old module. NOTE: You may be instructed by Comark to transfer group delay corrector from faulty module to new module. Install replacement module on extender PCB. Close EMB circuit breaker to power up exciter. Adjust sync amplitude to 40IRE (R129) and depth of modulation to 100IRE (R727). May require adjustment of luminance linearity, differential phase, differential gain correctors, if used. May require adjustment of white clipper threshold (R14). May require alignment of VITS present sampling (R345, S300, TP305, TP303 - align pulse to center of white bar in vertical interval test signal). Open EMB circuit breaker, replace module cover, remove extender PCB, insert module, close EMB circuit breaker.
Vision IF/RF Converter Module	Switch to reserve exciter (where applicable). Open EMB circuit breaker to remove power to exciter. Remove faulty module. Ensure that part number on replacement module exactly matches old module, including last two "variant" digits after decimal point. Configure jumper settings on new module to match old module. NOTE: You may be instructed by Comark to transfer upconverter filter from faulty module to new module. Install replacement module on extender PCB. Turn AGC and MGC potentiometers fully CCW before restarting transmitter. Close EMB circuit breaker to power up exciter. Restart transmitter and adjust power to 100% in MGC mode (R913). Align AGC clamp to back porch via R921, TP900, TP903. Adjust AGC level to 100% (R941, R902). Set -3dB and -6 dB reduction thresholds as necessary via R983 (-3dB), R984 (-6dB). Adjust linearity corrector setting as necessary to achieve acceptable LF LIN and ICPM performance. Open EMB circuit breaker, replace module cover, remove extender PCB, insert module, close EMB circuit breaker.
Local Oscillator Module	Switch to reserve exciter (where applicable). Open EMB circuit breaker to remove power to exciter. Remove faulty module. Ensure that part number on replacement module exactly matches old module, including last two "variant" digits after decimal point. Configure jumper settings on new module to match old module. NOTE: You may be instructed by Comark to transfer crystal oscillator Y100 (where applicable) to the replacement module and retune the LO multiplier (UHF). Install replacement module. Close EMB circuit breaker to power up exciter. Check LO frequency with frequency counter.
Sound IF/RF Converter Module	Switch to reserve exciter (where applicable). Open EMB circuit breaker to remove power to exciter. Remove faulty module. Ensure that part number on replacement module exactly matches old module, including last two "variant" digits after decimal point. Configure jumper settings on new module to match old module. NOTE: You may be instructed by Comark to transfer upconverter filter from faulty module to new module. Install replacement module on extender PCB. Turn AGC and MGC potentiometers fully CCW before restarting transmitter. Close EMB circuit breaker to power up exciter. Restart transmitter and adjust power to 100% in MGC mode (R913). Adjust AGC level to 100% (R941, R902). Set -3dB and -6 dB reduction thresholds as necessary via R983 (-3dB), R984 (-6dB). Open EMB circuit breaker, replace module cover, remove extender PCB, insert module, close EMB circuit breaker.
Audio + IF Module	Switch to reserve exciter (where applicable). Open EMB circuit breaker to remove power to exciter. Remove faulty module. Ensure that part number on replacement module exactly matches old module, including last two "variant" digits after decimal point. Configure jumper settings on new module to match old module. Check for presence of AUDIO PRESENCE bypass = 100kohm resistor installed between pins 3 and 7 of chip MA4. Apply or remove bypass jumper to new module as desired to defeat AUDIO PRESENCE alarm. Install replacement module. Close EMB circuit breaker to power up

Optimum / Ultimate NTSC/PAL Exciter	
Subassembly	**Instructions and Precautions**
	exciter. Adjust front panel LEVEL pots as necessary to return aural modulation to correct level.
