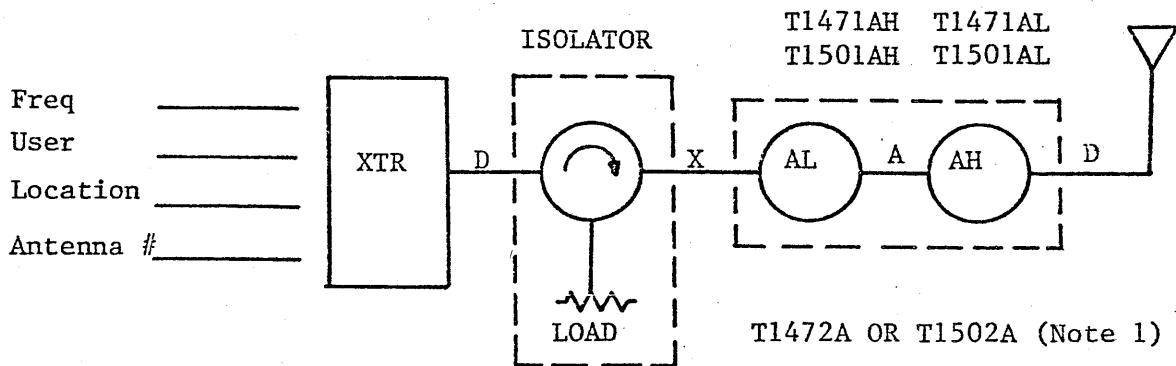


STANDARD ARRANGEMENT FOR TRANSMITTER MULTIPLEXING

DIAGRAM #1



- 1) T1471AL (T1501AL) and T1471AH (T1501AH) are tuned to transmitter frequency, reject frequencies are set at ± 3 MHz.
- 2) Isolator is connected to Low notch cavity of dual cavity filter.
- 3) Cable "A" lengths:

406-430 MHz	14 1/4"	Blk-Rd	1-84459A13
430-470 MHz	13-3/8"	Blk	1-84459A23
470-512 MHz	11 3/4"	Brn-Grn	1-84459A19

Cable "D" length is non-critical -
 Cable "X" Isolator output cable - RG9U Part # 1-84127F07
- 4) Recommended isolators are found in section I) 1) C).

NOTES

- 1) T1472A cavities cover the frequency range of 406 - 470 MHz. The new T1502A series covers the frequency range of 406 - 512 MHz.
- 2) When ordering T-1502A, indicate pass and reject frequencies.
- 3) When ordering T-1502A, cable A is included for frequency band indicated.
- 4) With the first repeater, the power output shall be adjusted for 40w to the antenna. When additional transmitters are multiplexed onto the same antenna, the power output shall be readjusted to obtain 40w at the antenna.
- 5) For 470-512MHz stations consult systems eng. for power output adjustments. Power is regulated by maximum permissible ERP and is dependent on antenna height.

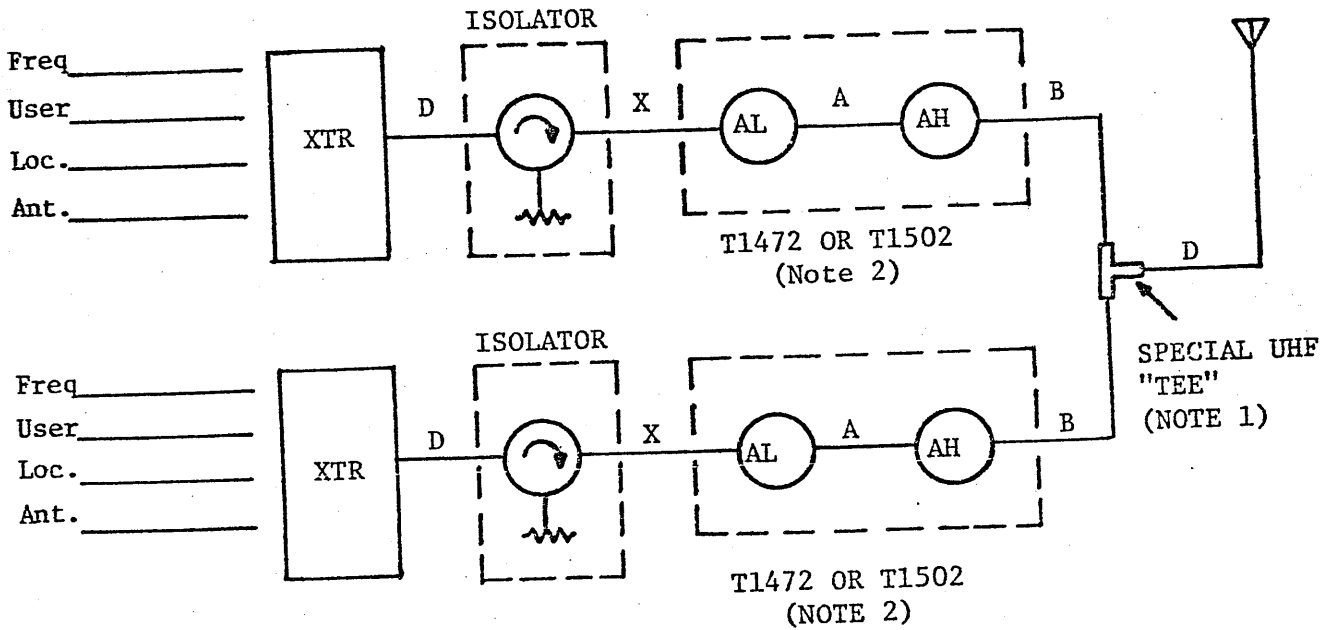
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TWO TRANSMITTER MULTIPLEXING

DIAGRAM #2

Cable lengths vary with frequency, see chart below.



