INSTRUCTION MANUAL

835A

4, 5, 6 kW UHF SOLID-STATE TRANSMITTER

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1. Introduction:

2. **System - 835A:** 1316-1000

A. System Description
B. Specifications
C. Site Considerations
D. Unpacking and Installation Procedures
E. Transmitter Set Up and Operation Procedure
F. Meters, Switches and Indicators
G. Transmitter Detailed Alignment Procedure
H. Remote Control Interface Connections
I. Drawings:

1. Transmitter Block Diagram 1278-3000
2. Transmitter Interconnect 1278-8000

3. **Single UHF Exciter Assembly:** 1278-1400

A. Drawings:

1. Interconnect 1278-8400

4. AC Distribution Assembly, Exciter Assembly 1245-1500

A. Drawings:

1. Interconnect 1245-8500

5. UHF Exciter Tray 1245-1100

A. Drawings:

1. Block Diagram 1245-3100
2. Interconnect 1245-8100

6. Variable Gain/Phase Tray, one Tray per Amplifier Array Assembly 1245-1200

A. Drawings:

1. Block Diagram 1245-3200
2. Interconnect 1245-8200

7. Metering Control Panel 1136811

A. Drawings:

1. Block Diagram 1245-3400
2. Interconnect 1245-8400

8. **Amplifier Array Assembly:** 1278-1300

A. Drawings:

1. Block Diagram 1278-3300
2. Interconnect 1278-8300

Your Transmitter contains either the Single Phase or the Three Phase AC Distribution Assembly. Choose the correct one below.

9. AC Distribution Assembly, Single Phase, One in each Amplifier Array 1278-1200

A. Drawings:

1. Interconnect 1278-8200

OR:

AC Distribution Assembly, Three Phase, One in each Amplifier Array 1278-1100

A. Drawings:

1. Interconnect 1278-8100

Your Transmitter contains the Low Band, Mid Band or High Band UHF Amplifier Trays. Choose the correct one below.

10. UHF Amplifier Tray (Low Band, Mid Band or High Band): 1294-1112/1294-1113/1294-1114

A. Drawings:

1. Block Diagram 1281-3100
2. Interconnect 1281-8100

11. Subassemblies:

Refer to the Subassembly Section of the Instruction Manual for the Schematics of the Boards and Modules, which make up the 835A. The Subassembly Drawing List, which is a list of the drawings in the order they appear in the Section, is located in the front of the Subassembly Section.

12. Maintenance

This section contains information on the operation and maintenance of the 835A.

The 835A is a complete UHF Solid State Internally Diplexed Television Transmitter which operates at a nominal Visual Output Power for a 4 kW of 4000 Watts Peak of Sync and Average Aural Output Power of 400 Watts, at an A/V Ratio of 10 dB, 10 % Sound or 200 Watts at 13 dB, 5 % Sound, or for a 5 kW, 5000 Watts Peak of Sync and Average Aural Output Power of 500 Watts, at an A/V Ratio of 10 dB, 10 % Sound or 250 Watts at 13 dB, 5 % Sound, or for a 6 kW, 6000 Watts Peak of Sync and Average Aural Output Power of 600 Watts, at an A/V Ratio of 10 dB, 10 % Sound or 300 Watts at 13 dB, 5 % Sound. The 835A is made up of three Cabinets, a UHF Single Exciter Cabinet and two Amplifier Array Cabinets.

The standard 835A is functionally comprised of (A1) a Single UHF Exciter Assembly, (A2 & A3) two Amplifier Array Assemblies, (A4) a Hybrid Combiner Assembly, (A9) a Bandpass Filter , (A10) an Output Trap Filter Assembly and (A11) an Output Coupler Assembly. A sample is taken from the Hybrid Combiner and connected to (A7) a Directional Coupler .

The (A1) Single UHF Exciter Assembly contains (A1) a UHF Exciter Tray, (A3) a Splitter, (A4 & A5) two Variable Phase/Gain Trays (1245-1200), (A6) a Metering Panel, (A8) an AC Distribution Assembly, Exciter (1245-1500) and (A9) a Remote Interface Assembly (1245-1801). This Exciter also contains a UHF Receiver Tray (1265-1100).

The (A2 & A3) 2-3 kW Amplifier Array Assemblies (1278-1300) each contain (A9-A1) an 8 Way Splitter (ZFSC-8-43), in a 4 kW four (A1, A2, A3 & A4), in a 5 kW five (A1, A2, A3 A4 & A5) and in a 6 kW six (A1, A2, A3 A4, A5 & A6) UHF Amplifier Trays, (A7) a 4, 5 or 6 Way Combiner, (A8) an Output Coupler, (A10) an AC Distribution Assembly for 3 Phase (1278-1100) or for Single Phase (1278-1200) and (A11) an Interface Panel. The reject output from the Combiner Board connects to (A12-A2) the Combiner Reject Load Board.

(A1) Single UHF Exciter Assembly

The Single UHF Exciter Assembly contains (A1) a UHF Exciter Tray (1245-1100) which operates using either the IF Output from the (A7) UHF Receiver Tray connected to J1 on the ALC Board (1265-1305) or the Combined IF Output generated from the Baseband Audio and Video Inputs connected to J32 on the ALC Board. The two IF Outputs are connected to the IF Relays K3 and K4, located on the ALC Board and by applying or removing a Jumper on Jack J8 Pins 10 & 11 located on (A9) the Remote Interface Assembly (1245-1801) the IF Output is selected. To select the output from the Modulator, J8-10 and 11, must be connected together. To select the output from the Receiver Tray, J8-10 and 11, must not be connected together.

The UHF Receiver Tray (1265-1100) takes the received RF On Channel Frequency and generates a 45.75 MHz + 41.25 MHz Combined IF Output. The Combined IF Output of the Receiver Tray connects to J6 on the rear of the (A1) UHF Exciter which is wired to J1 on the ALC Board. With Receiver selected, no connection between J8-10 and 11 on the Remote Interface Assembly, the IF Output from the Receiver Tray connects through the Relays to the rest of the ALC Board.

The Baseband Audio, from TB1 or J3, and Video, from J1, connect to the UHF Exciter which produces a Combined IF Output that connects to J32 on the ALC Board. To select the output from the Modulator, J8-10 and 11, must be connected together. The Exciter RF Output of the (A1) UHF Exciter at J15 is connected to the S Input on (A3) the Splitter.

The Output of the UHF Exciter is split two ways by A3 with the RF Output #1 connected to the input of the (A5) Variable Phase/Gain Tray (1245-1200) and the RF Output #2 connected to the input of the (A4) Variable Phase/Gain Tray (1245-1200).

The output of the (A4) Variable Phase/Gain Tray connects to (A2) the Side A 2-3 kW Amplifier Array Assembly (1278-1300). The output of the (A5) Variable Phase/Gain Tray connects to (A3) the Side B 2-3 kW Amplifier Array Assembly (1278-1300).

(A2 & A3) 2-3 kW Amplifier Array Assemblies (1278-1300)

The (A2 & A3) Amplifier Array Assemblies are identical, with each Assembly containing (A9-A1) an 8 Way Splitter (ZFSC-8-43), four for 4 kW (A1, A2, A3 & A4), five for 5 kW (A1, A2, A3, A4 & A5) or six for 6 kW (A1, A2, A3, A4, A5 & A6) UHF Amplifier Trays, (A7) a 4, 5 or 6 Way Combiner, (A8) an Output Coupler (1016-1043) and (A10) an AC Distribution Assembly for 3 Phase (1278-1100) or for Single Phase (1278-1200). The reject output from the 4, 5 or 6 Way Combiner Board connects to (A12-A2) the Combiner Reject Load Board (1278-1311).

(A2 & A3) 2-3 kW Amplifier Assemblies (1278-1300) - Continued

The RF Input from the Variable Phase/Gain Tray connects to J1 on (A11) the Interface Panel located in the Amplifier Array Assembly. The RF is connected to the COM Input of (A9-A1) the 8 Way Splitter which splits it eight ways. The outputs

connected to J1, the RF Input Jack on each of the UHF Amplifier Trays or are terminated with 50Ω. Each of the UHF Amplifier Trays amplify the RF signals to the power needed to produce a the total output power for the Transmitter , with a maximum of 600 Watts per Tray. The outputs of the UHF Amplifier Trays are combined in (A7) the 4, 5 or 6 Way Combiner that provides approximately half of the power needed to generate the desired Peak of Sync Output with a maximum of 3000 Watts per Array Assembly. The Combined RF Output is connected to (A8) the Output Coupler Assembly which supplies a Forward and a Reflected Power Sample of the output from the Amplifier Assembly to the Metering Panel in the Single Exciter Assembly. The reject output of the Combiner connects to (A12-A2) the Combiner Reject Load Board which dissipates any reject due to miss-tuning or a malfunction in any of the Amplifier Trays.

In each UHF Amplifier Tray, a Forward Power Sample and a Reflected Power Sample, from the Combiner Board, are connected to the Dual Peak Detector Board, Single Supply which provides peak detected forward samples to the Amplifier Control Board that supplies the samples to the front panel meter of the UHF Amplifier Tray. Before exiting each UHF Amplifier Tray the RF is fed through a Circulator for protection of the Tray from high VSWR conditions. The Reject Port of the Circulator provides a Reject Sample to the Combiner Board which supplies the Reflected Sample to the Dual Peak Detector Board, Single Supply located in the Tray that connects to the front panel meter for monitoring purposes.

Transmitter Output Assemblies

The outputs of the (A2 & A3) Amplifier Assemblies connect through (A5 or A6) 1-5/8" to 3-1/8" Adapters to (A4) a Hybrid Combiner which combines the output from each Amplifier Assembly into a single output. The Reject Output of the Hybrid Combiner is connected through (A12) a 1-5/8" to 3-1/8" Adapter to (A7) a Directional Coupler (1016-1043) which provides a Reject Sample from J3 to the Metering Panel located in the Single UHF Exciter Assembly for monitoring purposes. The output of the Directional Coupler connects to (A8) a 2500 Watt Reject Load which dissipates any reject due to problems in one of the Amplifier Arrays. Mounted on the 2500 Watt Load is (A8-A1) a Thermal Switch that connects to the Overtemperature Fault circuit located on the Transmitter Control Board in the UHF Exciter Tray. If the temperature of the load reaches 155°F. the switch closes and causes an Overtemperature Fault to occur which shuts down the Tray.

The output of the Hybrid Combiner at J3 is fed to (A9) a Bandpass Filter, (A10) an Output Trap Filter Assembly, then to (A11) the Output Coupler Assembly and finally to the Antenna for your System. The Bandpass Filter and Trap Filter are tuned to provide high out of band rejection of unwanted generated products. The filtered signal is connected to (A11) an Output Coupler Assembly which provides a Combined Forward and a Combined Reflected Power Sample to the Metering Panel located in the Single UHF Exciter Assembly. The Forward Sample is processed to provide peak detected Visual and Aural Power Output Samples to the front panel Meter of the Metering Panel. The Reflected Power Sample is also peak detected and wired to the front panel Meter. A Sample of the RF Output, for test purposes can be taken from J5 on the Coupler, but a 20 dB Attenuator must be connected to J6 for the Sample port to operate. An appropriate attenuator must be connected to J5 to protect any test equipment connected to it.

Control and Status

The Control and Status of the Transmitter are provided by the Meter indications on the Metering Control Panel and the Variable Phase/Gain Trays. There are also Control, Status and LED Indications located on the front panel of the UHF Exciter Tray.

The switches and LED indicators, which are mounted so that the switches and LEDs are operated or viewed from the front Panel of the UHF Exciter, are part of the Transmitter Control Board (1265-1311). On the UHF Exciter Tray, switch (S1) is an Operate/Standby Switch that provides the Operate Command (Enable), when in Operate, to the each of the Amplifier Arrays.

