Operating Manual

6530A Fiber Optic Transmitter

6531A Fiber Optic Receiver

datum

Timing, Test & Measurement

6530A & 6531A Fiber Distribution

TABLE OF CONTENTS

CHAPTER ONE

CHAPTER TWO

CHAPTER THREE

CHAPTER FOUR

APPENDIX

Chapter One

INTRODUCTION/PRODUCT OVERVIEW

This Operating Manual contains procedures and descriptive information for proper installation and operation of the Datum 6530A Fiber Optic Transmitter and 6531A Fiber Optic Receiver.

The Datum 6530A Fiber Optic Transmitter and 6531A Fiber Optic Receiver form a system that can distribute a high stability signal of a frequency source, such as a cesium standard, to remote sites that are separated by a distance of up to 1.25 miles (2 kilometers) without degradation and without AC power ground loop problems, which conventional copper wire systems can present. The frequency of operation is factory preset to one of four reference frequencies of 10 MHz, 5 MHz, 1 MHz, or 100 kHz. If no preference is stated in the order, the factory default setting is 10 MHz.

OPERATING MANUAL SUMMARY

This Operating Manual is divided into the following chapters:

A. CHAPTER ONE – INTRODUCTION/PRODUCT OVERVIEW
This chapter includes a general description of the Datum 6530A and 6531A and provides some basic product information.

B. CHAPTER TWO – INSTALLATION
Describes initial inspection and installation.

C. CHAPTER THREE - OPERATION
Describes the use of the switches and indicators.

D. CHAPTER FOUR – SPECIFICATIONS
Describes detailed specifications for all aspects of the Datum 6530A and 6531A.

E. APPENDIX
Datum's Limited Warranty and copyright notice are provided.

PURPOSE OF EQUIPMENT

The Datum 6530A Fiber Optic Transmitter and 6531A Fiber Optic Receiver use Datum's high performance distribution technology created for it's line of cesium standards. The 1U (1.75" high) chassis houses a set of very low noise and high isolation components. Up to ten Datum 6530A Fiber Optic Transmitters may be daisy chained to provide up to 120 independent fiber optic outputs of the common input. The level of the input signal and all ten output signals are monitored, providing a visual indicator of signal presence as well as a summary fault (form-C relay) for each module.

A complete list of performance characteristics is provided in Chapter Four.

INSTRUMENT IDENTIFICATION

The model number (Datum 653X) may be followed by a slash (/) and a three-digit number to specify an option that is supported within the instrument. At this time there are no options specified.

PREPARATION FOR SHIPMENT

Prior to shipment, remove the AC power from the plug on the rear panel. Package the instrument in its original packing if possible. If the original packing materials are not available, pack in a reinforced cardboard carton using foam to take up any space inside the carton. Do not use foam popcorn or crushed paper for packing.

If the instrument is being returned to Datum, contact the Service Department at (800) 938-9888 to advise of the product return.

TYPOGRAPHICAL AND OTHER CONVENTIONS

This Operating Manual uses the following conventions:

Acronyms and Abbreviations – Terms are spelled out the first time they appear in this Operating Manual. Thereafter, only the acronym or abbreviation is used. In addition, the glossary defines the acronyms and abbreviations.

Revision Control – The title page lists the printing date and part number of this Operating Manual. Table 1-1 describes the typographical conventions that this Operating Manual uses to distinguish between the different types of information according to how they are used.

TABLE 1-1. TYPOGRAPHICAL CONVENTIONS

WHEN TEXT APPEARS THIS WAY ...	IT MEANS ...
Datum 6530A/6351A Operating Manual	The title of a document or the name of a product
CRITICAL PORT-1 J1	An operating mode, alarm state, status, or chasis label.
Press the **Enter** key. Press the **Print Scrn** key.	A named keyboard key. The key name is shown as it appears on the keyboard. An explanation of the key's acronym or function immediately follows the first reference to the key, if required.
A *re-timing* application ...	A term or a word being emphasized.
Datum **does not** recommend ...	A word or term given special emphasis so that you do not miss the idea being presented.

WARNINGS, CAUTIONS, RECOMMENDATIONS, AND NOTES

Warnings, Cautions, Recommendations, and Notes attract attention to essential or critical information in this Operating Manual. The types of information included in each are explained as follows:

WARNING …

All warnings have this symbol. Do not disregard warnings. They are installation, operation, or maintenance procedures, practices, or statements that if not strictly observed, may result in personal injury or loss of life.