CABLE LENGTHS

1. KEY	406-430 MHz	430-470 MHz	470-512 MHz
A	14 1/4" Blk-Red 1-84459A13	13 3/8" Blk 1-84459A23	11 3/4" Brn-Grn 1-84459A19
B	9 3/4" Org. 1-84459A04	8 3/4" Grn 1-84459A06	8" Blk-Blu 1-84459A16
D	Cable D length is non-critical		
X	30" Gray 1-84127F07	30" Gray 1-84127F07	30" Gray 1-84127F07
KIT	TKN6558A	TKN6559A	TKN6560A

2. When ordering a T-1502A, cable A is included.
3. The two "B" cables and a Tee Connector make up a two branch multiplex kit. Order multiplex kit #'s listed above.
4. When ordering a T-1502A indicate the pass (transmitter) frequencies and notch (± 3 MHz) frequencies.

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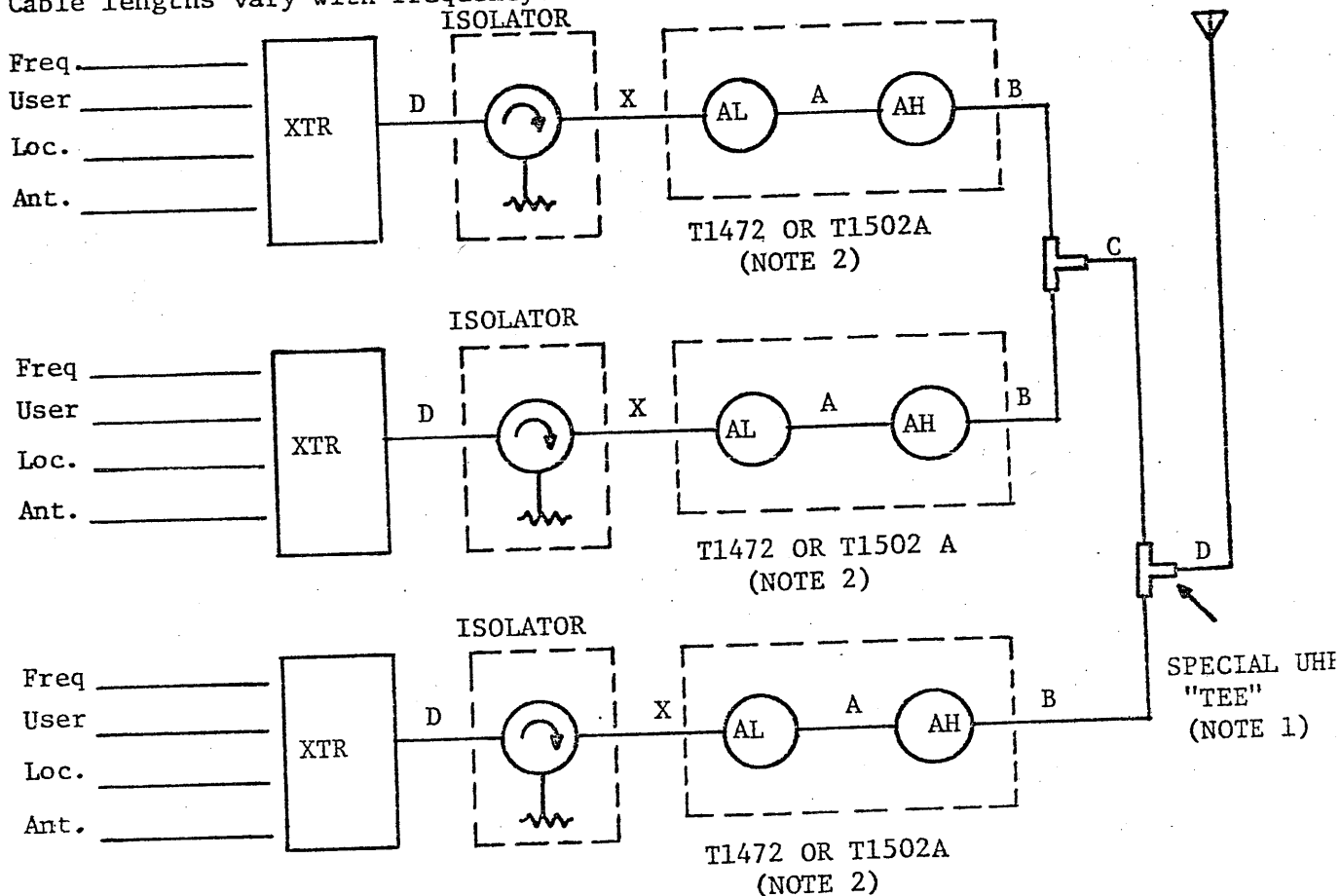
NOTES

- 1) When UHF female connector is used on Antenna Heliac, two of four "bosses" on the male portion of the UHF TEE must be removed to insure proper shielding of the transmission line.
- 2) T1472A cavities cover the frequency range of 406 - 470 MHz. The new T1500A series of cavities covers the frequency range of 406 - 512 MHz.
- 3) When a second transmitter is added to form a two transmitter multiplex, the cavity (pass frequency adjustment) for both transmitters should be peaked for optimum performance.
- 4) (Same as note 5 page I-4).

THREE TRANSMITTER MULTIPLEXING

DIAGRAM #3

Cable lengths vary with frequency. See chart below.