The Enable to each Amplifier Array Assembly at J4-15 & 16 is split ways on the terminal block A9-TB2 which are then applied to each of the UHF Amplifier Trays. The Enable is needed to turn on the Switching Power Supplies located in each of the UHF Amplifier Trays.

Control and Status - Continued

When the UHF Exciter is in Operate, the Green LED (DS2) is On and when in Standby the Amber LED (DS1) is On. **Note**: If the Transmitter does not switch to Operate when S1 is switched to Operate, check that a dummy plug, with a Jumper between Pins 1 & 2, is connected to Jack J7 located on (A9) the Remote Interface Assembly in the Single UHF Exciter Assembly. This Jumper provides the Interlock needed for the operation of the Transmitter. If the Interlock is present, the Green LED (DS5), located on the Transmitter Control Board, should be lit.

Operation of the Transmitter is controlled by the front panel switches located on the UHF Exciter Tray. During Normal operation of the Transmitter, Switch S2 should be in the Auto position. The front panel of the UHF Exciter also has LEDs that indicate a Video Fault (Loss), Red LED (DS9) and a VSWR Cutback, Amber LED (DS7).

Baseband Input and Remote Connections

The Baseband Video and Audio Inputs to the Transmitter, connect to the (A9) Remote Interface Panel located on the rear of the Single UHF Exciter Assembly. The Baseband Video Input connects to Jack J2, which is loop-thru connected to J1, that is wired to J1 on the Exciter. The Baseband Audio Input connects to Terminal Block TB1 for Balanced Audio or to Jack J6, which is loop-thru connected to J13, that is wired to J3 on the Exciter, for Composite, Stereo, Audio.

Remote Monitoring and Operation of the Transmitter is provided through the Jacks (J8, J9 & J10) located on (A9) the Remote Interface Assembly located on the rear of the Single UHF Exciter Assembly. Jack (J7) should have a dummy plug connected to it, which has a jumper connected between Pins 1 & 2, that provides the Interlock to the Exciter needed to operate the Transmitter. If the Jumper is missing, the Transmitter will not switch to Operate. If remote connections are made to the Transmitter they should be made through the plugs provided in the Installation Material as noted on the Interconnect Drawing (1278-8400) for the Single UHF Exciter. The On Channel RF Input to the Receiver Tray connects to the Transmitter through (A9) the Remote Interface Assembly at J1, "N" type connector, for 50Ω Input or J3, "F" type connector, for 75Ω Input.

Main AC Input

The Transmitter needs an AC input of 208/240 VAC 55 Amps for 3 Phase or 100 Amps for Single Phase for each Amplifier Assembly and 20 Amps Single Phase for the Single Exciter Assembly.

The 208/240 VAC Input to each Amplifier Assembly connects to (A10) the AC Distribution Assembly located on the right side, center rear of the Cabinet. The Assembly contains the Terminal Block (TB1) to which the 208/240 Three Phase or Single Phase connects. For 3 Phase: Line 1 to TB1-1A, Line 2 to TB1-2A, Line 3 to TB1-3A and Safety Ground to TB1-4A. For Single Phase: Line 1 to TB1-1A, Line 2 to TB1-3A and Safety Ground to TB1-4A The AC Distribution Panel contains six Circuit Breakers that supply the AC to the rest of the Amplifier Assembly. The Input AC from TB1B is connected to (CB1) the Main AC Circuit Breaker (55 Amps for 3 Phase or 100 Amps for Single Phase) which distributes the 208/240 VAC to the other circuit breakers. The output of CB1 has six MOVs, VR1, VR2, VR3, VR4, VR5 and VR6 mounted to it. VR4, VR5, and VR6 are connected from. the AC Lines to Ground and VR1, VR2, and VR3 are connected across the AC Lines. The switched Input AC is wired through the five Circuit Breakers, CB2-CB6, via AC Line Cords to the five UHF Amplifier Trays mounted in each Amplifier Array Cabinet. CB2 is a 20 Amp Circuit Breaker which supplies the AC voltage to the (A1) UHF Amplifier Tray. CB3 is a 20 Amp Circuit Breaker which supplies the AC voltage to the (A2) UHF Amplifier Tray. CB4 is a 20 Amp Circuit Breaker which supplies the AC voltage to the (A3) UHF Amplifier Tray. CB5 is a 20 Amp Circuit Breaker which supplies the AC voltage to the (A4) UHF Amplifier Tray. CB6 is a 20 Amp Circuit Breaker which supplies the AC voltage to the (A5) UHF Amplifier Tray. CB7 is used in the 6 kW Transmitter and supplies AC to the (A6) UHF Amplifier Tray . The circuit breakers CB8 and CB9 are not used in the 2 kW Amplifier Array Assemblies. These circuit breakers control the AC to the A12-A3 and A12-A5 Fans mounted on the (Optional) (A12) Reject Load Assembly which are part of the 2.5 and 3 kW Amplifier Array Assemblies.

Main AC Input - Continued

The 208/240 VAC Input to the UHF Exciter Assembly connects to (A8) the AC Distribution Assembly, UHF Exciter Assembly (1245-1500) located in the right, center rear of the Cabinet. The Assembly contains the Terminal Block (TB1) to which the 208/240 VAC connects. Line 1 to TB1-1, Line 2 to TB1-3 and Safety Ground to TB1-2. The AC Distribution Assembly contains (CB1) the Main Circuit Breaker (20 Amps) that supplies the AC to the rest of the Single Exciter Assembly. The output of CB1 has three MOVs, VR1, VR2 and VR3, connected to it, one connected from each Line of the Input AC to ground and one across the two lines. The AC output of CB1 is wired to A1 and A2 which are IEC Outlet Strips. The (A1) Exciter and the (A4) Variable Phase/Gain Tray plug into the (A1) IEC Outlet Strip. The (A5) Variable Phase/Gain Tray, the (A6) Metering Panel and the (Optional) (A7) Receiver Tray plug into the (A2) IEC Outlet Strip.

When the Circuit Breaker CB1 on the Single UHF Exciter Assembly is switched On, +12 VDC from the Exciter is supplied to each of the Amplifier Array Cabinets. The +12 VDC is split 5 Ways on the terminal block A9-TB1 and connected to each of the UHF Amplifier Trays. The +12 VDC is used for operation of the LED Status Indicators in the UHF Amplifier Tray.

Instruction Manual Description

The Instruction Manual is divided into sections which are labeled as to their contents. The first main section is the System Section which contains the Parameters and Specifications of the 835A along with the Site Preparation, Installation, Initial Turn On, System Set Up, Alignment and Operation Procedures. The Block Diagram and Interconnect Drawings for the Transmitter are also found in the System Section.

The Manual is further divided into Tray and Assembly Sections. Each Tray or Assembly Section of the Manual contains the Block Diagrams and Interconnects of that Assembly or Tray. Each of the Sections also contains the Circuit Descriptions and Detailed Alignment Procedures for that Tray or Assembly.

The Schematics for the individual boards which make up the Trays and Assemblies in the Transmitter are located in the Subassembly Section of the Manual. There is a Drawing List at the beginning of the Subassembly Section which lists the drawings in the order they appear in the section.

UHF Solid State Transmitters
835A-3, 835A-4, 835A-5, 835A-6

The 835A represents the state of the art in solid state UHF transmitters. High performance, redundancy, and simplicity are combined in a very reliable unit.

Using parallel high gain amplifiers, the 835A can be configured for 3kW, 4kW, 5kW, or 6kW operation. Combined aural/visual amplification is achieved with very good intermodulation performance, thanks to highly linear amplifiers and extensive correction capability.

Front panel samples, status, and metering, most of which are remote controllable, allow for convenient system monitoring. As with all Axcera products, servicing is made easy with slide out assemblies that require no extender cards. This allows the circuits to be accessed for maintenance or adjustments even while on the air.

UHF Solid State Transmitters

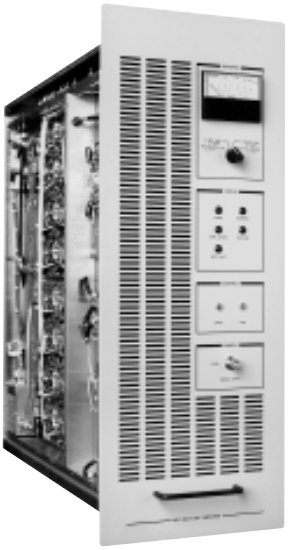
High Performance Exciter

The exciter, designed and built by Axcera, contains the circuitry to convert the input video and audio signals to a combined, modulated RF signal which drives two very linear phase and gain modules. An optional second exciter with automatic exciter switcher is available for added redundancy.

Video/Visual Modulation

The video signal is processed in several ways prior to modulation. Sync tip clamping is provided to restore proper DC level. Sync and white clipping are also included to limit video transient faults. Back porch clamping is also available for some scrambling systems.

The video signal is then applied to a double balanced diode modulator, providing modulation capability to 1% at standard intermediate frequency (IF). A SAW filter is employed for precise sideband filtering with minimal group delay error.



Audio/Aural Modulation

The audio signal is applied to a very wideband, linear FM modulator which operates at intercarrier frequency (4.5 MHz for system M). The high performance modulator accepts a full range of multichannel audio including stereo, mono, and second audio programming (SAP). Standard aural IF is achieved by heterodyne conversion of the modulated intercarrier signal with the visual IF.

IF Processing

The visual and aural modulated IF signals are combined and applied to IF processing stages. These stages provide outstanding signal precorrection to yield a very linear transmitter output. Amplitude linearity, incidental carrier phase modulation (ICPM), and frequency response correction are all adjustable.

Upconversion

The IF signal is upconverted to final channel frequency through heterodyning with a very stable local oscillator. The oscillator is crystal and oven temperature controlled for excellent frequency stability. The exciter is controlled with an Automatic Level Control (ALC) loop which ensures stable signal levels. After upconversion the signal is amplified to provide the exciter output.

Power Amplifiers

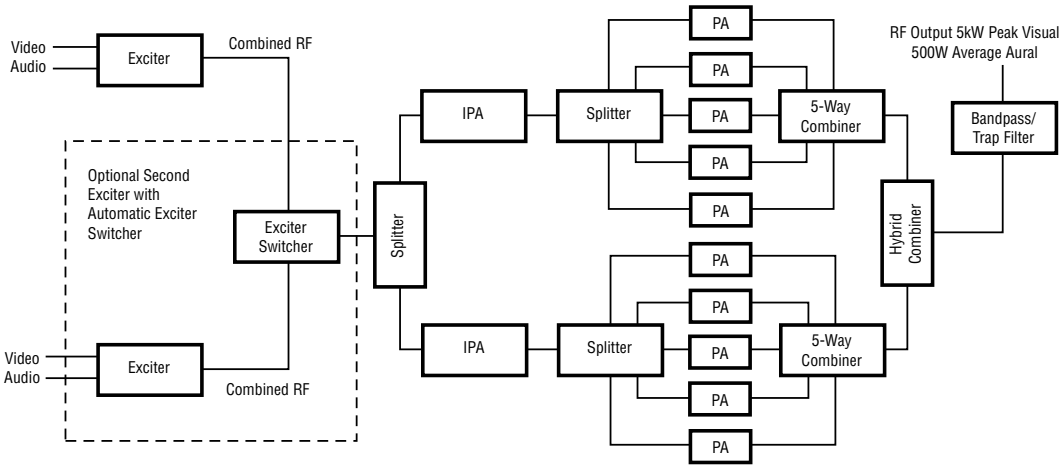
The parallel 600 watt power amplifiers are high gain units (45-50 dB), which provide redundant paths from the exciter to the output. Redundancy is enhanced with independent power supplies and cooling for each amplifier assembly. The output stage of each amplifier module utilizes eight transistors in parallel for added redundancy and on-air reliability.