Driver Power Supply	Switch to reserve exciter (where applicable). Open EMB circuit breaker to remove power to exciter. Remove cover from VIDEO+IF module and install on extender PCB. Remove faulty supply. Install replacement supply. Close EMB circuit breaker to power up exciter. Measure +/- 12V at F801 and F 802 at lower rear of video + IF module with cover removed. Adjust power supply front panel controls as necessary to set +/- 12V. Open EMB breaker, Restore VIDEO+IF module to original condition, close EMB breaker.
Synthesizer Module	Switch to reserve exciter (where applicable). Open EMB circuit breaker to remove power to exciter. Synthesizers with OL model numbers: Remove cover from old module and observe setting of thumbwheel switches (digits of LO frequency). Set thumbwheel switches to match in new module. Synthesizers with DDAS model numbers: Access Synthesizer field on PCL in Maintenance mode. Re-type desired LO frequency and press Enter. CPU will send new frequency setting to synthesizer module. Install replacement module. Close EMB circuit breaker to power up exciter. Verify on channel operation with frequency counter.

Affinity ATSC Solid State Transmitter	
Subassembly	**Instructions and Precautions**
Upconverter Module	Partially remove small power supply (to left) to remove power to upconverter. Remove faulty unit. Install replacement unit. Replacement unit must be aligned in factory before shipment. Final alignment of power reading may also be performed on site with Affinity Control software GUI. Consult Service Bulletin 040603 for more details.
Upconverter PS Plug-in	Remove faulty unit. Install replacement unit. No further setup required.
32V PA Power Supply	Remove AC power to unit. Remove faulty unit. Install replacement unit.
Power Amplifier Module	Remove faulty unit. Install replacement unit. No further setup required.
A10 Remote Metering Assembly	Remove connector from module. CAUTION: connector is not keyed – note correction orientation of connector before removing module. Observe save orientation when connection to replacement module. Remove faulty unit. Install replacement unit. Check with a voltmeter for 3-4VDC between positions TB2-13 & -14. If necessary, adjust scale adjustment (vertically the lowest pot when physically viewed) to obtain proper output voltage.

Optimum/Ultimate Solid State Transmitter	
Subassembly	**Instructions and Precautions**
Air Cooled PA Module	Remove faulty module. Verify that part number of new module matches part number of old module. UHF modules: set band select switch on side of module to correct setting. Insert new module. Ensure that module fully seats in slot. Adjust amplifier AGC level (front of module) to be within .05V of all other PAs on AGC page in control screen.
Liquid Cooled PA Module	Unplug module before disconnecting cooling. Remove faulty module. Verify that part number of new module matches part number of old module. UHF modules: set band select switch on side of module to correct setting. Insert new module. Connect cooling before final insertion. Ensure that module fully seats in slot. Adjust amplifier AGC level (front of module) to be within .05V of all other PAs on AGC page in control screen.
Air Cooled PA Power Supply	Open power supply breaker. Partially remove PA modules mated to PS. Remove faulty power supply. Install new power supply with breaker open. WARNING: Do not touch banana plugs while trying to align module insertion - 208/480V may be present. Fully insert PA modules to mate with new supply. Close breaker to power up supply once installed. Apply fixing screws as necessary per Service Bulletin 020809. Check amp currents for affected PA modules to ensure that a good connection has been made.
Liquid Cooled PA Power Supply	Open power supply breaker. Partially remove PA modules mated to PS. Disconnect cooling to supply. Remove faulty power supply. Install new power supply with breaker open. WARNING: Do not touch banana plugs while trying to align module insertion - 208/480V may be present. Fully insert PA modules to mate with new supply. Reconnect cooling to supply. Close breaker to power up supply once installed. Apply fixing screws as necessary per Service Bulletin 020809. Check amp currents for affected PA modules to ensure that a good connection has been made
CPU Card	Open CPU power circuit beaker before removing or inserting module. Software revision on replacement card (white sticker 2970xxxx on plug-in chip) must match revision on old card.