ELECTRICAL SHOCK HAZARD …

All electrical shock hazard warnings have this symbol. To avoid serious personal injury or death, do not disregard electrical shock hazard warnings. They are installation, operation, or maintenance procedures, practices, or statements that if not strictly observed, may result in personal injury or loss of life.

CAUTION …

All cautions have this symbol. Do not disregard cautions. They are installation, operation, or maintenance procedures, practices, conditions, or statements that if not strictly observed, may result in damage to or destruction of equipment or may cause a long-term health hazard.

CAUTION …

All Electrostatic Discharge (ESD) cautions have this symbol. They are installation, operation, or maintenance procedures, practices, conditions, or statements that if not strictly observed, may result in electrostatic discharge damage to, or destruction of, static sensitive components of the equipment.

RECOMMENDATION …

All recommendations have this symbol. Recommendations indicate manufacturer-tested methods or known functionality. They contain installation, operation, or maintenance procedures, practices, conditions, or statements that provide you with important information for optimum performance results.

NOTE …

All notes have this symbol. Notes contain installation, operation, or maintenance procedures, practices, conditions, or statements that alert you to important information which may make your task easier or increase your understanding.

WHERE TO FIND ANSWERS TO PRODUCT AND DOCUMENT QUESTIONS

If you believe that this product is not performing as expected, or if you have comments about this Operating Manual, please contact your Datum representative or sales office

We appreciate your suggestions on ways to improve this Operating Manual. Please mark or write your suggestions on a copy of the page and mail or fax it to …

Datum – Timing, Test & Measurement
34 Tozer Road
Beverly, MA 01915-5510
US Toll Free: 1-800-544-0233
Phone: +1-978-927-8220
Fax: +1-978-927-4099
E-mail: ttmsales@datum.com

Thank you for providing the information.

NOTE …

Datum offers a number of applicable training courses designed to enhance product usability. Contact your Datum representative or sales office for a complete list of courses and outlines.

Chapter Two

INSTALLATION

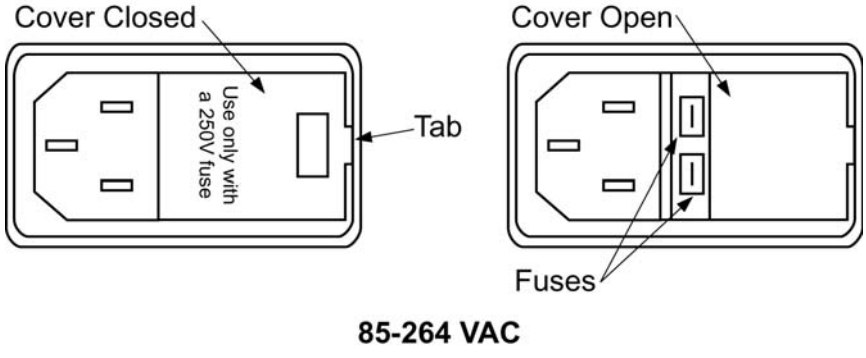
MOUNTING

The Datum 6530A and 6531A are designed to be mounted in a standard 19-inch equipment rack and take up 1 U of vertical space (1.75"). The chassis depth is 12 inches.

POWER CONNECTION/FUSES/VOLTAGE SELECTION

The Datum 6530A and 6531A are powered from an AC source by a detachable power supply cord. No selection of power voltage range is required since the power supply will function over the range of 85 to 264 Vac. The power cord is the disconnect device. Refer to Chapter Four for power supply requirements. The AC fuse is located inside the AC connector/filter. Only the hot line is fused. To change fuses, refer to Figure 2-1. Open the cover on the AC connector/filter by applying a screwdriver to the cover slot. Once the cover is open, each fuse holder may be removed for inspection or replacement. Replace only with a 0.5A, 250V fuse as specified in Chapter Four. Finally, snap the cover shut.

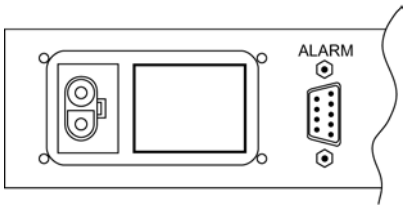
FIGURE 2-1. AC INPUT FILTER/FUSES/VOLTAGE SELECTOR



DC POWER CONNECTION

The Datum 6530A and 6531A (DC version) is powered from a DC source. The connections are made as shown in Figure 2-2. The voltage input may be 22 to 75 Vdc. The mating connector is Molex Part No. 03-12-1026 for the connector body and for the terminals.