A high degree of protection is provided with each amplifier. Individual circulators, overdrive protection, VSWR cutback, and overtemperature protection are all included. Automatic Gain Control around each amplifier ensures that the transmitter output remains stable.

The output of each RF cabinet is fed into a low loss hybrid combiner. Output bandpass and trap filtering is included to provide superior out of band rejection.

UHF Solid State Transmitters

Block Diagram - 835A UHF 5kW Transmitter



Features and Benefits

- Utilizes 100% solid state circuitry for high reliability and low maintenance costs
- Configured with parallel high gain amplifiers for total system redundancy and maximum on-air reliability, including driver stages
- Provides standard ±1 kHz frequency stability for stations with an offset frequency
- Independent power supplies and cooling for cost-effective and reliable operation
- Configured with broadcast quality exciter that includes full BTSC sound capability
- Provides output circulator amplifier protection and isolation for high VSWR conditions
- Experienced field service/support team is ready to help you 24 hours a day, 7 days a week

24 Hour Field Supprt

Standard with all Axcera products is 24 hour/day, 7 day/week field support. This service operates as a direct telephone line during business hours, and on a pager system at all other times. Since all our products are designed and built at our facility just south of Pittsburgh, Pennsylvania, we are able to offer quick turnaround on most replacement modules, and timely shipping from the Pittsburgh International Airport.

835A-3, 835A-4, 835A-5, 835A-6

Visual Performance

Power Output (Peak)	3000, 4000, 5000, or 6000 watts
Output Impedance	50 ohms
Output Connector	3 1/8" EIA
Frequency Range	470 to 860 MHz
Carrier Stability	±1 kHz (standard) ±350 Hz (optional)
Regulation of RF Output Power	3%
Output Variation (over 1 frame)	2%
Sideband Response (System M/N-others on request)	
-3.58 MHz	-42 dB
-1.25 MHz and below	-20 dB
-0.5 to +3.58 MHz	±0.5 dB
3.58 MHz to 4.18 MHz	+0.5, -1.0 dB
Freq Response vs. Brightness	±0.5 dB
Visual Modulation Capability	1%
Differential Gain	5%
Incidental Phase Modulation	±3°
Linearity (Low Frequency)	5%
Differential Phase	±3°
Signal-to-Noise Ratio	55 dB
2t K-Factor	2%
Env. Delay	Per CCIR or FCC Standard
Video Input	75 ohms (loop through)
Video AGC Range	1V, ±6 dB
Harmonics	-60 dB or better
Intermodulation Products	-52 dB or better
Spurious (>3 MHz from channel edge)	-60 dB or better

Aural Performance

Power Output (Average)	300, 400, 500, or 600 W
Frequency Deviation Capability	±75 kHz
Distortion	0.5%
FM Noise	-60 dB
AM Noise	-50 dB
Aural to Visual Separation	4.5 MHz, ±100 Hz
Composite Audio Input (multi-channel sound)	
Input Level	1V peak, nominal
Input Impedance	75 ohms, unbalanced
Frequency Range	
±0.1 dB response	50 Hz to 50 kHz
±0.5 dB response	30 Hz to 120 kHz
Monaural Audio Input	
Input Level	0 to +10 dBm
Input	600 ohms, balanced
Freq Range (±0.5 dB resp.)	30 Hz to 15 kHz
Pre-emphasis	75µs
Subcarrier Input	
Input Level	1V peak, nominal
Input Impedance	75 ohms, unbalanced
Freq Range (±0.5 dB resp.)	20 kHz to 120 kHz

General

Operational Temperature Range	0°C to +50°C
Operational Humidity Range	0% to 95%
Altitude	8,500 feet
Line Voltage	230V, ±10%, 1 phase or 3 phase, 50/60 Hz
Power Factor	0.95
835A-3	
Size (H x W x D)	80" x 44" x 34"
Weight	1150 lbs
Power Consumption	10,300 W (50% APL)
835A-4	
Size (H x W x D)	80" x 66" x 34"
Weight	1350 lbs
Power Consumption	13,700 W (50% APL)
835A-5	
Size (H x W x D)	80" x 66" x 34"
Weight	1500 lbs
Power Consumption	17,000 W (50% APL)
835A-6	
Size (H x W x D)	80" x 66" x 34"
Weight	1650 lbs
Power Consumption	20,200 W (50% APL)

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There are special considerations that need to be made before installing the 835A and this section will help you plan ahead.

The Transmitter consists of three cabinet assemblies, the Exciter Cabinet Assembly and two Amplifier Array Assemblies. The Exciter Cabinet Assembly requires an AC Input of 208/240 VAC, Single Phase with a rating of 20 Amps. Each of the Amplifier Array Assemblies requires an AC Input of 208/240 VAC, Three Phase with a rating of 55 Amps or 208/240 VAC, Single Phase with a rating of 100 Amps . Check that the site has the voltage requirement needed.

The 835A is designed and built to provide long life with a minimum of maintenance. The environment in which it is placed is important and certain precautions must be taken. The three greatest dangers to your Transmitter are heat, dirt and moisture. Heat is usually the greatest problem, followed by dirt and then moisture. Over-temperature can cause heat related problems such as thermal runaway and component failure. Each Amplifier Tray in the Transmitter contains a Thermal Interlock Protection Circuit that will shut down that Tray until the temperature drops to an acceptable level.

To begin to design a suitable environment for your new Transmitter it is imperative that you understand what an "Ideal Environment" is and how it can enhance the overall performance and reliability of your Transmitter, thereby maximizing revenues by minimizing down time. A properly designed facility will have an adequate supply of cool clean air, free of airborne particulates of any kind, and without excessive humidity. An Ideal Environment will require temperature in the range of 40° F to 70° F year round, reasonably low humidity and a dust free room. It should be noted that this is rarely if ever attainable in the real world. However, the closer your environment is to the Ideal Environment the greater the operational elevation. A heat related problem may not surface for many months if the installation is completed during cool weather, but may suddenly appear during the heat of summer.

The fans designed and built into your Transmitter will remove the heat from within the Trays but additional means are required for removing this heat from the building. In doing this a few considerations should be noted. The first step is to determine the amount of heat to be removed. There are generally three sources of heat that must be considered. The first and most obvious is the heat from the Transmitter it self. 'The following example is for a 5kW Transmitter. The heat can readily be determined by subtracting the Average Power to the Antenna (3225 Watts) from the AC Input Power (20000 Watts). These numbers will be different for the 4 kW and 5 kW Transmitters but can be found by referring to the published literature or directly from Axcera. This number in Watts (16775) is then multiplied by 3.41 which gives (57202.75) the BTU's to be removed every hour. 12,000 BTU's per hour equals one ton, so a five ton air conditioner will cool a 5 kW Transmitter. The second source of heat is other equipment in the same room. Calculate this number as you did above. The third source of heat is equally obvious but not as simple to calculate. This is the heat coming through the walls, roof and windows on a hot summer day. Unless the underside is exposed, the floor is usually not a problem. Determining this number is usually best left up to a qualified HVAC Technician. There are far too many variables to even estimate this number without detailed drawings of the site showing all construction details. The sum of these three sources is the total amount of heat that must be removed. There may be other sources of heat, such as personnel, and all should be taken into account.

Now that you know the amount of heat that must be removed we will consider how this can be accomplished. Your options are air conditioning, ventilation or a combination of the two. Air conditioning is always the preferred method and is the only way to approach the Ideal Environment.

Ventilation will work quite well if the ambient air temperature will be below 100° F or about 38° C and the humidity should be at a reasonable level. In addition, the air stream must be adequately filtered to ensure that no airborne particulate of any kind will be carried into the Transmitter. The combination of air conditioning for summer and ventilation during the cooler months is acceptable when the proper cooling cannot be obtained through the use of ventilation alone and air conditioning year round is not feasible for whatever reason. However, **operation of air conditioning and ventilation simultaneously is not recommended** because this can cause condensation in Transmitters. For tube type Transmitters this can be especially serious if the condensation forms in the tube cavity and creates damaging arcs.
A few precautions should be observed concerning an air conditioning system.

1. Air conditioners have an ARI nominal cooling capacity rating. In selecting your air conditioner do not assume you can equate this number to your requirements. Make certain that your contractor uses the actual conditions you wish to maintain in determining the size of the unit. With desired conditioned room temperature under 80° F the unit must be derated, possibly by a substantial amount.

2. Do not have the air conditioner blowing directly onto the Transmitter. Condensation may occur on, or worse, in the Transmitter under certain conditions.

3. Do not isolate the front of the Transmitter from the back with the thought of air conditioning the front only. Cooling

air is drawn in the front of all Transmitters and in the front and back of others. Any attempt to isolate the front from the rear will adversely affect the cooling air flow.

4. Interlocking the Transmitter with the air conditioner is recommended to preclude operation of the Transmitter without the necessary cooling.

5. The periodic cleaning of all filters is a must.

When using ventilation alone, the following general statements apply.

1. The Blower with attendant filters should be on the inlet, thereby pressurizing the room which prevents the ingress of dirt.

2. The inlet and outlet should be on the same side of the building, preferably the leeward side. The pressure differential created by wind will be minimized. Only the outlet may be through the roof.

3. The inlet and outlet should be screened with 1/8" hardware cloth (preferred), galvanized hardware cloth (acceptable).

4. Cooling air should enter the room as low as practical but in no case higher than four feet above the floor. The inlet must be located where dirt, leaves, snow, etc. will not be carried in with the cooling air.

5. The exhaust should be located as high as possible. Some ducting is usually required to insure complete flushing of heated air with no stagnant areas.

6. The filter area must be adequate to insure a maximum air velocity of 300 feet per minute through the filter. This is not a conservative number but a never exceed number. In a dusty or remote location, this number should be reduced to 150 CFM.

7. The inlet and outlet(s) must have automatic dampers that close any time the ventilation blower is Off.

8. Where Transmitters are regularly Off for a portion of each day, a temperature differential sensor controlling a small heater must be installed. This sensor will monitor inside and outside temperatures simultaneously. If the inside temperature falls to within 5° F of the outside temperature the heater will come On. This will prevent condensation when the ventilation blower comes On and applies even in the summer.

9. A controlled air bypass system must be installed to prevent the temperature in the room from falling below 40° F during Transmitter operation.

10. The blower should have two speeds, which are thermostatically controlled, and interlocked with the Transmitter.

11. The blower on high speed must be capable of moving the required volume of air into a half inch of water pressure at the required elevation. The free air delivery method must not be used.

12. Regular maintenance of the filters if present can not be overemphasized.

13. Tube Transmitters should not rely on the internal blower for exhausting cooling air at elevations above 4000 feet. For external venting, the air vent on the cabinet top must be increased to an 8" diameter for a 1 kW Transmitter and to 10" for 4, 5 kW, 6 kW & 10 kW Transmitters. An equivalent rectangular duct may be used but in all cases the outlet must be increased in area by 50 % through the outlet screen.

14. It is recommended that a site plan be submitted to Axcera for comment before installation commences.

In calculating the blower requirements, filter size and exhaust size, use the following guide. If the total load is known in Watts, you will need 2000 CFM into 1/2" of water for each 5000 Watts. If the load is known in BTU's you will need 2000 CFM into 1/2" of water for each 17,000 BTU's. The inlet filter must be seven square feet minimum, larger for dusty and remote locations, for each 5000 Watts or 17,000 BTU's. The exhaust must be at least four square feet at the exhaust screen for each 5000 Watts or 17,000 BTU's. The above is a general guide and may need modified for unusually severe conditions.

A combination of air conditioning and ventilation installation should not be difficult to design using the above information. System interlocking and thermostat settings should be reviewed with Axcera. As with any equipment installation it is always good practice to consult the manufacturer when questions arise. Axcera may be contacted at (724) 873-8100.