CABLE LENGTHS

1. KEY	406-430 MHz	430-470 MHz	470-512 MHz
A	14 1/4" Blk-Red 1-84459A13	13 3/8" Blk 1-84459A23	11 3/4" Brn-Grn 1-84459A19
B	9 3/4" Org. 1-84459A04	8 3/4" Grn 1-84459A06	8" Blk-Blu 1-84459A16
C	8" Blk-Blu 1-84459A16	7 3/8" Vio 1-84459A10	6 7/8" Brn-Red 1-84459A21
D	Cable D length is non-critical		
X	30" Gray 1-84127F07	30" Gray 1-84127F07	30" Gray 1-84127F07

2. When ordering a T-1502A, cable A is included.
3. There is no set kit number for a three transmitter branch kit. When adding a third transmitter, one must order a C and B cable in the frequency range of the transmitters and a UHF Coaxial Tee (Motorola Part #9-86150).
4. When ordering a T-1502A indicate the pass (transmitter) frequency and notch (± 3 MHz) frequencies.

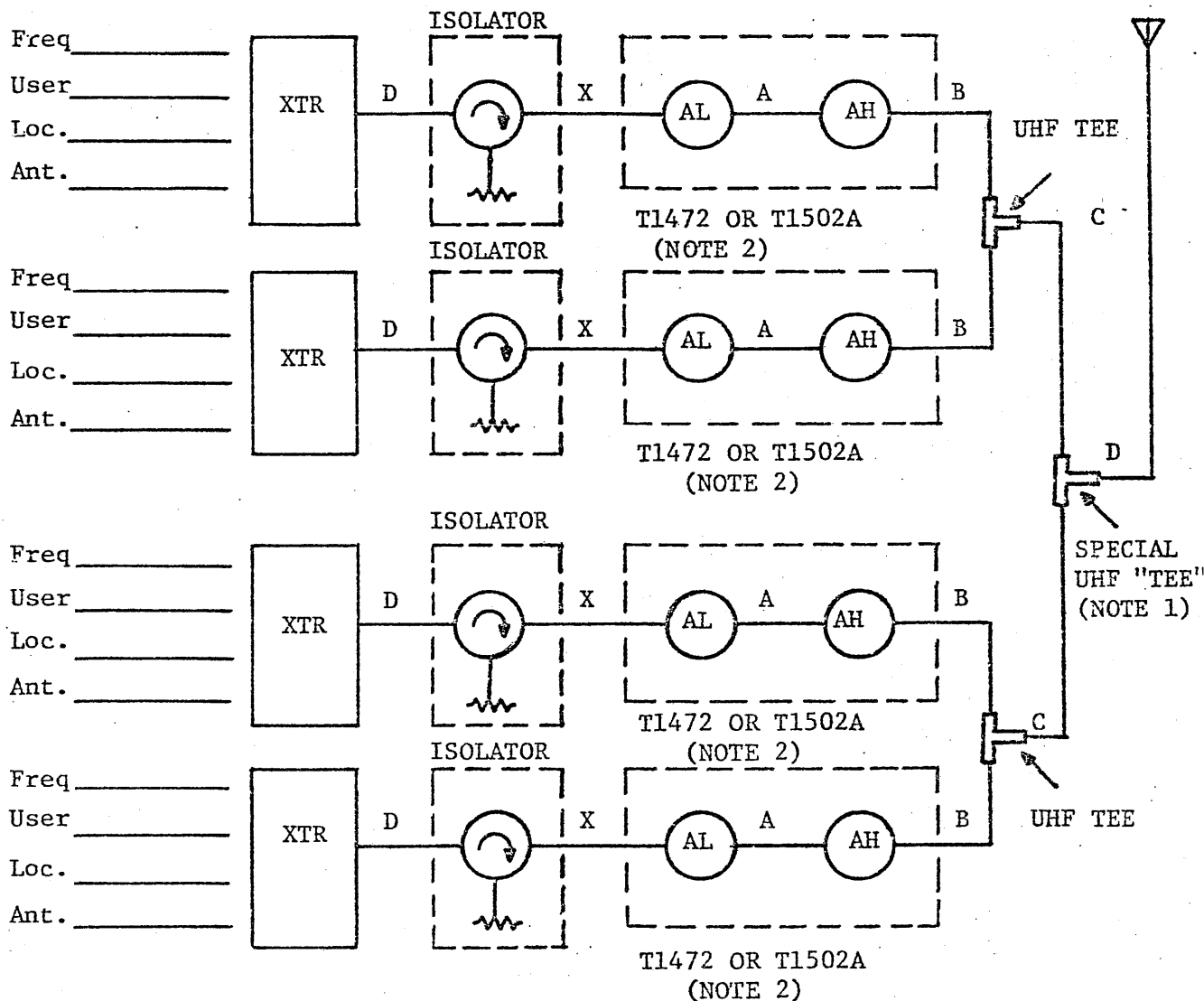
NOTES

- 1) When UHF female connector is used on Antenna Heliac, two of four "bosses" on the male portion of the UHF TEE must be removed to insure proper shielding of the transmission line. Special TEE's have been color-coded GREEN.
- 2) T1472A cavities cover the frequency range of 406 - 470 MHz. The new T1500A series of cavities covers the frequency range of 406 - 512 MHz.
- 3) When a third transmitter is added to form a three transmitter multiplex, the cavity (pass frequency adjustment) of all three transmitters should be peaked for optimum performance.
- 4) (Same as note 5, page I-4).

FOUR TRANSMITTER MULTIPLEXING

DIAGRAM #4

Cable lengths vary with frequency - see chart below.