CPU Power Supply	Open CPU power circuit breaker before removing or inserting module. The same CPU power supply is used for both 120V (colorized screen) and 220V (monochrome screen) version transmitters. CPU power supply must be opened and the position of a 120V/220V set for the appropriate voltage.
PCL Local Control Panel	Note forward and reverse power readings before removing panel. Open CPU power circuit breaker before removing or inserting module. Software revision on replacement unit (white sticker 2970xxxx on plug-in chip) must match revision on old unit. Recalibrate forward and reverse power readings to previously noted values. Be sure to calibrate PCL screen readout, then bargraph display for each power reading.
Multiplex Board	Turn off transmitter. Disconnect primary power to cabinet via AC switch. Configure switch settings on new board to match old board. Remove R1600 resistor network in UHF transmitters. Remove faulty board. Install replacement board. Restore AC power to cabinet.
A300 American Metering Assembly	Turn off transmitter. Remove faulty unit. Install replacement unit. Requires recalibration of forward and reverse power readings. Requires alignment of AGC system. Consult Service Bulletin 030416 for more details.



IOX or DCX IOT Transmitter	
Subassembly	**Instructions and Precautions**
IOT Inductive Output Tube	Place amplifier cabinet in STOP mode. Turn HVPS rotary switch to OFF position. Remove faulty IOT per tube manufacturer's instructions. Install new IOT per tube manufacturer's instructions. Adjust IOT filament and bias voltages per Service Bulletin 030524 and 030525 to manufacturer's suggested settings. Tune IOT tuning per Service Bulletin 030528, 030615, or per manufacturer's instructions. Record filament hours counter reading in log upon installation of new tube.
IOT Input Cavity	Place amplifier cabinet in STOP mode. Turn HVPS rotary switch to OFF position. Remove faulty input cavity per tube manufacturer's instructions. Install new input cavity per tube manufacturer's instructions. Tune IOT tuning per Service Bulletin 030528, 030615, or per manufacturer's instructions.
FBI Filament / Bias / Ion Supply	Place amplifier cabinet in STOP mode. Turn HVPS rotary switch to OFF position. Turn off FBI circuit breaker CB6. Operate HV ground switch. Open HV compartment. Ground HV circuits. Observe proper HV safety precautions. Remove faulty unit. Install replacement unit. Calibrate filament, bias, and ion readings per Service Bulletin 030524, 030608, and 030609. Adjust filament and bias voltages per Service Bulletins 030524 and 030525.
Crowbar Assembly	Place amplifier cabinet in STOP mode. Turn HVPS rotary switch to OFF position. Turn off crowbar circuit breaker CB5 AND control power circuit breaker CB8 (otherwise, HPA will start counting crowbar firings when the J1 connector is loose from the crowbar unit). Operate HV ground switch. Open HV compartment. Ground HV circuits. Observe proper HV safety precautions. Remove faulty unit. Caution: Thyratron will be HOT. Install replacement unit. Adjustment crowbar filament voltage per Service Bulletin 030605. Verify correct crowbar firing per Service Bulletins 990611.
Thyratron Crowbar Tube (only)	Place amplifier cabinet in STOP mode. Turn HVPS rotary switch to OFF position. Turn off crowbar circuit breaker CB5 AND control power circuit breaker CB8 (otherwise, HPA will start counting crowbar firings when the J1 connector is loose from the crowbar unit). Operate HV ground switch. Open HV compartment. Ground HV circuits. Observe proper HV safety precautions. Remove entire crowbar assembly from HV compartment. Caution: Thyratron will be HOT. Remove HV (upper) assembly lid (four screws). Remove thyratron from crowbar assembly (six screws). Install replacement thyratron. Ensure that thyratron filament leads are well tightened. Reinstall crowbar assembly in HV compartment. Adjustment crowbar filament voltage per Service Bulletin 030605. Verify correct crowbar firing per Service Bulletins 990611. NOTE: the length of one of the grid leads varies according to thyratron manufacturer (E2V vs. L3). If grid lead does not reach for new thyratron, it is possible to make an emergency "extension" for the grid lead out of non-high voltage wire. Contact Comark to obtain a new grid lead wire as necessary.