FIGURE 2-2. DC POWER CONNECTION

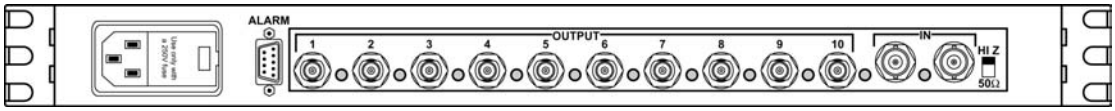


DATUM 6530A FIBER OPTIC TRANSMITTER SIGNAL CONNECTIONS

Connect the signal to be distributed to one of the two BNC connectors labeled INPUT. Set the impedance switch to 50 (down) if only one 6530A module is to be used. If multiple 6530A modules are used to obtain more than ten outputs, see Figure 2-4.

Output cables may be connected in any order to the fiber optic connectors labeled 1 to 10. Refer to Figure 2-3.

FIGURE 2-3. DATUM 6530A SIGNAL CONNECTIONS

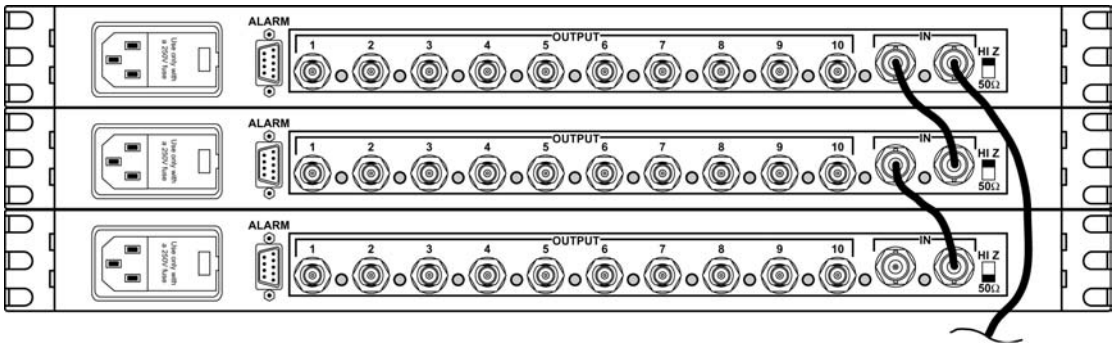


With the 6530A powered, the green power indicator on the front panel will illuminate. The impedance switch should be set to 50 if there is only one module. The red indicator next to the input signal is off to show that there is a valid input signal.

DAISY-CHAINING MORE THE ONE DATUM 6530A MODULE

If more than ten outputs are required, up to ten Datum 6530A modules can be driven by a common input signal to produce up to 100 outputs. Figure 2-4 illustrates this connection.

FIGURE 2-4. DAISY-CHAINING MULTIPLE 6530A MODULES



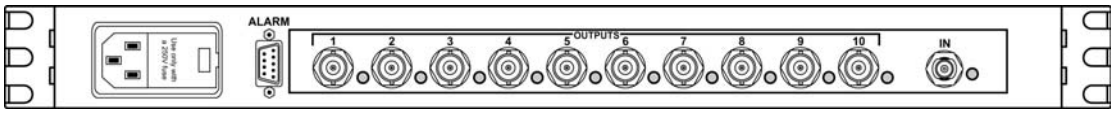
The example in Figure 2-4 shows three units. The original signal from the source is connected to the right IN connector on the right side of the first module. The left IN connector on the first module is connected to the right IN connector on the second module. The second module is connected to the third module in the same fashion. The impedance switch for the first and second chassis is set to HI Z (>5KΩ), while the impedance switch on the third (or last) chassis in the daisy chain is set to 50Ω.

Connect the fiber cable with an ST connector to any of the ten outputs. Full specifications are met at fiber optic cable lengths up to 1.25 miles (2 kilometers).

DATUM 6531A FIBER OPTIC RECEIVER SIGNAL CONNECTIONS

A Datum 6531A is placed at each remote location. Connect the fiber cable (ST connector) to the fiber optic connector labeled IN. Output cables may be connected in any order to the ten BNC connectors labeled OUTPUT. Refer to Figure 2-5.

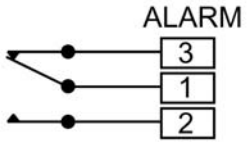
FIGURE 2-5. DATUM 6531A SIGNAL CONNECTIONS



ALARM CONNECTIONS

The Datum 6530A and 6531A provide for an alarm to signal the failure of any signal input or output. One set of form-C relay contacts is provided on the 9-pin D connector labeled ALARMS. For normal operation, pins 1 to 2 are open and pins 1 to 3 are closed. The sense is reversed for a fault condition. Refer to Figure 2-6.