Air conditioning and any related heat exhaust ducts should be in place before continuing with the installation of the Transmitter.

Installation of Cabinets and Trays

Please inspect the Cabinets and all other material thoroughly upon arrival. Axcera certifies that upon leaving our facility the equipment was undamaged and in proper working order. The shipping containers should be inspected for obvious damage that indicates rough handling. Check for dents, scratches, broken switches, meters or connectors. Any claims against in-transit damage should be directed to the Carrier. Also please inform Axcera as to the extent of the damage.

Remove the Cabinets, Trays, Hybrid Combiner, Bandpass Filter, Trap Filter and Output Couplers along with the Installation Material that make up the 835A from the crates and boxes. Remove the straps which hold the Cabinets to the shipping skids and slide the Cabinets from the skids. Remove the plastic wrap and foam protection from around the Cabinets. Do not remove any labeling or tags from any cables or connectors, for these are identification markers which make reassembly of the Transmitter as easy as possible.

There are three Cabinets, (A1) the Single UHF Exciter Assembly, (A2) the Side A 2-3 kW Amplifier Array Assembly and (A3) the Side B 2-3 kW Amplifier Array Assembly. These Cabinets should be arranged from left to right with you facing the front, the A1 Single UHF Exciter Cabinet, the A2 Side A Amplifier Cabinet and the A3 Side B Amplifier Cabinet.

The cabinets should be positioned with consideration taken for adequate air intake and exhaust, the opening of the rear door, access to the Trays including sliding them out for testing, the AC hook up and the installation of the Output Transmission Line. The Cabinets should be Grounded using copper strapping material and also should be permanently mounted to the floor of the Site using the holes in the bottom of the Cabinets.

Remove the two L-brackets, mounted on the front panel rails of the Single Exciter Cabinet, which hold the Trays in place during shipment. The UHF Amplifier Trays are shipped separately from the Amplifier Array Cabinets because of the weight of each Tray. The Trays are mounted in the cabinet using Chassis Trak cabinet slides. The Tray Slides are on the Top and Bottom of the UHF Amplifier Trays and on the sides of the UHF Exciter Tray and the Variable Phase/Gain Trays. Inspect for any loose hardware or connectors, tightening where needed. Open the rear door, the key to unlock the door, if the door has the Optional lock, is found in a tan envelope taped to the door, and inspect the interior for packing material. Carefully remove any packing material that is found. Slowly slide each Tray in and out to verify that they do not rub against each other and have no restriction to free movement. **Note: The UHF Amplifier Trays must be placed into the Cabinets in the proper location according to the labeling on each Tray or the Gain and the Phasing will not be maximized.**

The UHF Amplifier Trays are labeled to indicate where they are positioned in the Side A or the Side B Amplifier Cabinets. They are mounted in each Cabinet from bottom left to top right, with A1 the bottom left Tray and A6 the top right Tray. Locate the Tray labeled A1 and slide it into the Side A Cabinet, the bottom left position. Locate the Tray labeled A2 and slide it into the Side A Cabinet, the bottom right position. Locate the Tray labeled A3 and slide it into the Side A Cabinet, the center left position. Locate the Tray labeled A4 and slide it into the Side A Cabinet, the center right position. Locate the Tray labeled A5 and slide it into the Side A Cabinet, the top left position.

Locate the UHF Amplifier Tray labeled B1 and slide it into the Side B Cabinet, the bottom left position. Locate the Tray labeled B2 and slide it into the Side B Cabinet, the bottom right position. Locate the Tray labeled B3 and slide it into the Side B Cabinet, the center left position. Locate the Tray labeled B4 and slide it into the Side B Cabinet, the center right position. Locate the Tray labeled B5 and slide it into the Side B Cabinet, the top left position. All of the Amplifier Trays should now be installed. Slowly slide each Tray in and out to verify that they do not rub against each other and have no restriction to free movement.

Caution: Each UHF Amplifier Tray has a hard-line coaxial cable connected to the rear panel and will not slide out without first removing this connection. In order to pull out the Tray for test purposes or other reasons, use the test cable included in the Installation Material Kit for connection from the Tray to the Output Cable. Adjustments to the position of the Trays may be necessary, and are accomplished by loosening the cabinet slide mounting bolts that hold the front of the slide to the mounting frame of the Cabinet and moving the Tray, up or down, left or right, as needed to correct for the rubbing.

Main AC Inputs

Once the Cabinets are in place and the Trays are checked for damage and alignment, the Main AC Hook-Up is ready to be made. Before connecting the 208/240 VAC, make certain that all of the circuit breakers associated with the Transmitter are

switched Off. There are three AC Input circuits to the Transmitter, one 208/240 VAC 20 Amp for the Exciter Cabinet and two 208/240 VAC 100 Amp for single phase or two 208/240 VAC 55 Amp for three phase, one to each of the Amplifier Cabinets.

The 20 Amp, 208/240 VAC Input connections are made to the Terminal Block A8-TB1, which is part of the AC Distribution Assembly, Exciter Cabinet (1245-1500), located near the center right hand side, rear portion of Cabinet #1. Terminal 1 Line 1, Terminal 3 Line 2 (208/240 VAC) and Terminal 2 (Chassis Ground).

Three Phase AC Installation to the Amplifier Cabinets

Connect one of the 55 Amp, 208/240 VAC Inputs to the Terminal Block A10-TB1, which is part of the AC Distribution Assembly, Amplifier Assembly (1278-1100), located near the center right hand side, rear portion of Cabinet #2. Connect Line 1 to TB1-1A, Line 2 to TB1-2A, Line 3 to TB1-3A, and Safety Ground to TB1-4A.

Connect the other 55 Amp, 208/240 VAC Input to the Terminal Block A10-TB1, which is part of the AC Distribution Assembly, Amplifier Assembly (1278-1100), located near the center right hand side, rear portion of Cabinet #3. Connect Line 1 to TB1-1A, Line 2 to TB1-2A, Line 3 to TB1-3A, and Safety Ground to TB1-4A.

Single Phase AC Installation to the Amplifier Cabinets

Connect one of the 100 Amp, 208/240 VAC Inputs to the Terminal Block A10-TB1, which is part of the AC Distribution Assembly, Amplifier Assembly (1278-1200), located near the center right hand side, rear portion of Cabinet #2. Connect Line 1 to TB1-1A, Line 2 to TB1-3A and Safety Ground to TB1-4A.

Connect the other 100 Amp, 208/240 VAC Input to the Terminal Block A10-TB1, which is part of the AC Distribution Assembly, Amplifier Assembly (1278-1200), located near the center right hand side, rear portion of Cabinet #3. Connect Line 1 to TB1-1A, Line 2 to TB1-3A and Safety Ground to TB1-4A.

Output Connections

The RF Output of the (A2) Amplifier Assembly connects through (A5) a 1-5/8" to 3-1/8" Adaptor to J1 on (A4) the Hybrid Combiner and the RF Output of the (A3) Amplifier Assembly connects through (A6) a 1-5/8" to 3-1/8" Adaptor to J2 on (A4) the Hybrid Combiner. The Reject Output of the combiner at J4 connects through (A12) a 1-5/8" to 3-1/8" Adapter to (A7) a Directional Coupler (1016-1043) to (A8) a 2500 Watt Reject Load. The combined RF Output of the Combiner at J3 connects to through (A9) Bandpass Filter to (A10) the Output Trap Filter Assembly. The filtered output connects through (A11) the Output Coupler Assembly (1020-1002) to the Transmission Line that is connects to your Antenna System.

This completes the Unpacking and Installation of the 835A UHF Transmitter, Internally Diplexed. Refer to the Set Up and Operation Procedure which follows before applying power to the Transmitter.

Initially the Transmitter should be turned on with the RF Output at J2 of the (A11) Coupler Assembly terminated into a dummy load of at least the power rating of the Transmitter. If a load is not available, check that the Output of the Coupler Assembly at J2 is connected to the Antenna for your System.

If your Transmitter contains the Receiver Option, it provides the operator the ability to select either the Combined IF Output from the Receiver Tray or from the Modulator. The switching of the IF Relay, located on the ALC Board, is accomplished by applying or removing a jumper on Jack J8 Pins 10 & 11 located on (A9) the Remote Interface Assembly. To select the output from the Modulator, J8-10 and 11, must be connected together. To select the output from the Receiver Tray, J8-10 and 11, must not be connected together.

Connect the On Channel RF Signal Input to the "N" Connector Jack (J1), for 50Ω Input, or to the "F" Connector Jack (J3), for 75Ω Input, located on (A9) the Remote Interface Assembly, mounted on the top, rear of the cabinet. With Receiver selected, the Transmitter uses the IF Output from the Receiver Tray.

Connect the Baseband Balanced Audio Input to the Terminal Block (TB1) located on (A9) the Remote Interface Assembly, mounted on the top, rear of the Single UHF Exciter Cabinet. If Composite Audio, Stereo, is used instead of Balanced Audio, connect the Composite Audio Input to the BNC Jack (J6). Connect the Baseband Video Input to the BNC Jack (J2) also located on (A9) the Remote Interface Assembly.

Switch On the Main AC Circuit Breaker located on the AC Distribution Assembly mounted toward the rear of the Single UHF Exciter Assembly. Switch On the Main AC Circuit Breakers located on the AC Distribution Assemblies mounted toward the rear of the Amplifier Cabinets. Switch On the CB2-CB6 Circuit Breakers, for the individual UHF Amplifier Trays, on the AC Distribution Assemblies mounted in each Amplifier Cabinet.

Switch the Operate/Standby Switch located on the UHF Exciter to Standby and the Auto/Manual Switch also on the UHF Exciter to Auto. Normal operation of the Transmitter is with the switch in Automatic. Automatic operation of the Exciter uses the Video Input to the Exciter as an Operate/Standby Switch. In Auto, if the Input Video is lost, the Exciter will automatically revert the Transmitter to Standby and when the Video Signal is restored, the Exciter will automatically return the Transmitter to Operate.

Move the Operate/Standby Switch on the Exciter to Operate. Note the power supply readings on the front panel Meters of the UHF Amplifier Trays in each Amplifier Cabinet Assembly, they should be +26.5 VDC. **Note:** If the Transmitter does not switch to Operate, when the Operate/Standby Switch is switched to Operate, check that there is an External Interlock Plug connected to Jack (J7), located on the Remote Interface Assembly mounted in the top, rear of the Single UHF Exciter Cabinet, and that it has a Jumper from Pins 1 to 2 which provides the interlock for the Exciter. The Interlock must be present for the Transmitter to Operate.

Observe the Front Panel Meter located on the Metering Panel with the switch in the Combined Visual Output Power position, it should read 100%. If needed, adjust the Power Adjust screwdriver pot located on the front panel of the UHF Exciter to attain 100% Output on the Front Panel Meter located on the Metering Panel with the switch in the Combined Visual Output Power position.

As you are checking the output Power Level, check the Meter Readings on the Transmitter Metering Panel in the % Reflected Power Position for the Side A and also the Side B Amplifier Assemblies and the Combined position for the Transmitter. If the % Reflected Power for any of the readings is very high, above 20%, a problem with the Output Coaxial Lines in the problem Side Amplifier Assembly or in the Output Lines for the System is present and needs to be checked and corrected. A center bullet missing from the 1-5/8" or 3-1/8" Rigid Coax Lines or loose bolts on the connections can cause this problem. Return the Operate/Standby Switch to Standby.

Observe the % Exciter Power reading of the Meter on the Exciter, it should read the same as written on the Test Data Sheet for your Transmitter. Move the Operate/Standby Switch, located on the Exciter, to Standby.