CABLE LENGTHS

1. KEY	406-430 MHz	430-470 MHz	470-512 MHz
A	14 1/4" Blk-Red 1-84459A13	13 3/8" Blk 1-84459A23	11 3/4" Brn-Grn 1-84459A19
B	9 3/4" Org. 1-84459A04	8 3/4" Grn 1-84459A06	8" Blk-Blu 1-84459A16
C	8" Blk-Blu 1-84459A16	7 3/8" Vio 1-84459A10	6 7/8" Brn-Red 1-84459A21
D	Cable D length is non-critical		
X	30" Gray 1-84127F07	30" Gray 1-84127F07	30" Gray 1-84127F07

2. When ordering a T-1502A, cable A is included.

3. When multiplexing four transmitters one requires a total of three branch kits, two (2) two branch kits and one (1) four branch kit. The correct kit #'s are listed below.

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<u>Branches</u>	<u>406-430 MHz</u>	<u>430-470 MHz</u>	<u>470-512 MHz</u>
2	TKN 6558A	TKN 6559A	TKN 6560A
4	TKN 6552A	TKN 6553A	TKN 6554A

4. When ordering a T-1502A indicate the pass (transmitter) frequencies and notch (± 3 MHz) frequencies.

NOTES

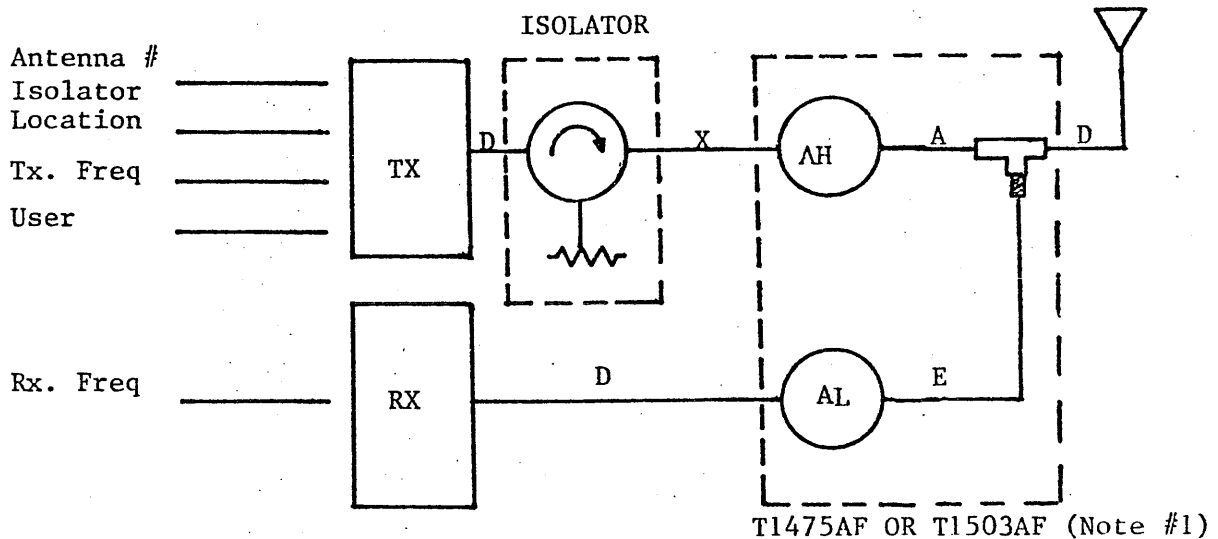
- 1) When UHF female connector is used on Antenna Heliac, two of four "bosses" on the male portion of the UHF TEE must be removed to insure proper shielding of the transmission line. Special TEE's have been colorcoded GREEN.
- 2) T1472A cavities cover the frequency range of 406 - 470 MHz. The new T1500A series of cavities covers the frequency range of 406 - 512 MHz.
- 3) When a fourth transmitter is added to form a four transmitter multiplex, the cavity pass frequency adjustment for all four transmitters should be peaked for optimum performance.
- 4) (Same as note 5, page I-4).

INSTALLATION OF BASES USING A SINGLE ANTENNA

LOW DENSITY SITES ONLY

430 - 470 MHz ARRANGEMENT ONLY

CABLE LENGTHS VARY WITH FREQUENCY - SEE TABLE BELOW



CABLE LENGTHS

<u>KEY</u>	<u>430 - 470 MHz</u>
A	8-3/4" Grn. 1-84459A06
E	5-3/4" Red-Yel 1-84459A12
D	Non critical length
X	Isolator Output Cable Part #1-84127F07
Duplexer	
Cable Kit	TKN 6539A

CAVITY TUNING (Note 2)

TRANSMITTER PASS: TRANSMIT FREQUENCY
 TRANSMITTER NOTCH: +5 MHz
 RECEIVER PASS: RECEIVE FREQUENCY
 RECEIVER NOTCH: -5 MHz