FIGURE 2-6. ALARM CONTACTS



Relay shown in non-faulted condition

If the 6530A input signal or input buffer fails or falls below the factory-set low-level threshold (+5 dBm), the red fault indicator next to the input connector will turn on. Likewise, if the 6531A input fails or falls below the factory-set low-level threshold(<-30dBm), a red fault indicator next to that output will turn on. The ALARM form-C relay is normally energized, indicating no signal failure. If either the input or any output signal fails, the relay is deenergized (short between pins 1 and 2), indicating a fault condition. This is a failsafe design that will indicate a fault in the event of a power loss.

The 6531A contains a phase lock loop (PLL) circuit that "cleans up" the phase noise of the received optical signal to the original levels at the input of the 6530A transmitter. The PLL circuitry contains an oscillator that typically takes less than 15 minutes to warm-up. Prior to warm-up the unit may indicate a fault, please disregard this fault during the 15-minute warm-up period. If the frequency configuration of the 6530A and 6531A are not identical, the PLL will not lock. This condition is sensed and all outputs are turned off. The 6531A will thus have no outputs and the output alarms of each channel will be illuminated.

Chapter Three

OPERATION

The Datum 6530A Fiber Optic Transmitter and 6531A Fiber Optic Receiver controls and indicators are described in this chapter. For both modules, there is only one external control switch (HI Z/50) and three front panel indicators (POWER, ALARM and INPUT ALARM). The front and rear panels are shown in the following figures.

FIGURE 3-1. DATUM 6530A FRONT PANEL

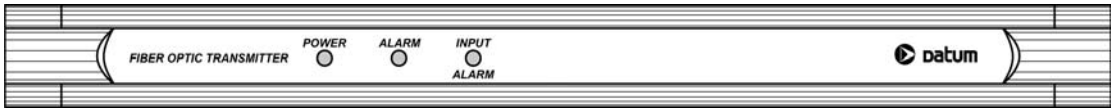


FIGURE 3-2. DATUM 6530A REAR PANEL

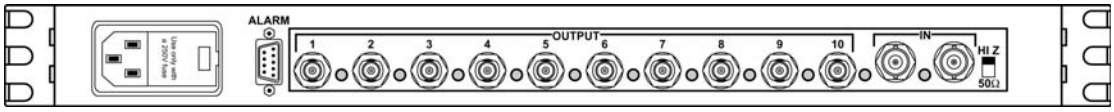


FIGURE 3-3. DATUM 6531A FRONT PANEL

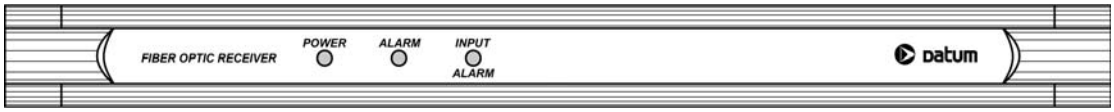
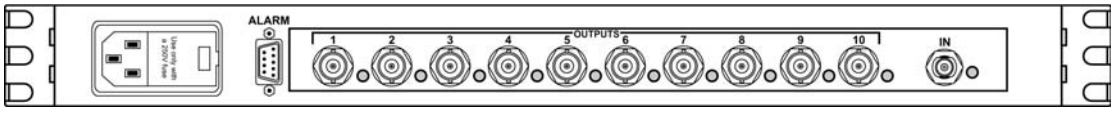


FIGURE 3-4. DATUM 6531A REAR PANEL



HI Z/50 – This slide switch on the rear panel selects either the HI Z input impedance (unterminated) or the 50 input impedance. For an installation of two or more (ten maximum) Datum 6530A Fiber Optic Transmitter modules, set the switch to HI Z position on the module connected to the source of the signal, and on all subsequent modules except the last module, which is switched to the 50 position, providing proper termination for the signal.

POWER – LED on the front panel to indicate that power is applied. There is no power switch on either the 6530A or 6531A. When power is connected, power is ON.

ALARM – LED on the front panel to indicate that an ALARM condition exists. An alarm condition exists when the input signal or any output signal fails or falls below the factory preset amplitude.

INPUT ALARM – This LED is located both on the front panel on the rear panel, adjacent to the INPUT connector(s). If the input signal fails or falls below the factory preset amplitude, both LED indicators will light and stay on until the cause of the fault is remedied.