The Gain and Phase controls located on the front panels of the individual UHF Amplifier Trays were adjusted at the factory to attain 100% Output of the Transmitter and should not need readjusted. The Forward Meter readings for Side A and for Side B may not be the same but should be the same as the values written on the Test Data Sheet for your Transmitter. Side A and Side B are combined to give the correct Peak of Sync Output, which is 100% in the Combined Visual position.
The readings on each of the individual UHF Amplifier Trays may not be the same. Refer to the Test Data Sheet for your Transmitter and compare the final readings from the Factory on the Test Data Sheet with the readings on each of the Trays after the Set Up. They should be very close to the same. If a reading is way off, refer to the Phasing and Power Adjustment Procedure for the UHF Amplifier Trays in the Detailed Alignment Procedure before trying to adjust.

If a dummy load is connected to the Transmitter, switch the Transmitter to Standby and switch Off the Main AC Circuit Breakers found on the AC Distribution Panels in each Cabinet. Remove the dummy load and make all connections needed to connect the Transmitter to the Antenna for your System. Switch the Main AC Circuit Breakers On and the Operate/Standby Switch to Operate. Adjust the Exciter Power Adjust pot to attain 100% Combined Output.

If the Transmitter is already connected to the Antenna, check that the Combined Output is 100%. If needed, adjust the Power Adjust Pot located on the UHF Exciter for 100% in the Combined Output position.

This completes the Transmitter Set-Up and Operation Procedure for the 835A Transmitter. The Transmitter can now be Operated normally. For Normal operation the Exciter should be in Operate and the Auto/Manual Switch should be in Auto.

If a problem occurred during the Set-Up and Operation Procedure refer to the Detailed Alignment Procedure of the Transmitter for more information.

Name	**Function**

Receicer Tray (Optional)

Samples - BNC Connectors mounted on front panel.

f(IF) Output	A Sample of the IF Output taken from the IF Filter/ALC Board.
f(s) Oscillator	A Sample of the Channel Oscillator Output taken from the Sample Jack of the Channel Oscillator Assembly.

UHF Exciter Tray

Meters

Meter (A1-A18)	Reads power in terms of a percentage of the calibrated Output Power level. A full scale reading is 100% which is equivalent to the full rated Peak of Sync Exciter Output Power. Also reads Audio, Video and ALC reading.
Switch (S3), Meter	Selects the desired % Exciter Power, Video, or Audio Levels or the ALC Voltage reading.
Audio (0-100 kHz)	Reads the Audio Level. (±25 kHz Balanced or ±75 kHz Composite)
ALC (0-1 V)	Reads the ALC Voltage Level. (.8 VDC Typical)
% Exciter (0-100)	Reads the % Exciter Output Power. (Level needed to attain 100% Output Power)
Video (0-1 V)	Reads the Video Level. (1V = 140 IRE)

Switches

Transmitter (S1) Operate/Standby	The momentary switch (S1) applies a ground to K1, a latching relay, located on the Transmitter Control Board. K1 will switch either to Operate or to Standby depending on which direction S1 is pushed. When switched to Operate, a low, Enable Command, is applied to each Amplifier Array which are split and connected to each Amplifier Tray. These Enables turn on the UHF Amplifier Trays. The opposite occurs when switched to Standby.
Mode Select (S2) Auto/Manual	The momentary switch (S2) applies a ground to K2, a latching relay, located on the Transmitter Control Board. K2 will switch the Transmitter to Automatic or Manual depending on which direction S2 is pushed. In Automatic, the Video Fault Command from the ALC Board will control the Operation of the Transmitter. The Transmitter will switch to Standby, after a slight delay, if the input video is lost and will switch back to Operate, quickly, when the Video is restored. In Manual, the Transmitter is controlled by the Operator using the front panel Operate/Standby Switch or by remote control.

UHF Exciter Tray - Continued

Fault Indicators

Name	Function
Video Loss (DS9 Red)	Indicates that the Input Video has been lost to the Transmitter. The Fault is generated on the ALC Board located in the UHF Exciter Tray.
VSWR Cutback (DS7 Amber)	Indicates that Reflected Power Level of the Transmitter has increased above 20% which will automatically cutback the Output Power Level to 20 %. The Fault is generated on the Transmitter Control Board located in the UHF Exciter Tray.

Samples

f(IF)	A Sample of the Visual IF taken from the Sample Jack on the IF Carrier Oven Oscillator Board.
f(IC)	A Sample of the 4.5 MHz Intercarrier taken from the Aural IF Synthesizer Board.
f(s)	A Sample of the Channel Oscillator Output taken from the Sample Jack of the Channel Oscillator Assembly.
Exciter O/P	An Output Power Sample of the Exciter taken from the UHF Upconverter Board.
Transmitter O/P	A Forward Power Sample of the Transmitter taken from the Visual/Aural Metering Board.

UHF Amplifier Trays

Meters

Meter (A9)	Reads power in terms of a percent of the calibrated power output value. A full scale reading is 100% which is equivalent to the full rated Peak of Sync Visual Output Power + Aural (600 Watts). Also reads Power Supply and AGC Voltage.
Switch (S2), Meter	Selects the desired % Power or the Voltage reading.
% Output Pwr	Reads the % Output Power of the Tray. (100% = 600 Watts pk of Sync + Aural)
% Refl (Reflected)	Reads the % Reflected Output Power of the Tray. (<5% with all Amplifier Trays operating)
Power Supply	Reads the Power Supply Voltage. (+26.5 VDC)
AGC Voltage	Reads the AGC Voltage Level. (1-2 VDC Typical)

Status Indicators

Enable (DS4 Green)	Indicates that an Enable, Operate Command, is applied to the Trays from the UHF Exciter Tray.

Name	Function
UHF Amplifier Trays - Continued	
Status Indicators	
Overdrive (DS2 Red)	Indicates that the level of the drive to the output amplifiers is too high. The protection circuit will limit drive to the set threshold. The Fault is generated on the Amplifier Control Board.
VSWR Cutback (DS1 Red)	Indicates that Reflected Power Level of the Tray has increased above 50% which will automatically cutback the Output Power Level to 50 %. The Fault is generated on the Amplifier Control Board.
Overtemperature (DS3 Red)	Indicates that the temperature of (A5-A6-A3 & A5-A6-A4) one or both of two Thermal Switches mounted on the heatsink assembly for the output amplifiers is above 175° F. When this Fault occurs the Enable to the Switching Power Supply in the effected Amplifier Tray is removed immediately.
Sample	
Module O/P (0 dBm)	A Sample of the Combined Output of the four Dual Stage Amplifier Boards taken from the Dual Peak Detector Board.
Variable Phase/Gain Trays	
Meters	
Switch (S1), Meter	Selects the desired % Power or the ALC Voltage reading.
% Output Power	Reads the % Output Power of the Tray. (100% = +23 dBm pk of Sync + Aural)
ALC	Reads the ALC Voltage, from the UHF Exciter, which connects to the Amplifier Trays.
Sample	
Output (J4), (0 dBm)	A front panel Sample of the RF Output of the Phase/Gain Tray which connects to the Amplifier Array, taken from the Variable Gain/Phase Board.

(A1) Single UHF Exciter Assembly

(A1-A6) Metering Control Panel, 835A Transmitter

Combined

Reflected (0 - 120%) = < 5 %

Visual (0 - 120%) = 100 %

Aural (0 - 120%) = 100 %

Reject (0 - 120%) = < 5 %

Amplifier Array Side A

Reflected (0 - 120%) = < 5 %

Forward (0 - 120%) = as needed to attain 100%

Amplifier Array Side B

Reflected (0 - 120%) = < 5 %

Forward (0 - 120%) = as needed to attain 100%

(A1-A1) UHF Exciter Tray

Audio (0 - 100 kHz) = ±25 Bal or ±75 kHz Stereo

% Exciter (0 - 120%) = ≈30 %

Video (0 - 1 V) = 1 Vpk-pk at White

ALC (0 - 1 V) = .8 V

(A1-A4) Phase/Gain Tray Side A

ALC (0 - 1 V) = .6 - 1 V Typical

% Power (0 - 120%) = ≈50 %

(A1-A5) Phase/Gain Tray Side B

ALC (0 - 1 V) = .6 - 1 V Typical

% Power (0 - 120%) = ≈50 %

(A2 & A3) Amplifier Array Assemblies, 4kW, 5kW or 6kW
Two Amplifier Arrays, each with for, five or six UHF Amplifier Trays

(A2) Side A

(A2-A1) 4kW, 5kW & 6kW

AGC Voltage = 1 V - 2 V

% Reflected = < 5 % with all Trays operating.

% Output Forward = The level is as needed to attain 100% Output Power from the Transmitter.

Power Supply = 26.5 V

(A2-A2) 4kW, 5kW & 6kW

AGC Voltage = 1 V - 2 V

% Reflected = < 5 % with all Trays operating.

% Output Forward = The Level is as needed to attain 100% Output Power from the Transmitter.

Power Supply = 26.5 V

(A2 & A3) Amplifier Array Assemblies, 4kW, 5kW or 6kW
Two Amplifier Arrays, each with four, five or six UHF Amplifier Trays

(A2) Side A - Continued

(A2-A3) 4kW, 5kW & 6kW

AGC Voltage = 1 V - 2 V

% Reflected = < 5 % with all Trays operating.

% Output Forward = The level is as needed to attain 100% Output Power from the Transmitter.

Power Supply = 26.5 V

(A2-A4) 4kW, 5kW & 6kW

AGC Voltage = 1 V - 2 V

% Reflected = < 5 % with all Trays operating.

% Output Forward = The Level is as needed to attain 100% Output Power from the Transmitter.

Power Supply = 26.5 V

(A2-A5) 5kW & 6kW

AGC Voltage = 1 V - 2 V

% Reflected = < 5 % with all Trays operating

% Output Forward = The level is as needed to attain 100% Output Power from the Transmitter.

Power Supply = 26.5 V

(A2-A6) 6kW

AGC Voltage = 1 V - 2 V

% Reflected = < 5 % with all Trays operating

% Output Forward = The level is as needed to attain 100% Output Power from the Transmitter.

Power Supply = 26.5 V

(A3) Side B

(A3-A1) 4kW, 5kW & 6kW

AGC Voltage = 1 V - 2 V

% Reflected = < 5 % with all Trays operating .

% Output Forward = The level is as needed to attain 100% Output Power from the Transmitter.

Power Supply = 26.5 V

(A3-A2) 4kW, 5kW & 6kW

AGC Voltage = 1 V - 2 V

% Reflected = < 5 % with all Trays operating.

% Output Forward = The Level is as needed to attain 100% Output Power from the Transmitter.

Power Supply = 26.5 V

(A3-A3) 4kW, 5kW & 6kW

AGC Voltage = 1 V - 2 V

% Reflected = < 5 % with all Trays operating.

% Output Forward = The level is as needed to attain 100% Output Power from the Transmitter.

Power Supply = 26.5 V

(A3-A4) 4kW, 5kW & 6kW

AGC Voltage = 1 V - 2 V

% Reflected = < 5 % with all Trays operating.

% Output Forward = The Level is as needed to attain 100% Output Power from the Transmitter.

Power Supply = 26.5 V

(A2 & A3) Amplifier Array Assemblies, 4kW, 5kW or 6kW

Two Amplifier Arrays, each with fou, five or six UHF Amplifier Trays

(A3) Side B - Continued

(A3-A5) 5kW & 6kW

AGC Voltage = 1 V - 2 V

(A3-A6) 6kW

AGC Voltage = 1 V - 2 V

% Reflected = < 5 % with all Trays operating.

% Output Forward = The level is as needed to attain 100% Output Power from the Transmitter

Power Supply = 26.5 V

% Reflected = < 5 % with all Trays operating.

% Output Forward = The level is as needed to attain 100% Output Power from the Transmitter.