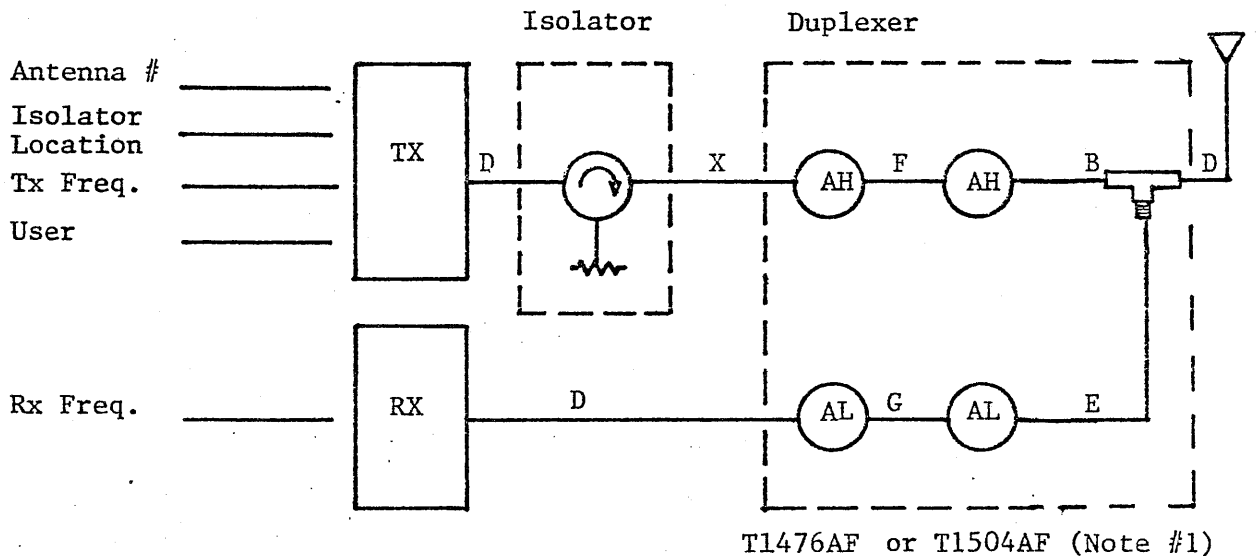
NOTES

- 1) T1475AF cavity duplexer covers the frequency range of 406-470 MHz.
The new T1503AF cavity duplexer covers the frequency range of 406-512 MHz.
- 2) Specify pass and reject frequencies when ordering

INSTALLATION OF BASES USING A SINGLE ANTENNA

406-430 MHz ARRANGEMENT

2-5 MHz Tx-Rx Frequency Separation*



CABLE LENGTHS

<u>Key</u>	<u>406-430 MHz</u>	<u>Part #</u>
F	9 3/8" Blk-Grn	1-84459A15
G	10 1/2" Blk-Yel	1-84459A14
B	9 3/4" Org.	1-84459A04
E	6 3/8" Brn-Blu	1-84459A18
D	Non-Critical Length	
X	Isolator Output Cable	1-84127F07
Duplexer Cable Kit		TKN6541A

CAVITY TUNING (Note 2)

Transmitter Pass: Transmit frequency
 Transmitter Notches: Receive frequency
 Receiver Pass: Receive frequency
 Receiver Notches: Transmit frequency

NOTES:

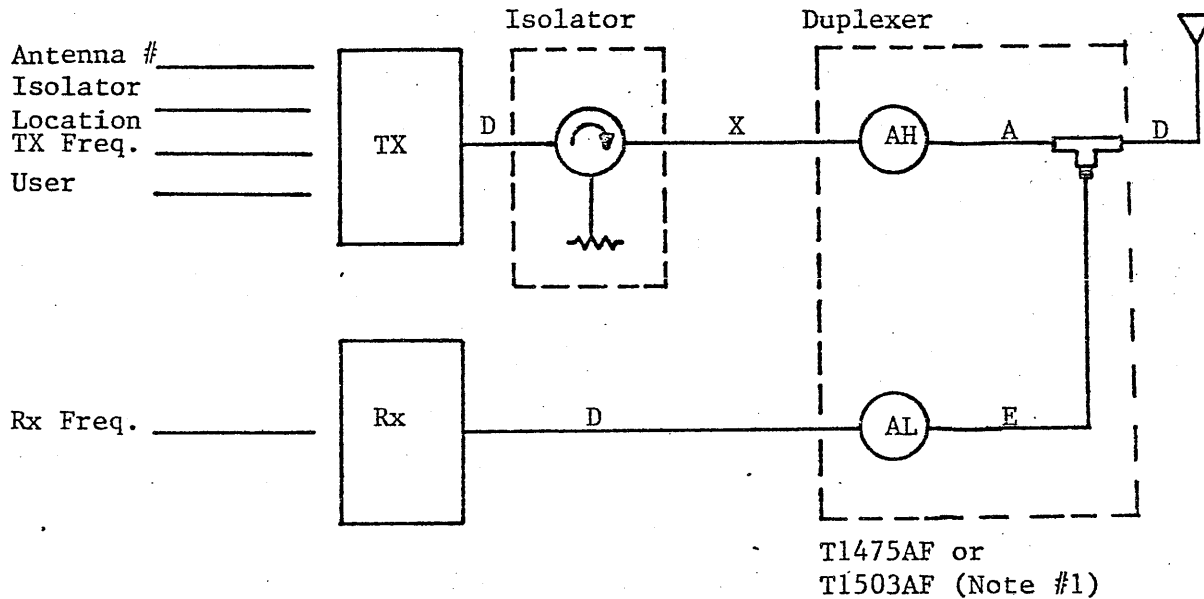
- 1) The T1476AF duplexer covers the frequency range of 406-470 MHz.
The T1504AF duplexer covers the frequency range of 406-512 MHz.
- 2) Specify pass and reject frequencies when ordering.

*For frequency separations of less than 2 MHz consult your Area System Engineer.