CHANGING THE CONFIGURATION

Each unit (6530A Transmitter and 6531A Receiver) is factory configured for frequency of operation. If a frequency preference is indicated on the order, each unit will be set to the frequency indicated. If no preference is indicated, the factory default setting is 10 MHz. The user may change the frequency configuration in the field by removing the top cover and moving the jumpers as indicated in Figures 3-5, 3-6 and 3-7.

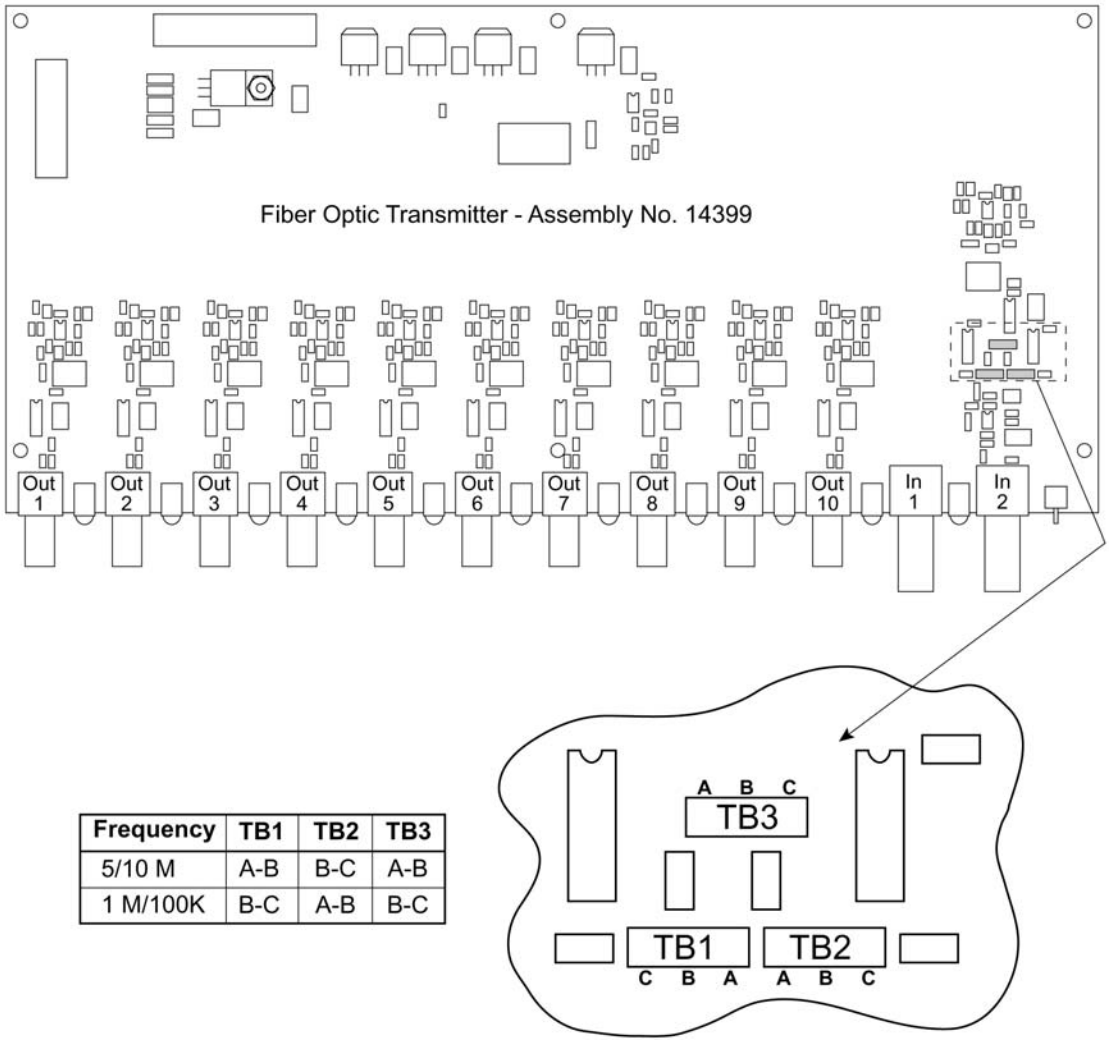
CAUTION …

Opening either the 6530A or 6531A and changing the configuration jumpers may result in the warranty being voided. Please contact the Datum –TT&M service department for more information