Power Supply = 26.5 V

This Transmitter was aligned at the factory and should require no additional alignment to achieve normal operation. Check that the RF Output at J2 of (A11) the Output Coupler Assembly of the Transmitter is terminated into a dummy load rated at least at the output power of the Transmitter or is connected to the Antenna for your System. Refer to the Test Data Sheet for your Transmitter and compare the final readings from the Factory with the readings on each of the Trays while doing the alignment. They should be very close to the same. If a reading is way off, the problem is likely to be in that Tray.

Switch On the Main AC Circuit Breakers located on the AC Distribution Panels mounted toward the rear of each Cabinet. Switch On CB2-CB4, for 4 kW, CB2-CB4 & CB5, for 5 kW & 6 kW and CB2-CB5 & CB6, for 6 kW. Circuit Breakers located on each of the AC Distribution Assemblies in the Amplifier Cabinets.

This Transmitter contains a Receiver Tray and using the IF Relays, located on the ALC Board, give the operator the ability to select either the Combined IF Output from the Receiver Tray or from the Modulator. The switching of the IF Relay is accomplished by applying or removing a jumper on Jack J9 Pins 31 & 32 located on the Optional A/V Input and Remote Interface Assembly or by applying or removing a jumper on Jack J11 Pins 10 & 28 located on the rear of the UHF Exciter. To select the output from the Modulator, J9 Pins 31 and 32 or J11 Pins 10 & 28, must be connected together. To select the output from the Receiver Tray, J9 Pins 31 and 32 or J11 Pins 10 & 28, must not be connected together.

(A3) UHF Receiver Tray (Optional)

Connect a UHF Input (-61 dBm to -16 dBm), with a Multiburst Test signal applied, that is at the desired Channel Frequency to Jack J18, "F" type connector, for 75Ω or Jack J1, "N" type connector, for 50Ω located on the A/V Input & Remote Interface Panel. Check that the On/Off Circuit Breaker, located on the rear of the Tray, is On.

Check the Front Panel Sample Jack (J9) with a Frequency Counter. The signal should be at the needed frequency, check the top of the Channel Oscillator Assembly for the actual frequency, to produce the IF Outputs.

(A1) UHF Exciter Tray

This Tray has adjustments for Video and Audio Modulation levels and other related parameters.

Preset the following switches and pots located in the UHF Exciter Tray:

(A5) Sync Tip Clamp/Modulator Board (1265-1302):
- W1 on J5 to the Bypass position, bypassing the Delay Equalizer Board, if present.
- W7 on J4 to the Clamp Enable position, Auto Clamp On.

(A8) ALC Board (1265-1305):
- W3 on J6 to the ALC Auto position.
- W4 on J8 to the Normal position.
- W8 on J9 to the Normal position.
- W9 on J27 to the 6 dB Pad Out position.
- W10 on J28 to the 6 dB Pad Out position.
- W1 on J4 to the Disable (Off) position, Linearity Correctors Off.
- W11 on J29 to the Local Modulator Select Disable position.

Preset the following switches and pots located in the UHF Exciter Tray:

(A9) IF Phase Corrector Board (1227-1250):
- W2 on J9 to the Phase Correction Enable Position.
- W3 on J10 to the Amplitude Correction Disable Position.

Switch the Exciter to Auto/Manual Switch to Manual and the Operate/Standby Switch to Operate.

(A1) UHF Exciter Tray - Continued

Connect an NTSC Composite Video Test Signal Input (1 Vpk-pk) to the Transmitter Video Input Jack J2, located on (A9) the Remote Interface Assembly. Connect a Baseband Audio Input (+10 dBm) to the Balanced Audio Input Terminal Block TB1

or if Stereo/Composite Audio Input (1 Vpk-pk) is provided, connect it to the BNC Jack (J6) the Composite Audio Input Jack.

Observe the Front Panel Meter located on the UHF Exciter Tray. In the Video Position the Meter indicates Active Video from 0 to 1 Vpk-pk. With an Input Video of 1 Vpk-pk the display should indicate 1 Vpk-pk at White. If these readings are not the proper levels, the overall Video Level can be changed by adjusting the Video Level Control (R12), located on (A5) the Sync Tip Clamp/Modulator Board (1265-1302).

Switch the Meter to the Audio Position which indicates the Audio Deviation (Modulation Level) of the signal, from 0 to 100 kHz. The Aural IF Synthesizer Board was factory set for ±25 kHz deviation with a Balanced Audio Input of +10 dBm. If the reading is not the correct level, adjust the Balanced Audio Gain Pot R13, on the Aural IF Synthesizer Board, as needed to attain the ±25 kHz deviation. The Aural IF Synthesizer Board was factory set for ±75 kHz deviation with a Composite Audio Input of 400 Hz @ 1 Vpk-pk. If the reading is not correct, adjust the Composite Audio Gain Pot R17, on the Aural IF Synthesizer Board, as needed for the ±75 kHz deviation.

The Upconverter Section of the UHF Exciter Tray includes adjustments for automatic level control (ALC), linearity (amplitude predistortion) and incidental phase (phase change vs. level) predistortion for correction of the nonlinearities of the RF Amplifier Trays. The Upconverter Section also includes adjustments of the local oscillator chain tuning and also the local oscillator center frequency tuning. Both of these were completed at the factory and should not require adjustment at this time. Move the Operate/Standby Switch located on the UHF Exciter Tray to Standby.

The set-up of the RF Output includes the adjustment of the Linearity and Incidental Phase Predistortion which compensate for any nonlinear response of the Amplifier Trays and also the gain and phasing adjustments of the UHF Amplifier Trays in each of the Amplifier Assemblies.

Verify that all **Red** LEDs located on the ALC Board are extinguished. The following list details the meaning of each LED when illuminated.

DS1 ..... Input Fault. Indicates that the Input level to the board is low or missing.

DS2 ..... Indicates that the ALC circuit is unable to maintain the signal level requested by the ALC reference. Normally this is due to excessive attenuation in the linearity or ICPM corrector signal path or that Jumper W3 on J6 is in the Manual ALC Gain position.

DS3 ..... Indicates a loss of Video at the Input of the board.

DS4 ..... Indicates a Visual Mute Command is present. Not used in this System.

Check that the Jumper W3 on J6 on (A8) the ALC Board (1265-1305) in the Auto Position and adjust the Power Gain Pot, located on the Front Panel of the UHF Exciter Tray, to obtain +0.8 VDC on the Front Panel Meter in the ALC Position. Move the Jumper W3 on J6 to the Manual Position and adjust R87 on the ALC Board for +0.8 VDC on the Front Panel Meter in the ALC Position. Move the Jumper back to Auto which is the normal operating position.

The detected IF signal level at J19-2 of the ALC Board is connected to the Transmitter Control Board that distributes the level to the Phase/Gain Trays. The (A4 & A5) Phase/Gain Trays connects the ALC voltages to the Metering Panel which splits the references which are connected to the Amplifier Assemblies where they are used as the reference for the automatic gain control (AGC) for each Amplifier Tray.

Phase and Gain Adjustment Procedure for the Transmitter

This Transmitter was aligned at the factory for proper Phase and Gain and should require no additional alignment to achieve normal operation. **Use this procedure only if a UHF Amplifier Tray has been replaced or repaired and full transmitter adjustment is needed.**

Each Amplifier Assembly contains an AC Distribution Panel that is made up of a Main 100 Amp Circuit Breaker and five 20 Amp Circuit Breakers. CB2 applies power to A1 the left bottom UHF Amplifier Tray, CB3 applies power to A2 the right

bottom UHF Amplifier Tray, CB4 applies power to A3 the left middle UHF Amplifier Tray, CB5 applies power to A4 the right middle UHF Amplifier Tray and CB6 applies power to the A5 left top UHF Amplifier Tray.

Phase and Gain Adjustment Procedure for Amplifiers in the Amplifier Array Assemblies

Switch the Transmitter to Standby and switch Off the Main AC Circuit Breaker located on each of the AC Distribution Assemblies in the Amplifier Array Assemblies. Switch Off all the AC Circuit Breakers, located on the AC Distribution Assembly, for the individual Amplifier Trays.

1. Adjust all gain controls located on the UHF Amplifier Trays full CCW.

2. Switch On the Main AC Circuit Breaker for the Side A Amplifier Array Assembly and switch On the AC Circuit Breaker for Amplifier #1.

3. Place the Transmitter in Operate and adjust the Gain control on the Amplifier Tray for 50% output power and adjust the Phase control to mid range.

4. Monitor the output power of the Transmitter by connecting a Spectrum Analyzer to the Sample Jack located on the Metering Panel. Adjust the Spectrum Analyzer for Zero Span operation. The power could be monitored by watching the meters on the panel but the power change is easier to see on the analyzer.

5. Turn On the AC to Amplifier Tray #2 and adjust its' output power to 50%.

6. While monitoring the output power of the Transmitter, adjust the Phase Control until the power reaches a peak. If the Phase adjust reaches its end of travel, add a 2 inch cable to the RF Input (J1) of the amplifier. Re-adjust the Phase to peak the System output power. If the Phase Control again reaches its end of travel before a peak in power is reached, remove the 2 inch cable and add a 3 inch cable to J1 of amplifier and readjust phase for peak output power. The adding of cables should be done during the adjustment anytime the range of the phase adjust needs extended.

7. Repeat steps 5 and 6 for the remaining Amplifiers.

8. Increase the output power on Amplifier #1 and Amplifier #2 to 90%.

9. Adjust the Phase Control on Amplifier #2 to peak the System output power.

10. Increase the output power on Amplifier #3 to 90% and adjust the Phase control for maximum System output power.

11. Increase the output power on Amplifier #4 to 90% and adjust the Phase control for maximum System output power.

12. Increase the output power on Amplifier #5 to 90% and adjust the Phase control for maximum System output power.

13. Monitor the Reflected Power on all of the UHF Amplifier Trays. The Reflected Power should read $\leq$5%. If an amplifier is showing high reflected power adjust the Phase control to minimize Reflected Power. Be careful not to increase Reflected Power on the other Amplifier Trays. The Amplifier Trays should interact in such a way that the phasing of any one Amplifier will affect the Reflected on the other Amplifiers.

14. Repeat Steps 1-13 for the Side B Amplifier Array Assembly.

Phase and Gain Adjustment Procedure for the entire Amplifier Array Assembly

1. Begin the alignment with all Amplifier Trays up and running. Monitor the Reject Power by setting the Combined Metering switch to the Reject position and adjusting the Phase Control on either, or both, of the Phase/Gain Modules to minimize the Reject reading.

2. Adjust the Amplifier Gain controls so that all amplifiers have equal output power.

3. The Gain control on the Phase/Gain Module can be used to balance the output power between Sides A and B. This adjustment has a 10% range. If the end of its' range is reached, you must adjust the gain of each amplifier in the Amplifier Side to balance the power of each Side.

IF Phase Corrector Adjustment

As shipped, the Exciters were preset to include linearity (gain vs. level) and incidental phase (carrier phase vs. level) predistortion. The predistortion was adjusted to approximately compensate the corresponding non-linear distortions of the Amplifier Trays. Locate (A9) the IF Phase Corrector Board (1227-1250) mounted in the UHF Exciter. The Amplitude Correction portion of the Board is not utilized in this configuration, therefore the Jumper W3 on J10 should be in the Disable Position, to +6.8 VDC, and R35 & R31 should be full CCW. R68 is the Range Adjustment and should be set in the Middle. The Phase Correction Enable/Disable Jumper W2 on J9 should be in the Enable Position, to Ground.

Switch the Input Video Test source to select a NTSC 3.58 MHz Modulated Staircase or Ramp Test waveform and set up the station demodulator and monitoring equipment to monitor the Differential Phase or Intermod Products of the RF Output signal. There are three corrector stages, located on the IF Phase Corrector Board, each with a Magnitude and a Threshold Adjustment which are adjusted as needed to correct for any Differential Phase or Intermod problems. Adjust R3 Threshold, for the cut in point of the correction and R7 Magnitude, for the amount of the correction as needed. The jumper W1 on J8 is set to give the desired polarity of the correction shaped by the Threshold R11 and Magnitude R15 adjustments. After setting the polarity, adjust R11 Threshold, for the cut in point of the correction and R15 Magnitude, for the amount of the correction as needed. Finally, adjust R19 Threshold, for the cut in point of the correction and R23 Magnitude, for the amount of the correction as needed.

