SERIAL NO. _____

USER'S MANUAL
TRANSLATOR OPTION
(-1)
SD375
DYNAMIC ANALYZER II

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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SECTION I

GENERAL INFORMATION

1.1 INTRODUCTION

This manual contains initial checkout and operating instructions for the Translator Option for the Spectral Dynamics Model SD375 Dynamic Analyzer. The manual is divided into three sections. Each section covers a specific aspect of the option. This manual is written for the operator and contains no maintenance information. Maintenance information is included in the Service Manual for the SD375 Dynamic Analyzer.

1.2 EQUIPMENT DESCRIPTION

The Translator Option circuitry is contained on PWA's 21180600 and 21284500. These PWA's are located in the SD375 card positions A5A4 and A5A5. Programming to implement the option is contained in the Microprogram for the SD375. With the PWA's inserted in their respective card positions, the Microprogram will respond to the appropriate front panel controls for the Translator Option. No additional equipment is required.

1.3 SPECIFICATIONS

Translation Characteristics

Zoom ..... Translation zoom factors of 2, 5, 10, 20, 50, or 100. Selectable from front panel touch controls. Magnifies baseband resolution (Δf).

Zoom Center ..... Established by positioning the cursor to frequency of interest.

Center frequency cell processing limits are:

Zoom Factor	Limits lower	upper
2	50	350
5	20	380
10	10	390
20	5	395
50	2	398
100	1	399

Zoom Set ..... Holds center frequency and permits cursor movement within translated display.

Output Characteristics

Gain ..... Post translation gain of X1 (unity), X2, X4, or X8. Selectable from front panel touch controls.

Translated Output ..... 12-bit digital data represents translated spectrum (100 cells below and above center frequency).

1.4 REPLACEMENT PARTS

Except for some special SDC specification controlled parts listed in Tables 1-1 and 1-2, standard electronic parts are used in the Translator Option circuitry. Parts that are commonly used in the SD375 can be found in the SD375 User's Manual. Spectral Dynamics maintains a stock of all parts used in this option.

When ordering parts, include assembly number of the PWA, reference designation, description, and Spectral Dynamics part number. Also include the instrument serial number and complete model number including "dash" number.

Table 1-1. Replacement Parts for Translator Option, PWA 21180600, Translator Card

Reference Designator	Description	Part Number
A5A4U35	IC, PROM (XSN24)	21284700
A5A4U48	IC, PROM (XSN13)	21284600
A5A4U51	IC, PROM (TLR2)	21284900
A5A4U57	IC, PROM (TLR1)	21284800

Table 1-2. Replacement Parts for Translator Option, PWA 21284500, Filter Output Card

Reference Designator	Description	Part Number
A5A5U17	IC, PROM (TLR3)	21286400
A5A5U26	IC, PROM (TLR6)	21295500
A5A5U35	IC, PROM (TLR5)	21286600
A5A5U44	IC, PROM (TLR4)	21286500
A5A5U51	IC, PROM (XCF24)	32386300
A5A5U61	IC, PROM (XCF13)	21286200
A5A5U71	IC, PROM (PRE2)	21286100
A5A5U72	IC, PROM (PRE1)	21286000

SECTION II

INSTALLATION

2.1 INTRODUCTION

This section contains instructions for performing initial inspection of the Model SD375 Translator Option. Procedures for inspecting, checking for physical damage, reshipment, and returning under warranty or damage claims are found in the SD375 User's Manual.

2.2 PREPARATION FOR USE

2.2.1 Option Included with Instrument

If the Translator Option is included with the SD375, this subsection does not apply. Continue to Section III, Operation.

2.2.2 Option Installed in the Field

When this option is to be installed in the field, the following procedure should be followed:

a. Ensure that the SD375 is operating properly.

b. Remove power from the SD375.

c. Unplug the instrument.

d. Remove the top cover.

e. Ensure that all plug-in IC's are firmly seated and that component parts on the option cards do not protrude enough to be damaged when the cards are placed in their respective card slots.

f. Carefully insert each card in its respective card slot with component side of PWA to the left.