NOTE …

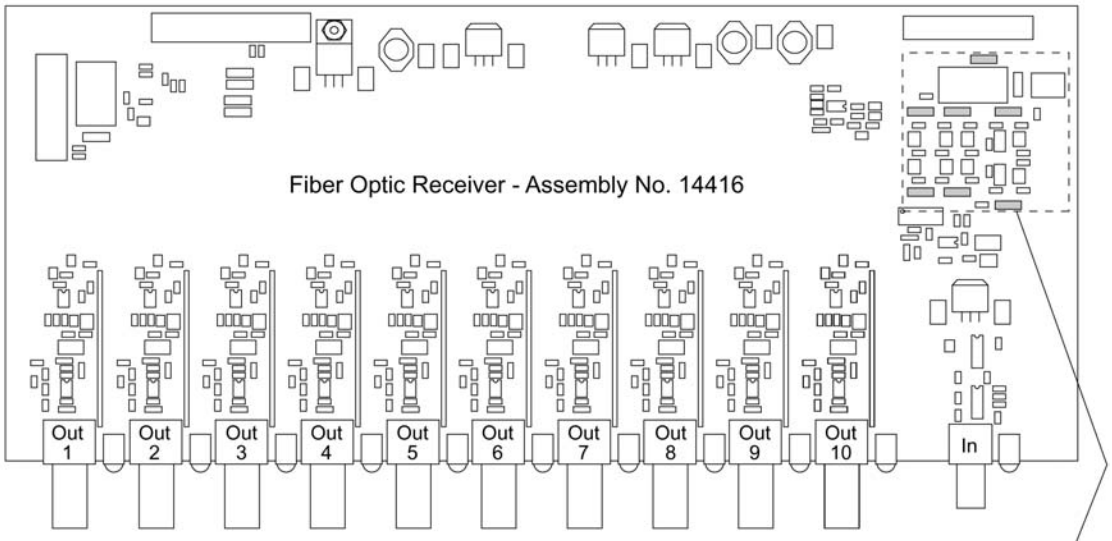
Care should be taken that the 6530A transmitter and the 6531A receiver are configured for the same frequencies. If the 6530A and 6531A are configured for different frequencies, the 6531A will have no outputs and the output alarms for each channel will be illuminated.