Calibration of the Forward Output Power Level of the Transmitter
Note: - Perform the following only if the power calibration is suspect.

Switch the Transmitter to Standby and preset R51, Aural Null pot, located on the Visual/Aural Metering Board (1265-1309) in the Metering Panel, full CCW. Adjust R48, the Null Offset pot, located on the Visual/Aural Metering Board, for 0% Visual Output. Do the following adjustments with no Aural present, by removing the Jumper Cable W1, Aural IF Loop-Thru, connected to J16, located on the Sync Tip Clamp/Modulator Board (1265-1302) in the selected UHF Exciter. Connect a Sync and Black Test Signal to the Video Input Jack J2 on the Remote Interface Assembly of the UHF Exciter Tray. Switch the Transmitter to Operate.

Next, set the Transmitter up for the appropriate Average Output Power Level. (Sync + Black 0 IRE Setup Watt Meter = Peak Transitter Rating x 0.595). (Sync + Black 7.5 IRE Setup Watt Meter = Peak Transmitter Rating x 0.545). NOTE: Must have 40 IRE Units of Sync. Adjust R28, Visual Calibration, located on (A10) the Visual/Aural Metering Board (1265-1309) in the Metering Panel, for 100% on the front panel Combined Meter in the % Visual Position.

With the Spectrum Analyzer set to Zero Span Mode obtain a peak reference on the screen. Reconnect the Jumper Cable W1 to J16 located on (A5) the Sync Tip Clamp/Modulator Board in the UHF Exciter. While in the Combined Visual Output Power position, adjust L3 for minimum visual power reading. Turn the power adjust pot on the front panel of the Exciter until the original peak reference level is attained. Switch to the Combined Aural Output Power position and peak L1 and C8 for maximum Aural Power reading. Then adjust R20 also for 100% Aural Power reading. Switch to Combined Visual Output Power position and adjust R51 for 100% Visual Power.

Calibration of the Reflected Output Level of the Transmitter

Turn the Power Adjust Pot on the UHF Exciter to 20% on the Metering Panel Combined Meter in the Visual Power position, check that the Jumper is in Manual on the UHF Upconverter Board (1265-1310) in the UHF Exciter. Unterminate the Transmitter and adjust R39 on the Visual/Aural Metering Board (1265-1309), in the Metering Panel, for a 20% reading in the Combined Reflected Power position. At this 20% Reference Power reading, the VSWR LED mounted on the front panel of the UHF Exciter should be illuminated. If not adjust R22 on the Transmitter Control Board, in the UHF Exciter, until the VSWR LED just turns On. Turn the Power Adjust pot slightly CCW and the LED should go out, turn the pot CW until the LED just turns On. The Reflected Output Power is now calibrated. Switch the Transmitter to Standby. Re-terminate the Transmitter. Switch the Transmitter to Operate and adjust the front panel power pot for 100% Visual Power reading on the Combined Meter.

(A4) Hybrid Combiner

The inputs to the Hybrid Combiner are the outputs of the two Amplifier Assemblies. The inputs are 50Ω impedances to

match the output impedance of the UHF Amplifier Trays. The two inputs are combined and then sent through a piece of transmission line 1/4 of a wavelength long to transform the output impedance of the combiner to 50Ω. The output of the Hybrid Combiner is then sent to a (A9) a Bandpass Filter.

(A9) Bandpass Filter

This filter is factory swept and should not be tuned without the proper equipment. Do not attempt to tune this filter without a sweep generator.

The input to this filter is output of the Hybrid Combiner which is the combined output of the Amplifier Assemblies. The filter is made of aluminum waveguide and has four resonant cavities. The filter has five bolts for tuning adjustments and rods for coupling adjustments between sections.

To tune the filter, connect a sweep signal to the input of the filter and adjust the five tuning bolts (three on one side and two on the other side of the filter) for a 6 MHz bandwidth and a flat frequency response across the band.

(A10) Output Trap Filter Assembly

The input to the Trap Filter is the output of the Bandpass Filter. The Trap Filter is comprised of a 3-1/8" EIA standard transmission line section connected to the main transmission line. The transmission line assembly consists of 7/8" EIA standard rigid coaxial components. Refer to the Alignment Procedure for the UHF Trap Filter which follows for more information.

The Bandpass Filter (A9) and the Output Trap Filter (A10) are tuned to reject unwanted distortion products generated when the signals are diplexed and also during the amplification process.

The Bandpass Filter is factory tuned to the proper bandwidth and should not need tuned. If you think tuning is needed consult ITS Corp. Field Support Department before beginning.

The Traps on the Output Trap Filter are labeled with their Center Frequency relative to the Frequency of the Carrier. (For Example: The Traps labeled -4.5 MHz are tuned for a Center Frequency of 4.5 MHz Lower than the Frequency of the Visual Carrier.)

The Trap Sections are Reflective Notches, adjustable across the entire UHF Frequency Band. The electrical length of the Outer Sleeve and the Center Rod of the Notch can be adjusted to Tune the Notch Frequency. The Depth of the Notch is set by the gap between the Center Conductor of the Trap Section and the Center Conductor of the Main Line. Tight Coupling makes a Deep Notch, while Loose Coupling makes a Shallow Notch.

(A10) Output Trap Filter Assembly - Continued

The Trap Sections have been factory tuned and should not need major adjustments. The Frequency, relative to Visual Carrier, that the Trap is tuned to is marked on the Notch. Fine Tuning of the Notches Center Frequency can be accomplished with the Tuning Bolts located on the side of the Filter Section. Loosen the nut locking the Bolt in place and adjust the Bolt to change the Frequency of the Notch. Monitor the output of the Transmitter with a Spectrum Analyzer and Null the Distortion Product with the Bolt. Red Field is a good Video Test Signal to use to see the +8.08 MHz Product. Tighten the nut when the tuning is completed. Hold the bolt in place with a screwdriver as the nut is tightened to prevent it from slipping.

For major tuning, such as changing the Notch Depth or moving the Notch Frequency more than 1 MHz, the Outer Conductor and the Center Conductor of the Trap Section must both be moved. This requires an RF Sweep Generator to accomplish. Apply the Sweep signal to the Input of the Trap Filter and monitor the Output. Loosen the Clamp holding the Outer Conductor in place and make the length longer to Lower the frequency of the Notch or shorter to Raise the frequency of the Notch. Loosen the Center Conductor with an Allen Wrench and move it Deeper for a Lower Frequency Notch or out for a Higher Frequency Notch. These adjustments must both be made to change the Notch Frequency. Moving only the Center Conductor or the Outer Conductor will effect the Notch Depth in addition to the Center Frequency. The variable that is being adjusted with this procedure is the length of the Center Conductor inside the Trap Filter.

The gap between the Trap and the Main Line should not be changed. Moving only the Inner or the Outer Conductors by itself will effect the Gap and the Notch depth.

To effect the Notch Depth Only, both sections will have to be moved. The Notch Depth is controlled by the Gap between the Center Conductor and the Trap Section. This Gap also has an effect on the Center Frequency. To Deepen the Notch, Shorten the Outer Conductor and pull the Center Conductor Out until the Notch is back in the same place. Move the Sections in the opposite direction to make a Shallow Notch.

The effects of tuning the Output Trap Filter

Lengthening Outer Conductor Only	Notch Frequency Up, Shallower Notch.
Shortening Outer Conductor Only	Notch Frequency Down, Deeper Notch.
Inserting Inner Conductor Deeper	Notch Frequency Down, Deeper Notch.
Inserting Less Inner Conductor	Notch Frequency Up, Shallower Notch.
Tuning Bolt In	Notch Frequency Down.
Tuning Bolt Out	Notch Frequency Up.
Moving both Inner and Outer Conductors to keep the Same Gap inside	Center Frequency Moves Notch Stays the Same.

After tuning has been completed, tighten the Clamp and the Allen Screws which hold the Conductors. Use the Fine Tuning Bolts to bring the Frequency In. The Final Tuning Adjustments should be completed with the Transmitter driving the Output Trap Filter for at least one hour to allow for warm-up drift.

This completes the Detailed Alignment Procedure for the 835A UHF Transmitter. If a problem occurred during the System Alignment, refer to the Detailed Alignment Procedure for that Tray for more information.

Function	**Remote Jack/Pin No.**	**Interface Type**
Exciter Enable Interlock	J7-1	J7-1 & 2 Must Be
Exciter Enable Interlock Rtn.	J7-2	Jumpered Together For Normal Operation.
Transmitter Remote Metering:		
Combined Visual Power	J10-7	1V Full Scale At 1kΩ
Combined Visual Power Rtn	J10-8	Source Resistance
Combined Aural Power	J10-5	1V Full Scale At 1kΩ
Combined Aural Power Rtn	J10-6	Source Resistance
Combined Reflected Power	J10-9	1V Full Scale At 1kΩ
Combined Reflected Power Rtn	J10-10	Source Resistance
Exciter Output	J9-26	1V Full Scale At 1kΩ
Exciter Output Rtn	J9-27	Source Resistance
Exciter Remote Control Commands:		
Exciter Operate (Enable)	J8-3	Contact Closure
Exciter Standby/Operate Rtn.	J8-2	
Exciter Standby (Disable)	J8-1	Contact Closure
Exciter Auto	J8-6	Contact Closure
Exciter Auto/Manual Rtn.	J8-5	
Exciter Manual	J8-4	Contact Closure
Modulator Select	J8-10	Contact Closure
Modulator Select Rtn	J8-11	
Power Raise (Optional)	J9-6	Contact Closure
Raise/Lower Rtn. (Optional)	J9-5	
Power Lower (Optional)	J9-4	Contact Closure
Exciter Remote Status Indications:		
Exciter Auto Mode Indicator	J9-30	50ma Max. Current Sink
Auto/Manual Mode Ind. Rtn	J9-31	
Exciter Manual Mode Indicator	J9-32	50ma Max. Current Sink
Operate Indicator	J9-1	50ma Max. Current Sink
Operate/Standby Ind. Rtn	J9-2	
Standby Indicator	J9-3	50ma Max. Current Sink
Exciter VSWR Cutback Indicator	J8-7	50ma Max. Current Sink

Exciter Remote Status Indications: - Continued

Video Loss Indicator	J9-7	50ma Max. Current Sink
Video Loss Indicator Rtn	J9-8	

Receiver Fault Ind.	J8-9	50ma Max. Current Sink

Side A Driver Remote Metering:

Side A Driver Output Power	J10-1	1V Full Scale At 1kΩ
Side A Driver Output Power Rtn	J10-2	Source Resistance

Side B Driver Remote Metering:

Side B Driver Output Power	J10-3	1V Full Scale At 1kΩ
Side B Driver Output Power Rtn	J10-4	Source Resistance

Side A Remote Metering:

Side A Forward Power	J10-14	1V Full Scale At 1kΩ
Side A Forward Power Rtn	J10-15	Source Resistance
Side A Reflected Power	J10-16	1V Full Scale At 1kΩ
Side A Reflected Power Rtn	J10-17	Source Resistance

Side B Remote Metering:

Side B Forward Power	J10-20	1V Full Scale At 1kΩ
Side B Forward Power Rtn	J10-21	Source Resistance
Side B Reflected Power	J10-18	1V Full Scale At 1kΩ
Side B Reflected Power Rtn	J10-19	Source Resistance

Side A Plus B Remote Metering:

Reject Power	J10-11	1V Full Scale At 1kΩ
Reject Power Rtn	J10-12	Source Resistance

The above connections are made to Jack (J9), the 37 Position "D" Connector, to Jack (J10), the 25 Position "D" Connector, to Jack (J8), the 25 Position "D" Connector Or to Jack (J7), the 9 Position "D" Connector, located on (A9) the Remote Interface Assembly (1245-1801) mounted at the Top, Rear of the Single UHF Exciter Cabinet.