INSTALLATION OF BASES USING A SINGLE ANTENNA

406-430 MHz ARRANGEMENT

5 MHz (Or Greater) Tx-Rx Frequency Separation



CABLE LENGTHS

<u>Key</u>	<u>406 - 430 MHz</u>	<u>Part #</u>
A	9 3/4" Org.	1-84459A04
E	6 3/8" Brn-Blu	1-84459A18
D	Non-Critical length	
X	Isolator Output Cable	1-84127F07
Duplexer Cable Kit		TKN6538A

CAVITY TUNING

Transmitter Pass: Transmit frequency
 Transmitter Notch: Receive frequency
 Receiver Pass: Receive frequency
 Receiver Notch: Transmit frequency

NOTES:

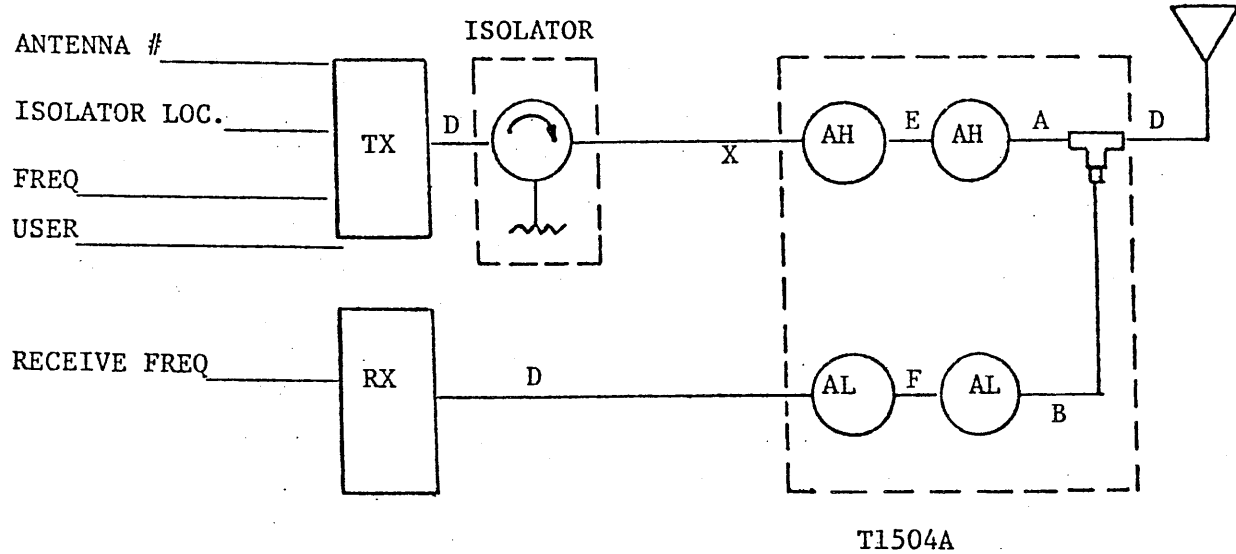
- 1) The T1475AF duplexer covers the frequency range of 406-470 MHz.
The T1503AF duplexer covers the frequency range of 406-512 MHz.
- 2) Specify pass and reject frequencies when ordering.

INSTALLATION OF BASES USING A SINGLE ANTENNA

430-470 MHz ARRANGEMENT ONLY

LOW DENSITY SITES ONLY

T1504 DUPLEXER



CABLE LENGTHS

<u>KEY</u>	<u>430 - 470 MHz</u>
A	8-3/4" - Grn - 1-84459A06
B	5-3/4" - Red/Yel - 1-84459A12
D	Non-Critical Lengths
E	8-1/2" Blu - 1-84459A07
F	9-3/4" - Org - 1-84459A04
X	30" - RG9U - 1-84127F07

CAVITY TUNING

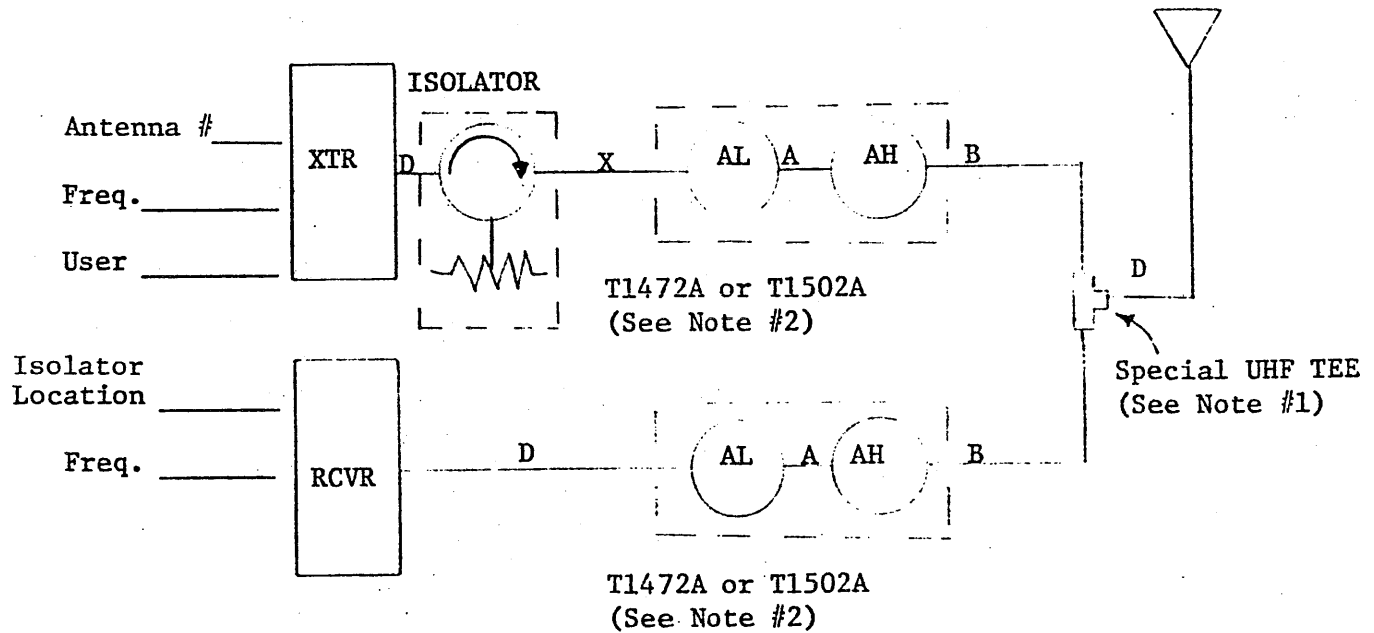
T1504A

Receiver Pass: Receiver Freq.
Receiver Notches: \pm 5 MHz
Transmitter Pass: Transmitter Freq.
Transmitter Notches: +5 MHz