FIGURE 3-5. SETTING JUMPERS ON 6530A TRANSMITTER ASSEMBLY

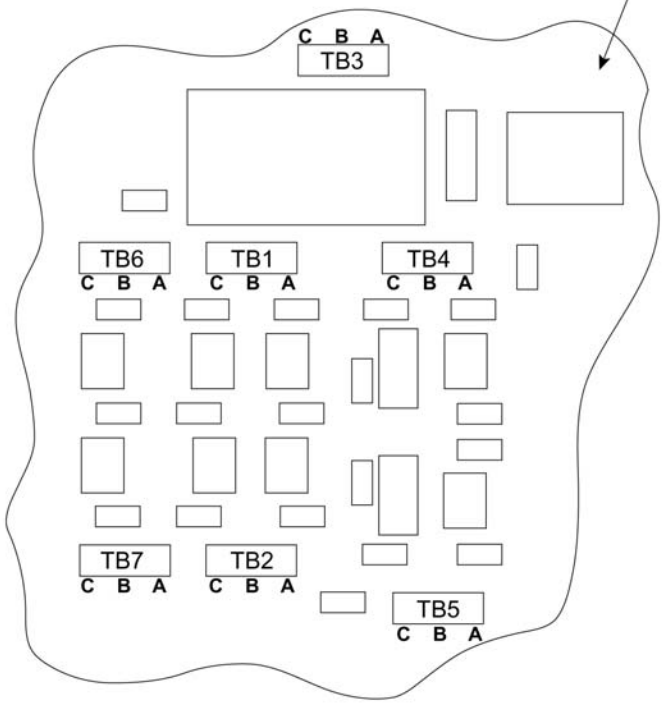


Frequency	TB1	TB2	TB3
5/10 M	A-B	B-C	A-B
1 M/100K	B-C	A-B	B-C

FIGURE 3-6. SETTING JUMPERS ON 6531A RECEIVER ASSEMBLY

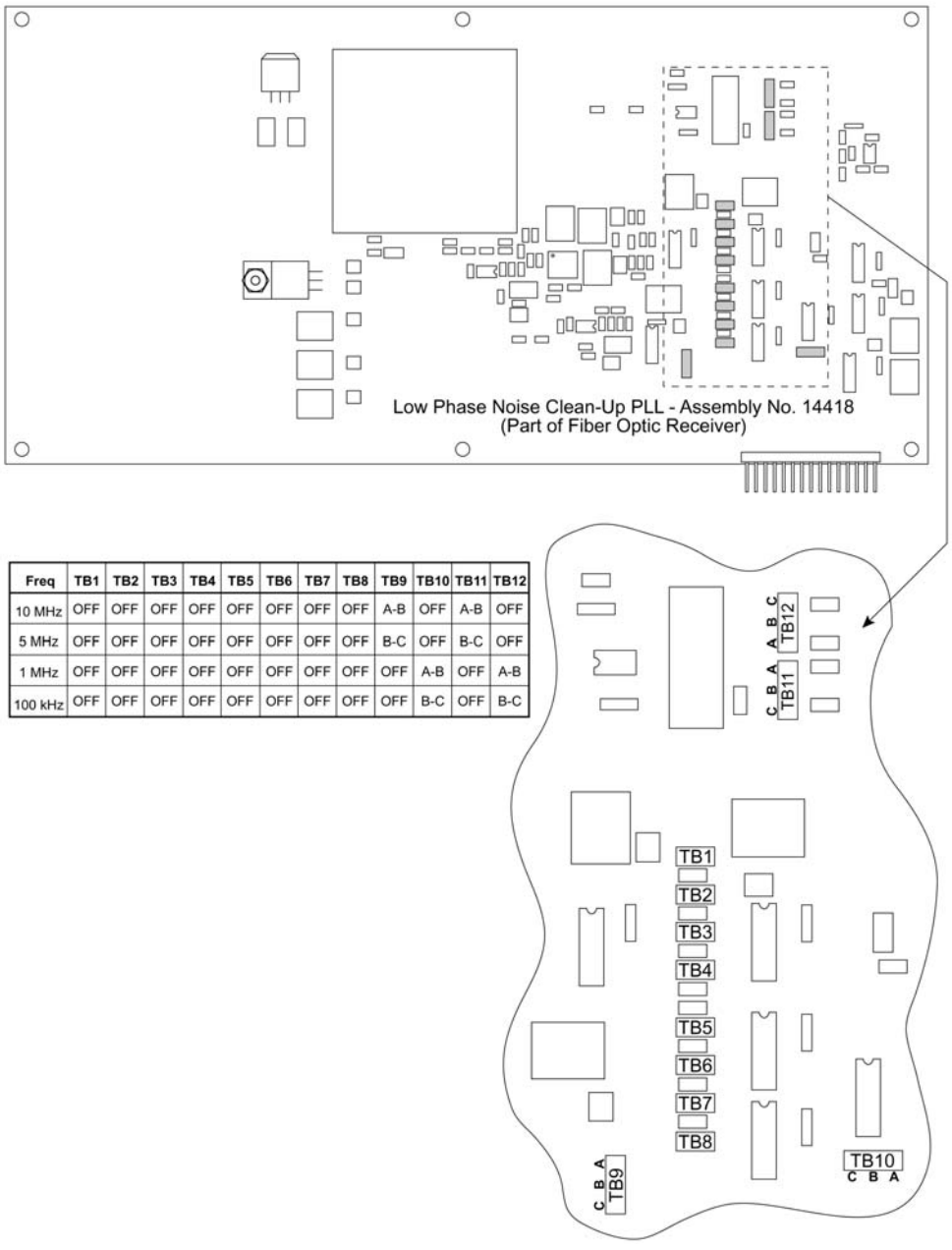


PLL Mode	TB3
Normal	B-C
Bypass	A-B



Freq	TB1	TB2	TB4	TB5	TB6	TB7
10 MHz	A-B	A-B	—	—	—	—
5 MHz	B-C	B-C	—	—	—	—
1 MHz	—	—	A-B	A-B	—	—
100 kHz	—	—	B-C	B-C	—	—

FIGURE 3-7. SETTING JUMPERS ON 6531A PLL ASSEMBLY



Freq	TB1	TB2	TB3	TB4	TB5	TB6	TB7	TB8	TB9	TB10	TB11	TB12
10 MHz	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	A-B	OFF	A-B	OFF
5 MHz	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	B-C	OFF	B-C	OFF
1 MHz	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	A-B	OFF	A-B
100 kHz	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	B-C	OFF	B-C

Chapter Four

SPECIFICATIONS

NOTE …

All performance is at an ambient temperature of 25°C unless otherwise specified.