(A2 and A3) Amplifier Array Assembly Remote Metering

for 4 kW, 5 kW & 6 kW		
(A1) UHF Amp Tray Refl Pwr	J5-2	1V Full Scale At 1kΩ
(A1) Reflected Power Rtn	J5-1	Source Resistance

(A2 and A3) Amplifier Array Assembly Remote Metering - Continued

for 4 kW, 5 kW & 6 kW - continued		
(A1) UHF Amp Tray Fwrd Pwr	J5-4	1V Full Scale At 1kΩ
(A1) Forward Power Rtn	J5-3	Source Resistance
(A2) UHF Amp Tray Refl Pwr	J5-6	1V Full Scale At 1kΩ
(A2) Reflected Power Rtn	J5-5	Source Resistance

(A2) UHF Amp Tray Fwrd Pwr	J5-8	1V Full Scale At 1kΩ
(A2) Forward Power Rtn	J5-7	Source Resistance
(A3) UHF Amp Tray Refl Pwr	J5-9	1V Full Scale At 1kΩ
(A3) Reflected Power Rtn	J5-10	Source Resistance
(A3) UHF Amp Tray Fwrd Pwr	J5-11	1V Full Scale At 1kΩ
(A3) Forward Power Rtn	J5-12	Source Resistance
(A4) UHF Amp Tray Fwrd Pwr	J5-13	1V Full Scale At 1kΩ
(A4) Forward Power Rtn	J5-14	Source Resistance
(A4) UHF Amp Tray Refl Pwr	J5-15	1V Full Scale At 1kΩ
(A4) Reflected Power Rtn	J5-16	Source Resistance
For 5 kW & 6 kW		
(A5) UHF Amp Tray Fwrd Pwr	J5-17	1V Full Scale At 1kΩ
(A5) Forward Power Rtn	J5-18	Source Resistance
(A5) UHF Amp Tray Refl Pwr	J5-20	1V Full Scale At 1kΩ
(A5) Reflected Power Rtn	J5-21	Source Resistance
For 6 kW		
(A6) UHF Amp Tray Fwrd Pwr	J5-22	1V Full Scale At 1kΩ
(A6) Forward Power Rtn	J5-23	Source Resistance
(A6) UHF Amp Tray Refl Pwr	J5-24	1V Full Scale At 1kΩ
(A6) Reflected Power Rtn	J5-25	Source Resistance

The above connections are made to Jack (J5), the 37 Position "D" Connector located on (A11) the Remote Interface Panel mounted at the Top, Rear of each of the Amplifier Array Cabinets.

UHF Filter 1007-1101
Schematic 1007-3101

±12V Power Supply Board 1062-1013
Schematic 1062-3013

Channel Oscillator Board, Dual Oven 1145-1201
Schematic 1145-3201

(Optional) VCXO Board, Dual Oven 1145-1204
Schematic 1145-3204

Splitter Board 1181-1002
Schematic 1181-3002

IF Carrier Oven Oscillator Board, 45.75 MHz 1191-1404
Schematic 1191-3404

(Optional) IF Delay Equalizer Board, 45.75 MHz 1197-1112
Schematic 1197-3112

x8 Multiplier Board 1227-1002
Schematic 1227-3002

(Optional) Delay Equalizer Board 1227-1204
Schematic 1227-3204

(Optional) Composite 4.5 MHz Filter Board 1227-1244
Schematic 1227-3244

IF Phase Corrector Board 1227-1250
Schematic 1227-3250

1 Watt Amplifier Board 1227-1303
Schematic 1227-3303

Coupler Board Assembly 1227-1316
Schematic 1227-3316

Dual Peak Detector Board, Single Supply 1227-1333
Schematic 1227-3333

Transmitter Control Board 1245-1101
Schematic 1245-3101

Variable Gain/Phase Board 1245-1201
Schematic 1245-3201

Metering Board 1245-1202
Schematic 1245-3202

+15V/-12V Power Supply Board 1245-1203
Schematic 1245-3203

Detector Threshold Board 1245-1402
Schematic 1245-3402

Sync Tip Clamp/Modulator Board 1265-1302
Schematic 1265-3302

Aural IF Synthesizer Board, 4.5 MHz 1265-1303
Schematic 1265-3303

ALC Board, NTSC 1265-1305
Schematic 1265-3305

(Optional) 4.5 MHz Bandpass Filter Board 1265-1307
Schematic 1265-3307

(Optional) FSK Identifier Board w/EEPROM 1265-1308
Schematic 1265-3308

Visual/Aural Metering Board 1265-1309
Schematic 1265-3309

UHF Upconverter Board 1265-1310
Schematic 1265-3310

Transmitter Control Board 1265-1311
Schematic 1265-3311

+12V(4A)/-12V(1A) Power Supply Board 1265-1312
Schematic 1265-3312

Dual Stage Amplifier Assembly, Class AB, Mid Band 1265-1411
Made from a Generic Dual Stage Amplifier Board, Class AB (1265-1404).
Schematic 1265-3411

Amplifier Protection Board 1265-1412
Schematic 1265-3412

Dual Stage Amplifier Assembly, Class AB, Low Band 1265-1413
Made from a Generic Dual Stage Amplifier Board, Class AB (1265-1404).
Schematic 1265-3413

Amplifier Control Board 1265-1414
Schematic 1265-3414

Single Stage Amplifier Assembly, Class A, Mid Band 1265-1416
Made from a Generic Dual Stage Amplifier Board, Class A (1265-1415).
Schematic 1265-3416

Single Stage Amplifier Assembly, Class A, High Band 1265-1417
Made from a Generic Dual Stage Amplifier Board, Class A (1265-1415).
Schematic 1265-3417

Single Stage Amplifier Assembly, Class A, Low Band 1265-1418
Made from a Generic Dual Stage Amplifier Board, Class A (1265-1415).
Schematic 1265-3418

Dual Stage Amplifier Assembly, Class AB, High Band 1265-1420
Made from a Generic Dual Stage Amplifier Board, Class AB (1265-1404).
Schematic 1265-3420

Variable Gain/Phase Board 1265-1425
Schematic 1265-3425

Dual Stage Amplifier Assembly, Class AB, Low Band 1265-1439
Made from a Generic Dual Stage Amplifier Board, Class AB (1265-1404).
Schematic 1265-3439

Dual Stage Amplifier Assembly, Class AB, Mid Band 1265-1440
Made from a Generic Dual Stage Amplifier Board, Class AB (1265-1404).
Schematic 1265-3440

Dual Stage Amplifier Assembly, Class AB, High Band 1265-1441
Made from a Generic Dual Stage Amplifier Board, Class AB (1265-1404).
Schematic 1265-3441

Combiner Reject Load Board 1278-1311
Schematic 1278-3311

(Optional) IF Delay Equalizer Board 1555-1219
Schematic 1555-3219

Dual Peak Detector Board, SMT 1555-1270
Schematic 1555-3270

Dual Peak Detector Board 1159965
Schematic 1159976

The 835A is designed with components that require little or no periodic maintenance except for the routine cleaning of the Fans and front panels of the Trays.

The amount and time interval between cleanings depends on the conditions within the Transmitter room. While the electronics have been designed to function even if covered with dust. A heavy buildup of dust, dirt or insects will hinder the effectiveness of the cooling of the components and lead to a thermal shutdown or premature failure of the affected Tray.

When the front panels of the Trays become dust covered, the top covers should be removed and any accumulated foreign material removed. A vacuum cleaner utilizing a small wand type attachment is an excellent way to suction out the dirt. Alcohol and other cleaning agents should not be used unless you're certain that the solvents will not damage components or the silk-screened markings on the Trays and boards. Water based cleaners can be used, but do not saturate the components. The fans and heatsinks should be cleaned of all dust or dirt to permit the free flow of air for cooling purposes.

It is recommended that the operating parameters of the Transmitter be recorded from the meters on the Trays and the System Metering Control Panel at least once a month. It is suggested that the data be retained in a rugged folder or envelope for the life of the equipment. A sample format for a Log Sheet is included in this section. Photocopies of the Log Sheet should be made for continued data entries.

(A1) Single UHF Exciter Assembly

(A1-A6) Metering Control Panel, 835A

Combined

Reflected (0 - 120%) = _____%

Visual (0 - 120%) = _____%

Aural (0 - 120%) = _____%

Reject (0 - 120%) = _____%

Amplifier Array Side A

Reflected (0 - 120%) = _____%

Forward (0 - 120%) = _____%

Amplifier Array Side B

Reflected (0 - 120%) = _____%

Forward (0 - 120%) = _____%

(A1-A1) UHF Exciter Tray

Audio (0 - 100 kHz) = _____kHz

% Exciter (0 - 120%) = _____%

Video (0 - 1 V) = _____V

ALC (0 - 1 V) = _____V

(A1-A4) Phase/Gain Tray Side A

ALC (0 - 1 V) = _____V

% Power (0 - 120%) = _____%

(A1-A5) Phase/Gain Tray Side B

ALC (0 - 1 V) = _____V

% Power (0 - 120%) = _____%

(A2 & A3) Amplifier Array Assemblies, 835A 4 kW, 5 kW or 6 kW Transmitter

Two Amplifier Arrays, each with Four, Five or Six UHF Amplifier Trays

(A2) Side A

(A2-A1) 4kW, 5kW & 6kW

AGC Voltage = _____V

% Reflected = _____%

% Output Forward = _____%

Power Supply = _____V

(A2-A2) 4kW, 5kW & 6kW

AGC Voltage = _____V

% Reflected = _____%

% Output Forward = _____%

Power Supply = _____V

(A2 & A3) Amplifier Array Assemblies, 835A 4 kW, 5kW or 6kW Transmitter

(A2) Side A - Continued

(A2-A3) 4kW, 5kW & 6kW

AGC Voltage = _____V

% Reflected = _____%

% Output Forward = _____%

Power Supply = _____V

(A2-A4) 4kW, 5kW & 6kW

AGC Voltage = _____V

% Reflected = _____%

% Output Forward = _____%

Power Supply = _____V

(A2-A5) 5kW & 6kW

AGC Voltage = _____V

% Reflected = _____%

% Output Forward = _____%

Power Supply = _____V

(A2-A6) 6kW

AGC Voltage = _____V

% Reflected = _____%

% Output Forward = _____%

Power Supply = _____V

(A3) Side B

(A3-A1) 4kW, 5kW & 6kW

AGC Voltage = _____V

% Reflected = _____%

% Output Forward = _____%

Power Supply = _____V

(A3-A2) 4kW, 5kW & 6kW

AGC Voltage = _____V

% Reflected = _____%

% Output Forward = _____%

Power Supply = _____V

(A3-A3) 4kW, 5kW & 6kW

AGC Voltage = _____V

% Reflected = _____%

% Output Forward = _____%

Power Supply = _____V

(A3-A4) 4kW, 5kW & 6kW

AGC Voltage = _____V

% Reflected = _____%

% Output Forward = _____%

Power Supply = _____V

(A2 & A3) Amplifier Array Assemblies, 835A 4 kW, 5kW or 6kW Transmitter

(A3) Side B - Continued

(A3-A5) 5kW & 6kW

(A3-A6) 6kW

AGC Voltage = _____V

% Reflected = _____%

% Output Forward = _____%

Power Supply = _____V

AGC Voltage = _____V

% Reflected = _____%

% Output Forward = _____%

Power Supply = _____V

Date _____
Customer Name _____ Call Letters _____
Technician _____