HPA Controller CPU Card	Place amplifier cabinet in STOP mode. Turn off control power breaker CB8. Remove faulty controller CPU PCB. Install replacement CPU PCB. Make sure code revision of new front panel (FP) is compatible with CPU revision level (v2.xx CPU = v2.xx front panel, v3.xx CPU = V3.xx front panel). CPU & front panel versions are displayed on stickers on PCBs and/or on LCD screen during start up. At power up, choose option "Initialize CPU, Clear CPU History to match to HPA." No further setup required.
HPA Controller Backplane	Place amplifier cabinet in STOP mode. Turn off control power breaker CB8. Remove faulty backplane. Install replacement backplane. Consult Service Bulletin 040704 for complete installation procedure. Do not attempt to operate transmitter without having

IOX or DCX IOT Transmitter	
Subassembly	**Instructions and Precautions**
	executed the install procedure in Service Bulletin 040704.
HPA Controller Relay Card	Place amplifier cabinet in STOP mode. Turn off control power breaker CB8. Remove faulty relay PCB. Install replacement relay PCB. No further setup required.
HPA Controller Power Supply	Place amplifier cabinet in STOP mode. Turn off control power breaker CB8. Remove faulty power supply PCB. Install replacement power supply PCB. No further setup required.
HPA Controller Front Panel	Place amplifier cabinet in STOP mode. Turn off control power breaker CB8. Remove faulty panel. Install replacement panel. Make sure code revision of new front panel (FP) is compatible with CPU revision level (v2.xx CPU = v2.xx front panel, v3.xx CPU = V3.xx front panel). CPU & front panel versions are displayed on stickers on PCBs and/or on LCD screen during start up.
IPA RF Amplifier	Place amplifier cabinet in STOP mode. Turn off driver circuit breaker CB9. Disconnect DC and communications cable to amplifier. Disconnect RF input and output cable to amplifier. Remove faulty amplifier. Install replacement amplifier. No further setup required. If transmitter must operate with a missing IPA for an extended period of time, break RF connection at splitter and combiner ports, not at IPA module input and output ports. That is, do not leave drive cables dangling from splitter or combiner while transmitter is operating.
IPA Power Supply	Place amplifier cabinet in STOP mode. Turn driver circuit breaker CB9. Remove faulty supply. Install replacement supply. No further set-up required.
Three Phase Monitor	Lock out & tag out main AC feed into HPA cabinet (feed to TB1). Observe proper HV safety precautions. Remove faulty three phase monitor. Install replacement three phase monitor. Hysteresis pot may require adjustment for station power. No further set-up required.
CB3 Motorized Breaker	Lock out & tag out main AC feed into HPA cabinet (feed to TB1). Observe proper HV safety precautions. Remove faulty CB3. Install replacement CB3 Breaker. Clean carbon deposits from wiring. Ensure loose strands do not splay out of wire socket. Ensure shunt-trip and aux contact wiring are not pinched behind breaker. Motorized mechanism may require alignment to fit over new breaker handle position.
480V Rotary Switch	Lock out & tag out main AC feed into HPA cabinet (feed to TB1). Observe proper HV safety precautions. Remove faulty rotary switch. Install replacement rotary switch. No further setup required. If HPA is open to left side, side skin removal will greatly ease repair.
Focus Supply	Place amplifier cabinet in STOP mode. Turn off focus supply breaker CB7. Remove faulty focus supply. Install replacement focus supply. Calibrate focus current readings per Service Bulletin 030612 for more details. Adjust supply to same current setting as old supply.