DATUM 6530A FIBER OPTIC TRANSMITTER

Input:	
Frequency	10 MHz / 5 MHz / 1 MHz / 100 kHz
Level	1 Vrms
Output (10) (Optical):	
Frequency	850 nm with AM Squarewave Modulation 10 MHz / 5 MHz / 1 MHz / 100 kHz
Level (Optical)	-13 dBm (nominal)
Connectors	Type ST
Recommended Cable:	62.5 / 125 um
Power Requirements:	
AC Input	85 to 264 Vac
DC Input (optional)	22 to 75 Vdc, 15W
Fuse	0.5A 250V Slow Blow 5mm x 20mm type
Dimensions:	
Height	1U (1.75 inches)
Width	19 inches
Depth	12 inches
Environmental:	
Operating Temperature	0° to 50° C
Relative Humidity	0 to 95% (non-condensing)
Weight:	<10 lbs.

Alarm Output:
Summary alarm indicates failure of any output signal.

Each Output & Main	Red LED
Non-alarm Condition	Relay energized (fail safe) Form C contacts

DATUM 6531A FIBER OPTIC RECEIVER

Input:	
Frequency	850 nm with AM square MOD 10 MHz / 5 MHz / 1 MHz / 100 kHz
Level	-10 dBm to -30 dBm
RF Output (10):	
Frequency	Selectable 10 MHz / 5 MHz / 1 MHz / 100 kHz
Level	1 Vrms
Connectors	BNC
Recommended Fiber Optic Cable:	62.5 / 125 um
SSB Phase Noise:	
(1 Hz Bandwidth) Offset From Carrier	
1 Hz	-105 dBc
10 Hz	-130 dBc
100 Hz	-145 dBc
1000 Hz	-155 dBc
10000 Hz	-155 dBc
Power Requirements:	
AC Input	85 to 264 Vac
DC Input (optional)	22 to 75 Vdc, 15W
Fuse:	0.5A, 250 V Slow Blow 5mm x 20mm type
Dimensions:	
Height	1U (1.75 inches)
Width	19 inches
Depth	12 inches
Environmental:	
Operating Temperature	0º to 50º C
Relative Humidity	0 to 95% (non-condensing)
Weight:	<10 lbs.
Alarm Output:	
Summary alarm indicates failure of any output signal.	
Each Output & Main	Red LED
Non-alarm Condition	Relay energized (fail safe) Form C contacts

Limited Warranty

DATUM - TT&M guarantees its products to be free from defects in material and workmanship for a period of one year from the date of shipment. Datum - TT&M shall, at its option, either repair or replace hardware products which prove to be defective.

DATUM - TT&M software and firmware products designed to be used and installed in Datum - TT&M hardware products are warranted not to fail to execute their programming instructions due to defects in material or workmanship. If Datum - TT&M receives notice of such defects during the warranty period, Datum - TT&M will repair or replace software media and firmware which do not execute their programming instructions due to such defects. Datum - TT&M does not warrant that operation of the software, firmware or hardware shall be uninterrupted or error free.

All warranty service will be carried out at the Datum - TT&M – TT&M facilities at 34 Tozer Rd, Beverly, MA 01915. The purchaser shall prepay shipping charges and shall pay all duties and taxes for products returned for warranty service. Datum - TT&M will pay for the return of products to the purchaser except for products returned from another country.

LIMITATION OF WARRANTY: The above warranty does not apply to defects of, or resulting from the following:

1. End items included as part of a system or product selected by, but not designed by, Datum - TT&M are subject only to warranty as may be obtained from the original manufacturers. Such items include, but are not limited to, test equipment, accessories, batteries, computers, printers, software, etc.
2. Items manufactured by Datum - TT&M pursuant to detailed designs furnished by purchaser or specific components, accessories, support equipment and software specified by purshaser.
3. Improper or inadequate maintenance by purchaser.
4. Unauthorized modifications, misuse or mishandling.
5. Operation outside of the environmental specifications of the product.
6. Purchaser's supplied software or interfacing.

THIS WARRANTY IS EXCLUSIVE AND NO OTHER WARRANTY, WHETHER WRITTEN OR ORAL, IS EXPRESSED OR IMPLIED. DATUM - TT&M SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

The remedies set forth above are the purchaser's sole and exclusive remedies. In no circumstances shall Datum - TT&M assume liability for loss, damage, or consequential expense (including loss of profits) whether based on contract, tort, or any other legal theory, arising directly or indirectly from the use of its equipment separately or in combination with other equipment.

Copyright Notice