PWA 21180600 — A5A4

PWA 21284500 — A5A5

g. Make sure that the cards are fully seated and that the tops of the cards are even with the tops of the other cards.

h. Replace top cover.

i. Plug in the SD375 and turn on power.

SECTION III

OPERATION

3.1 INTRODUCTION

This section provides the operator with a description of the translator operations, the front-panel touch controls that affect or that are affected by the option, and an operational checkout.

3.2 OPERATING MODES

3.2.1 General Overview

The Model SD375 Translator Option provides increased resolution by magnifying a selectable portion of the normal narrow band spectrum. This is accomplished by setting the cursor on one narrow band cell, and activating the SD375 front-panel XLTR ON touch control. The Translator Option then applies a translation zoom factor of 2, 5, 10, 20, 50, or 100 about this center frequency. Table 3-1 shows the Hz/cell resolution, the display analysis bandwidth, and the memory period for each frequency range and each zoom factor. The Translator Option also provides a post-filter gain selection of 1, 2, 4, or 8.

3.2.2 CRT Annotation

When using the Translator Option, the analysis frequency range is not displayed. In its place, the scale limits are displayed when the XLTR ON touch control is pressed. In addition, the translation zoom factor is displayed at the top of the crt in place of NB when the Translator is ON. The zoom factor is displayed in the form Zxxx where xxx is the selected zoom factor. Other annotation data remains the same.

3.3 FRONT PANEL CONTROL AND INDICATORS

Most front-panel controls and indicators will function in the same manner as described in the SD375 User's Manual. However, certain switch combinations can produce slightly different results than stated in the SD375 User's Manual. Other combinations may produce seemingly valid data that requires some interpretation. These combinations are discussed in the following paragraphs.

3.3.1 INPUT Group

All touch controls and indicators in this group operate as described in the SD375 User's Manual when used with the Translator Option.

3.3.2 PARAMETERS Group

All touch controls and indicators in this group operate as described in the SD375 User's Manual when used with the Translator Option.

Table 3-1. Translator Option Parameters

Frequency Range	Normal Display		X 2 Zoom			X 5 Zoom		
	Resolution Hz/Cell	Memory Period (Seconds)	Display Analysis Band-Width	Resolution Hz/Cell	Memory Period (Seconds)	Display Analysis Band-Width	Resolution Hz/Cell	Memory Period (Seconds)
1 Hz	.0025	400	.25	.00125	800	.1	.0005	2000
2 Hz	.005	200	.50	.0025	400	.2	.001	1000
4 Hz	.010	100	1.0	.005	200	.4	.002	500
5 Hz	.0125	80	1.25	.00625	160	.5	.0025	400
10 Hz	.025	40	2.5	.0125	80	1.0	.005	200
20 Hz	.05	20	5.0	.025	40	2.0	.01	100
40 Hz	.1	10	10.0	.05	20	4.0	.02	50
50 Hz	.125	8	12.5	.0625	16	5.0	.025	40
100 Hz	.25	4	25.0	.125	8	10.0	.05	20
200 Hz	.5	2	50.0	.25	4	20.0	.1	10
400 Hz	1.0	1	100.0	.5	2	40.0	.2	5
500 Hz	1.25	0.8	125.0	.625	1.6	50	.25	4
1 kHz	2.5	0.4	250.0	1.25	.8	100	.5	2
2 kHz	5.0	0.2	500.0	2.5	.4	200	1.0	1.0
4 kHz	10.0	0.1	1000	5.0	.2	400	2.0	.5
5 kHz	12.5	0.08	1250	6.25	.16	500	2.5	.4
10 kHz	25.0	0.04	2500	12.5	.08	1000	5.0	.2
20 kHz	50.0	0.02	5000	25.0	.04	2000	10	.10
40 kHz	100.0	0.01	10000	50.0	.02	4000	20	.05
50 kHz	125.0	0.008	12500	62.5	.016	5000	25	.04
100 kHz	250.0	0.004	25000	125	.008	10000	50	.02

Table 3-1. Translator Option Parameters (Continued)

