

THEORY OF OPERATION

A. INTRODUCTION

The DTXPRO-10U transmitter was designed to meet or exceed all FCC applicable specifications for TV broadcast equipment. Special attention was given to the selection of sub-assemblies and components to achieve maximum reliability and minimum down time. The construction of the DTXPRO-10U is BASIC and MODULAR. Special emphasis was placed on "KEEPING IT SIMPLE" and returning to more traditional transmitter layouts and instrumentation. Refer to the DTXPRO-10U Block Diagram for an overview of the transmitter architecture. This will give the technician basic information needed to understand the operation of the transmitter and the function of each subassembly.

B. DXDPRO-10U EXCITER

The heart of any TV Transmitter is the Exciter. This equipment receives the ASI (or SMPTE) digital stream from the source, changes the format to ATSC 8VSB and up converts the IF signal to the specific "on-channel" RF broadcast frequency. The Exciter consists of the following sub-assemblies all built into the 1RU chassis:

1. MPTPRO – ProTV core modulator assembly. This unit accepts the ASI input signal and converts it to ATSC 8VSB RF output. The output channel (frequency) is selectable through the use of appropriate software controls. This assembly can also accept external clock for sync and output accuracy. RF feedback signals from external directional couplers are used to provide both linear and non-linear correction.
2. AC2052 - 48VDC filtered power supply. This unit supplies all the DC power necessary to operate the transmitter.
3. 1A6001 – ALC Controller. This unit manages the exciter output power to keep it within designed parameters.
4. 1A0068-4832 – Converts the 48VDC to 32VDC for certain sub-assemblies
5. 1A0068-4805 – Converts the 48VDC to 5VDC for use with certain sub-assemblies.
6. DDR25U – Power amplifier section of transmitter. This sub-assembly consists of pallet amplifier assemblies 1A0301, 32V amplifier and ALC board, and DX25U-50, 48V 10W amplifier. The DDR25U accepts the RF signal from the MPTPRO modulator and amplifies it to the appropriate final output power.
7. 1A0069 – Power Detector board. This board receives a forward (FWD) output power sample from a post mask filter external directional coupler and converts it to an appropriate DC Voltage for use in the ALC Controller and also relative output power reading on front panel. This board also receives a reflected (RFLD) output power sample from a pre mask filter external directional coupler and converts it to an appropriate DC Voltage for high VSWR shutdown and front panel measurement.
8. 1A0067 – Master Logic, Control and Display. This unit performs the software control and monitoring interface with the modulator and other assemblies in the modulator and displays appropriate exciter and transmitter information on the front panel LCD display and LED's.

V -- THEORY OF OPERATION (Continued)**C. CT-170X-N CIRCULATOR**

This circulator is placed in the output of the DXDPRO-10U modulator before the pre mask Directional Coupler. Its purpose is to protect the modulator from reflected spurious signals and to help with impedance matching. Any reflected signals are directed by the circulator into the associated TR500U dump load.

D. DC2KC-1 DIRECTIONAL COUPLERS

There are two (2) DC2KC-1 Directional Couplers provided with this transmitter. One directional coupler (DC) is placed before (pre) the mask filter and one is placed after (post) the mask filter.

1. The **pre** directional coupler has four monitor probes of which two are used by the transmitter. One probe monitors the forward power which is sent by the supplied RG-223 cable to the back of the modulator and used for non-linear correction. The other DC probe monitors the reflected transmitter power and is also sent to the back of the modulator by RG-223 cable. This provides a HIGH ANTENNA VSWR MONITOR in the event of an antenna or transmission line failure. Should the reflected power exceed 25% the transmitter will shutdown.
2. The **post** directional coupler also has four monitor probes of which two are used by the transmitter. One probe monitors forward power and is sent by supplied RG-223 cable to the back of the modulator and used for linear correction. The other DC probe monitors the transmitter forward output power and is also sent to the back of the modulator by RG-223 cable. This port Monitors FORWARD POWER to the antenna and presents it as a percentage of power rating. The transmitter comes set to 25% Forward Power and the customers engineer turns the power up to 100% for 10W RMS transmitter output power after the mask filter.

The remaining spare DC probe positions are available for customer use.

L. BPUD100 UHF ATSC COMPLIANT STRINGENT MASK FILTER

This mask filter was designed to meet FCC Certification requirements with minimum loss of RF Power. The BPUD100 comes tuned and tested to the operating frequency of the transmitter and should not be adjusted without proper equipment and experience. It is recommended that, should adjustment become necessary, the filter be returned to the factory.

M. BLP2KU-CC HARMONIC FILTER

Harmonic filters are used to reduce harmonic output signals from the transmitter. At least one harmonic filter is used in the output of all the Pineapple Technology UHF transmitters. In the case were the transmitter channel 2nd or 3rd harmonics could fall into the protected GPS band then three (3) harmonic filters are used in order to comply with FCC 74.794.