Water Pump	Place amplifier cabinet in STOP mode. Lock out and tag out pump disconnect. Disconnect AC at pump. Shut off inlet and out values on pump. Drain back water/glycol inside pump. Loosen inlet and outlet unions. Remove faulty pump. Install replacement pump.
Heat Exchanger Fan Motor	Lock out and tag out heat exchanger disconnect. Remove faulty unit. Transfer fan blade assembly from faulty unit to new unit. Install replacement fan motor. No further setup required.
Cavity Blower	Place amplifier cabinet in STOP mode. Turn off cavity blower circuit breaker CB2. Remove faulty blower. Install replacement blower. Verify positive airflow and swap two phase wires if incorrect. No further setup required.

IOX / DCX / Paragon System Controller	
Subassembly	**Instructions and Precautions**
System Controller PLC Module	Power down entire transmitter system. Remove faulty PLC module. Install new PLC module. Bring entire system up on line. Consult Service Bulletin 040503 for "Emergency On Air Procedure" to bypass PLC and still remain on air.
System Controller I/O Module	Power down entire transmitter system. Remove faulty I/O module. Install new I/O module. Bring entire system up on line. Consult Service Bulletin 040503 for "Emergency On Air Procedure" to bypass PLC and still remain on air.
Scanner Module	Power down entire transmitter system. Remove faulty scanner module. Install new scanner module. Bring entire system up on line. Consult Service Bulletin 040503 for "Emergency On Air Procedure" to bypass PLC and still remain on air.
HPA I/O Module	Power down entire transmitter system and affected HPA controller. Remove faulty I/O block. Install new I/O block. No further set-up required. Consult Service Bulletin 040503 for "Emergency On Air Procedure" to bypass PLC and still remain on air.
Remote Control Panel	Place system in local mode. Remove power AC power to panel. Replace panel. No further setup required. Failsafe IN15 must be satisfied before remote mode is available.
System I/O Assembly	Power down entire transmitter system. Remove faulty system I/O assembly. Install new System I/O Assembly. Consult site-specific system interconnect drawing. No further setup required.

Paragon MSDC IOT Transmitter	
Subassembly	**Instructions and Precautions**
HV IOM	Place amplifier cabinet in STOP mode. Operate HV ground switch. Open HV compartment. Ground HV circuits. Observe proper HV safety precautions. Remove CAN connection. Remove faulty IOM. Install replacement IOM. No further setup required.
SYS IOM	Place amplifier cabinet in STOP mode. Remove CAN connection. Remove faulty IOM. Install replacement IOM. No further setup required.
R/C IOM	Place amplifier cabinet in STOP mode. Remove CAN connection. Remove faulty IOM. Install replacement IOM. Verify accuracy of telemetry readings on remote control. No further setup required.
AC IOM	Place amplifier cabinet in STOP mode. Remove CAN connection. Remove faulty IOM. Install replacement IOM. No further setup required.
UIF IOM	Place amplifier cabinet in STOP mode. Remove CAN connection (caution: cable is short!). Remove faulty panel. Install replacement panel. Perform meter movement calibration after installation per Service Bulletin 031209.
FFBI IOM / CPU Brain board	Back up cal.dat calibration settings file. (Contact Comark for procedure). Place amplifier cabinet in STOP mode. Remove modular AC connection to cut power to unit. Remove faulty unit. Install replacement unit. Upload cal.dat file to new unit. (Contact Comark for procedure).
DRV IOM	Place amplifier cabinet in STOP mode. Remove CAN connection. Remove faulty IOM. Install replacement IOM. Perform calibration of driver forward and reflected power readings per Service Bulletin 031210.
IOTC IOM	Place amplifier cabinet in STOP mode. Remove CAN connection. Remove faulty IOM. Install replacement IOM. Perform calibration of HPA forward and reflected power readings per Service Bulletin 031210.
CPU UPS	Place amplifier cabinet in STOP mode. Turn off control power breaker CB6. Remove faulty UPS. Install replacement UPS. No further setup required.