Frequency Range	Normal Display		X 10 Zoom			X 20 Zoom		
	Resolution Hz/Cell	Memory Period (Seconds)	Display Analysis Band-Width	Resolution Hz/Cell	Memory Period (Seconds)	Display Analysis Band-Width	Resolution Hz/Cell	Memory Period (Seconds)
1 Hz	.0025	400	.05	.00025	4000	.025	.000125	8000
2 Hz	.005	200	.1	.0005	2000	.05	.00025	4000
4 Hz	.010	100	.20	.0010	1000	.10	.00050	2000
5 Hz	.0125	80	.25	.00125	800	.125	.000625	1600
10 Hz	.025	40	.5	.0025	400	.25	.00125	800
20 Hz	.05	20	1.0	.005	200	.5	.0025	400
40 Hz	.10	10	2.0	.010	100	1.0	.0050	200
50 Hz	.125	8	2.5	.0125	80	1.25	.00625	160
100 Hz	.25	4	5.0	.025	40	2.5	.0125	80
200 Hz	.5	2	10.0	.05	20	5.0	.025	40
400 Hz	1.0	1	20.0	.10	10	10.0	.050	20
500 Hz	1.25	.8	25.0	.125	8	12.5	.0625	16
1 kHz	2.5	.4	50.0	.25	4	25.0	.125	8
2 kHz	5	.2	100	.5	2	50.0	.25	4
4 kHz	10.0	.1	200	1.0	1	100	.50	2.0
5 kHz	12.5	.08	250	1.25	.8	125	.625	1.6
10 kHz	25	.04	500	2.5	.4	250	1.25	.8
20 kHz	50	.02	1000	5.0	.2	500	2.5	.4
40 kHz	100	.01	2000	10	.1	1000	5.0	.2
50 kHz	125	.008	2500	12.5	.08	1250	6.25	.16
100 kHz	250	.004	5000	25.0	.04	2500	12.5	.08

Table 3-1. Translator Option Parameters (Continued)

Frequency Range	Normal Display		X 50 Zoom			X 100 Zoom		
	Resolution Hz/Cell	Memory Period (Seconds)	Display Analysis Band-Width	Resolution Hz/Cell	Memory Period (Seconds)	Display Analysis Band-Width	Resolution Hz/Cell	Memory Period (Seconds)
1 Hz	.0025	400	.01	.00005	20000	.005	.000025	40000
2 Hz	.005	200	.02	.0001	10000	.01	.00005	20000
4 Hz	.010	100	.04	.0002	5000	.02	.00010	10000
5 Hz	.0125	80	.05	.00025	4000	.025	.000125	8000
10 Hz	.025	40	.1	.0005	2000	.05	.00025	4000
20 Hz	.05	20	.2	.001	1000	.1	.0005	2000
40 Hz	.10	10	.4	.002	500	.20	.0010	1000
50 Hz	.125	8	.5	.0025	400	.25	.00125	800
100 Hz	.25	4	1.0	.005	200	.5	.0025	400
200 Hz	.5	2	2.0	.01	100	1.0	.005	200
400 Hz	1.0	1	4.0	.02	50	2.0	.010	100
500 Hz	1.25	.8	5.0	.025	40	2.5	.0125	80
1 kHz	2.5	.4	10.0	.05	20	5.0	.025	40
2 kHz	5	.2	20.0	.1	10	10.0	.05	20
4 kHz	10	.1	40.0	.20	5	20.0	.10	10
5 kHz	12.5	.08	50.0	.25	4	25.0	.125	8
10 kHz	25	.04	100	.5	2	50.0	.25	4
20 kHz	50	.02	200	1.0	1	100	.5	2
40 kHz	100	.01	400	2.0	.5	200	1.0	1
50 kHz	125	.008	500	2.5	.4	250	1.25	.8
100 kHz	250	.004	1000	5	.2	500	2.5	.4

3.3.3 DISPLAY Group

The Display mode X2 and X4 touch controls are disabled when using the Translator Option. All other touch controls in this group operate as described in the SD375 User's Manual.

3.3.4 FUNCTION Group

This group of controls provides the information that defines parameters to process the input signal for the translate function. Before activating the XLTR ON touch control, the cursor should be positioned to the center of the frequency band to be expanded.

XLTR ON Touch Control

This touch control sets the SD375 to the Translate mode of operation and centers the frequency cell of the last cursor position on the crt graticule; also sets the zoom factor to the last previously selected zoom factor. The upper and lower frequency limits of the crt spectrum display are determined by the frequency range selected.