INSTALLATION OF BASES USING A SINGLE ANTENNA

HIGH DENSITY SITES ONLY

430 - 470 MHz ARRANGEMENT ONLY



CABLE LENGTHS

<u>KEY</u>	<u>430 - 470 MHz</u>
A	13 3/8" Blk 1-84459A23
B	8 3/4" Grn 1-84459A06
D	Non-critical length
X	Isolator Output Cable - Part #1-84127F07

CAVITY TUNING

REC NOTCHES: AL: (Note #3) AH: (Note #3)
 REC PASS: Receiver Freq.
 TRANSMITTER NOTCHES: AL: (Note #3) AH: (Note #3)
 TRANSMITTER PASS: Transmitter Freq.

NOTES

- 1) When UHF Female connector is used on antenna Heliac, two of four "bosses" on the male portion of the UHF TEE must be removed to insure proper shielding of the transmission line. Special TEE's have been color-coded GREEN.
- 2) T1472A cavities cover the frequency range of 406 - 470 MHz. The new T1502A cavities cover the frequency range of 406 - 512 MHz.
- 3) Tuning of T1502's.

<u>Freq. Range</u>	<u>Tx or Rx</u>	<u>Low Notch</u>	<u>High Notch</u>
450 - 452.5	Tx	447.0	+ 5 MHz
452.5 - 454.975	Tx	449.5	+ 5 MHz
455 - 457.5	Rx	- 5 MHz	461.5
457.4 - 459.975	Rx	- 5 MHz	463.5
461 - 463	Tx	457.0	+ 5 MHz
463 - 464.975	Tx	459.5	+ 5 MHz
466 - 468	Rx	- 5 MHz	470.5 or (Note #5) 472.0
468 - 469.975	Rx	- 5 MHz	472.0
470 - 471.5	Tx	467.5	(2) + 3 MHz
471.5 - 473	Tx	467.5 OR 467.5 (Note #4)	(2) + 3 MHz
473 - 474.5	Rx	(2) - 3 MHz	- - - - -
474.5 - 476	Rx	(2) - 3 MHz	- - - - -

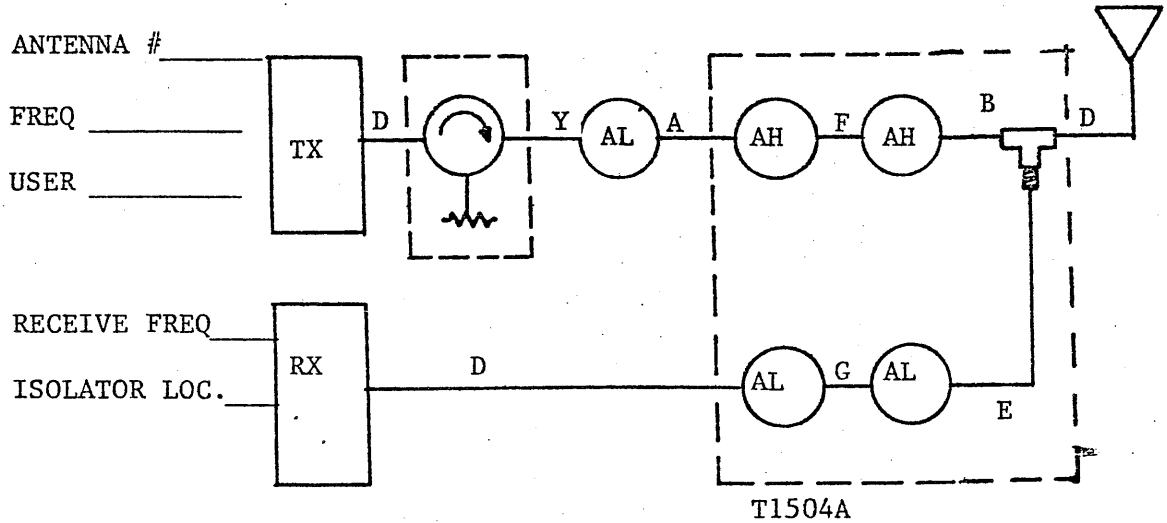
- 4) Low notch is dependent on the frequencies in the next lower receiver group. (ie: if the next lower receiver group is 466 - 468 MHz low notch should be set at 467.5 MHz. -if receiver group is 468 - 469.995 MHz, notch should be set at 469.5 MHz)
- 5) High notch is dependent on the frequencies in the next higher transmitter group. (ie: if the next higher transmitter group is 470 -471.5 MHz notch should be set at 470.5 MHz - if the transmitter group is 471.5 - 473 MHz, notch should be set at 472 MHz.)