FBI Filament / Bias / Ion Supply	Place amplifier cabinet in STOP mode. Turn off FBI circuit breaker CB8. Operate HV ground switch. Open HV compartment. Ground HV circuits. Observe proper HV safety precautions. Remove faulty unit. Install replacement unit. Calibrate filament, bias, and ion sensors per Service Bulletin 031211. Adjustment filament, bias, ion voltages per Service Bulletins 031208.
FBI Isolation Transformer	Place amplifier cabinet in STOP mode. Turn off FBI circuit breaker CB8. Operate HV ground switch. Open HV compartment. Ground HV circuits. Observe proper HV safety precautions. Remove faulty unit. Install replacement unit. Adjust filament and bias voltages per Service Bulletins 031208.
Focus Supply	Place amplifier cabinet in STOP mode. Turn off focus supply breaker CB9. Remove faulty focus supply. Install replacement focus supply. Calibrate focus current readings per Service Bulletin 040108 for more details. Adjust supply to same current setting as old supply. Fine tune focus setting as needed per Service Bulletin 031208.
Step Start Controller	Place amplifier cabinet in STOP mode. Turn off HVPS circuit breaker CB4. Remove faulty step start module. Install replacement step start module. No further setup required.
Solid State Driver Amplifier	Place amplifier cabinet in STOP mode. Disconnect RF input and output cables. Remove faulty amplifier. Install replacement amplifier. No further set-up required.

Paragon MSDC IOT Transmitter	
Subassembly	**Instructions and Precautions**
	If transmitter must operate with a missing amplifier for an extended period of time, break RF connection at splitter and combiner ports, not at driver module input and output ports. That is, do not leave drive cables dangling from splitter or combiner while transmitter is operating.
Driver Power Supply	Power off faulty driver power supply with CB on supply. Remove faulty supply. Install replacement supply. No further set-up required.
Collector Current Metering PCB	Place amplifier cabinet in STOP mode. Operate ground switch. Ground HV circuits. Observe proper HV precautions. Remove faulty unit. Install replacement unit. Recalibrate collector current sensor in question per Service Bulletin 040112.
Beam Current Fault PCB	Place amplifier cabinet in STOP mode. Operate ground switch. Ground HV circuits. Observe proper HV precautions. Remove faulty unit. Install replacement unit. No further setup required.
MSDC IOT Inductive Output Tube	Place amplifier cabinet in STOP mode. Turn off HVPS circuit breaker CB4. Remove faulty IOT per tube manufacturer's instructions. Install new IOT per tube manufacturer's instructions. Adjust IOT filament and bias voltages per Service Bulletin 031208 to manufacturer's suggested settings. Tune IOT tuning per Service Bulletin 040124 or per manufacturer's instructions. Record filament hours counter reading in log upon installation of new tube.
IOT Input Cavity	Place amplifier cabinet in STOP mode. Turn off HVPS circuit breaker CB4. Remove faulty input cavity per tube manufacturer's instructions. Install new input cavity per tube manufacturer's instructions. Tune IOT tuning per Service Bulletin 040124 or per manufacturer's instructions.
Oil Filter	Place amplifier cabinet in STOP mode to stop coolant circulation. Turn off pump circuit breaker CB3. Consult Service Bulletin 040122 for filter replacement procedure.
Water Pump / Oil Pump (primary cooling)	Place amplifier cabinet in STOP mode. Turn off pump circuit breaker CB3. Remove faulty unit. Install replacement unit. Prime replacement unit per instructions included with pump.
Heat Exchanger Fan Motor	Lock out and tag out heat exchanger disconnect. Remove faulty unit. Transfer fan blade assembly from faulty unit to new unit. Install replacement fan motor. No further setup required
Air Blower	Place amplifier cabinet in STOP mode. Turn off blower circuit breaker CB2. Remove faulty unit. Install replacement unit. No further setup required

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