CF SET Touch Control

This control locks the center frequency, establishing the spectrum limits each side of center and displaying the limits in the crt annotation where the frequency range is normally displayed. If this control is not activated, the center frequency will change when the cursor is moved. When CF SET is on, the cursor can be moved without the display changing its position within the spectrum range.

ZOOM Touch Controls

These controls allow the operator to expand the display on each side of the center frequency. With ZOOM 10 activated, 10 cells on each side of the center frequency are expanded to 100 cells. Table 3-1 shows the frequencies represented in each expanded cell.

Y GAIN Touch Controls

These controls allow the operator to amplify (digitally) the spectrum content within the ZOOM display (window). If the resultant gain produces a signal that exceeds the upper limit of the display, the display spectrum is rescaled to the next higher or lower range. The Y scale annotation at the left of the graticule will also be changed to agree with the new scaling factor.

3.3.5 CRT Group

The Translator Option does not affect this group.

3.3.6 CURSOR Group

X Touch Control

Only the Hz touch control is used with the Translator Option.

All other controls in this group operate as described in the SD375 User's Manual.

3.4 OPERATIONAL CHECKS

Test conditions set up in the following paragraphs check the Translator Option to assure that center frequency ranges are selected in all frequency ranges and that zoom and gain limits are correct. These checks are made using a Model 4300A Krohn-Hite oscillator or equivalent low-distortion sine wave generator.

The Translator Option checks assume that the SD375 has been thoroughly checked and is operating properly.

3.4.1 100 kHz Center Frequency Checks

a. Set front-panel touch controls as follows:

GAIN-X	LIN, X1
GAIN-Y	LIN, X1
AVG	EXPO, N = 4, START
INPUT LEVEL	1 Vrms
FUNCTION	SPECT, OPER
FREQ RANGE	100 kHz
WTG	H
SPECTRUM	NB
CURSOR	NORM
CURSOR-Y	dB
CURSOR-X	Hz
XLTR	OFF

b. Apply a sine wave signal of 60 kHz at approximately 1 Vrms to the front panel input connector.

NOTE

Signal frequency and amplitude can be checked by positioning the cursor to the 60 kHz cell and adjusting the sine wave signal until the cursor appears at the top of the resultant spectrum signal. In the same manner the sine wave amplitude can be adjusted for 1 Vrms by adjusting the input sine wave for a 0.0 dB reading in the cursor annotated display.

c. With the applied signal adjusted and the cursor positioned to the top of the displayed spectrum, press the XLTR ON touch control.

d. The following display and indicator changes will occur:

1. The XLTR ON indicator will light.

2. The zoom factor will be displayed on the crt.

3. The frequency range annotation below the left and right graticule lines will be blanked.

4. The displayed spectrum will move to the center of the crt.

5. The cursor will remain in its previous position.

e. Press the CF SET touch control. The CF SET indicator will light.

f. Press the ZOOM touch control.

1. The zoom factor annotation on the crt will increase by one step in the sequence Z2, Z5, Z10, Z20, Z50, Z100, Z2, etc.

2. Observe that the frequency range annotation on the left and right sides of the display are as listed in Table 3-2 for the selected zoom factor.

g. Reposition the cursor to the top of the spectrum.

1. Observe that the cursor position annotation indicates 60000 Hz $\pm$ 12.5 Hz.

2. The display may shift slightly but the cursor position should be within the specified limits.

Table 3-2. Zoom Parameters for 60 kHz

Zoom	Left	Right
2	47500	72500
5	55000	65000
10	57500	62500
20	58750	61250
50	59500	60500
100	59750	60250

NOTE

As the spectrum is expanded, the frequency measurement of the input signal will become more precise.

h. Repeat steps f and g until the readings have been verified for all zoom factors.

3.4.2 Y GAIN Check

a. With the signal as displayed at the end of the previous checks, set Y LOG touch control.

b. Press the MEM HOLD touch control.

c. The spectrum will stop updating and the display will remain fixed on the crt.

d. Press the Y GAIN touch control, as necessary, to select GAIN 1 (0 dB).

e. Record the Y dB reading.

f. Press the Y GAIN touch control to select, in order GAIN 2 (6 dB), GAIN 4 (12 dB), and GAIN 8 (18 dB).

g. The following annotation changes will occur:

1. Y GAIN 2

Vertical Scale reading = +4 to −56 dB
Cursor position = Y dB recorded in step d + 6 dB

2. Y GAIN 4

Vertical scale = −2 to −62 dB
Cursor position = Y dB recorded in step d + 12 dB

3. Y GAIN 8

Vertical scale = −8 to −68 dB
Cursor position = Y dB recorded in step d + 18 dB

3.4.3 50 – 10 kHz Center Frequency Checks

a. Set front-panel touch controls as listed in 3.4.1 step a, except set FREQ RANGE to 10 kHz.

b. Apply a sine wave signal of 6 kHz at approximately 1 Vrms. (Refer to note in 3.4.1 step b.)

c. With the applied signal adjusted and the cursor positioned to the top of the signal, press the XLTR ON touch control.

d. The XLTR ON indicator will light and the crt spectrum display will move to the center vertical line.

e. The cursor will remain in its previous position on the display and the frequency range annotation will be blanked.

f. Press the CF SET touch control. The CF SET indicator will light.

g. Press the ZOOM touch control.

1. The zoom factor annotation on the crt will increase by one step in the sequence Z2, Z5, Z10, Z20, Z50, Z100, Z2, etc.

2. Observe that the frequency range annotation on the left and right sides of the display are as listed in Table 3-3 for the selected zoom factor.

h. Reposition the cursor to the top of the spectrum.

1. Observe that the cursor position annotation indicates 6000 Hz ± 1.25 Hz.

2. The display may shift slightly but the cursor position should be within the specified limits.

i. Repeat steps g and h until the readings have been verified for all zoom factors.

3.4.4 5-1 kHz Center Frequency Checks

a. Set LEVEL VOLTS to 0.1 Vrms and FREQ to 1 kHz.

b. Press INPUT SIGNAL TEST touch control.

Table 3-3. Zoom Parameters for 6 kHz

Zoom	Left	Right
2	4750	7250
5	5500	6500
10	5750	6250
20	5875	6125
50	5950	6050
100	5975	6025

c. Position cursor to top of displayed spectrum.

d. Press XLTR ON and CF SET touch controls; then position cursor to top of spectrum.

e. Press the ZOOM touch control, as necessary, to select zoom 10 (Z10).

f. The appropriate indicators will light and the following crt annotations will be displayed.

1. Frequency Range: Left — 615.0 Hz
   Right — 665.0 Hz

2. Cursor Position: 64.000 Hz

g. Press XLTR ON touch control to return to normal operating mode.

h. Increase FREQ range to 2 kHz.

i. Position cursor to top of spectrum. Press XLTR ON and CF SET touch controls; then reposition cursor to top of spectrum.

j. The appropriate indicators will light and the following crt annotations will be displayed:

1. Frequency Range: Left — 1230 Hz
   Right — 1330 Hz

2. Cursor Position: 1280.000 Hz

k. Press XLTR ON touch control to return to normal operating mode.

l. Increase FREQ range to 5 kHz.

m. Position cursor to top of spectrum. Press XLTR ON and CF SET touch controls; then reposition cursor to top of spectrum.

n. The appropriate indicators will light and the following crt annotations will be displayed:

1. Frequency Range: Left — 3075.0 Hz
   Right — 3325.0 Hz

2. Cursor Position: 3200.00 Hz

3.4.5 Lower Frequency Ranges

By using the internal test signal in the manner described in 3.4.4 above, all lower frequencies can be checked for the following results:

Selected Frequency (Hz)	Range (Hz)		Cursor Position (Hz)
	Left	Right	
500	307.50	332.50	320.000
400	246.0	266.0	256.000
200	123.0	133.0	128.0000
100	61.5	66.5	64.0000
50	30.750	33.250	32.0000
40	24.60	26.60	25.6000
20	12.30	13.30	12.8000*
10	6.150	6.650	6.40000*

*In these ranges, complete spectrum update will require several minutes.