INSTALLATION OF BASES USING A SINGLE ANTENNA

470 - 512 MHz ARRANGEMENT ONLY

LOW AND HIGH DENSITY SITES*

ISOLATOR T1501AL* T1504A



CABLE LENGTHS

<u>KEY</u>	<u>470 - 512 MHz</u>
A	11 3/4" - Brn/Grn - 1-84459A19.
B	8" - Blk/Blu - 1-84459A16
D	Non-Critical Lengths
E	5-1/4" - Yellow - 1-84459A05
F	7 7/8" - Brn/Yel - 1-84459A20
G	9 3/8" - Blk/Grn - 1-84459A15
Y	18" - RG9U - 1-84127F08

CAVITY TUNING

T1504A

Receiver Pass: Receiver Freq.
 Receiver Notches: -3 MHz
 Transmitter Pass: Transmitter Freq.
 Transmitter Notches: +3 MHz

T1501AL *

Required at high-density sites only!
 Pass: Transmitter Freq.
 Notches: 467.5 MHz or
 469.5 MHz
 (Note #1)

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NOTE

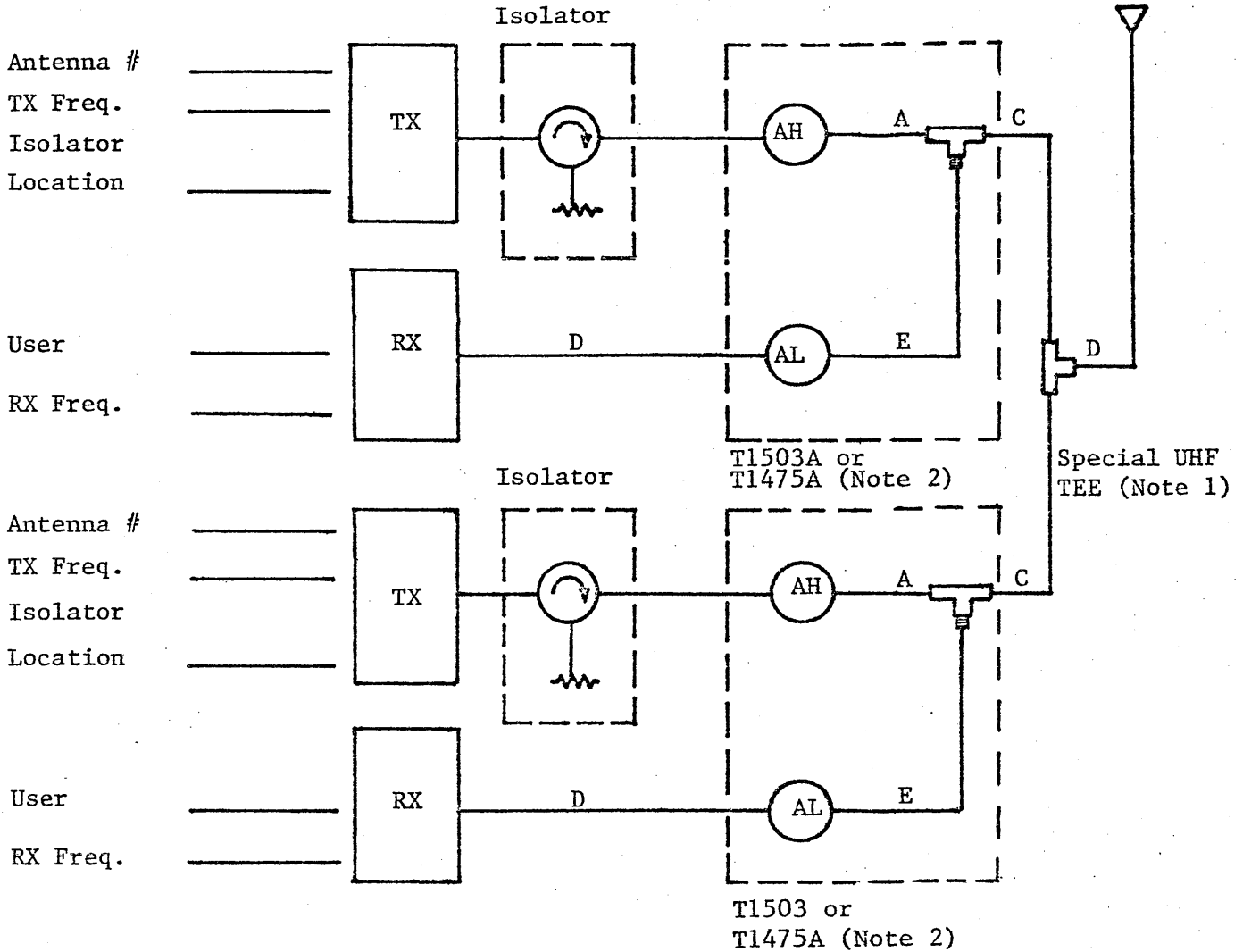
- 1) Low notch is dependent on the frequencies in the next lower receiver group. (i.e.: if the next lower receiver group is 466 - 468 MHz low notch should be set at 467.5 MHz. - If receiver group is 468 - 469.995 MHz, notch should be set at 469.5 MHz.)

INSTALLATION OF TWO BASES ON TO A SINGLE ANTENNA

(NOTE #3)

406-470 MHz ARRANGEMENT

Cable Lengths Vary With Frequency - See Table



Key	406-430 MHz	430-470 MHz
A	9 3/4" Org. 1-84459A04	8 3/4" Grn. 1-84459A06
E	6 3/8" Brn. - Blu. 1-84459A18	5 3/4" Red-Yel. 1-84459A12
C	8" Blk.-Blu. 1-84459A16	7 3/8" Vio. 1-84459A10
D	Non-Critical Length-Jacketed Foam Heliax	

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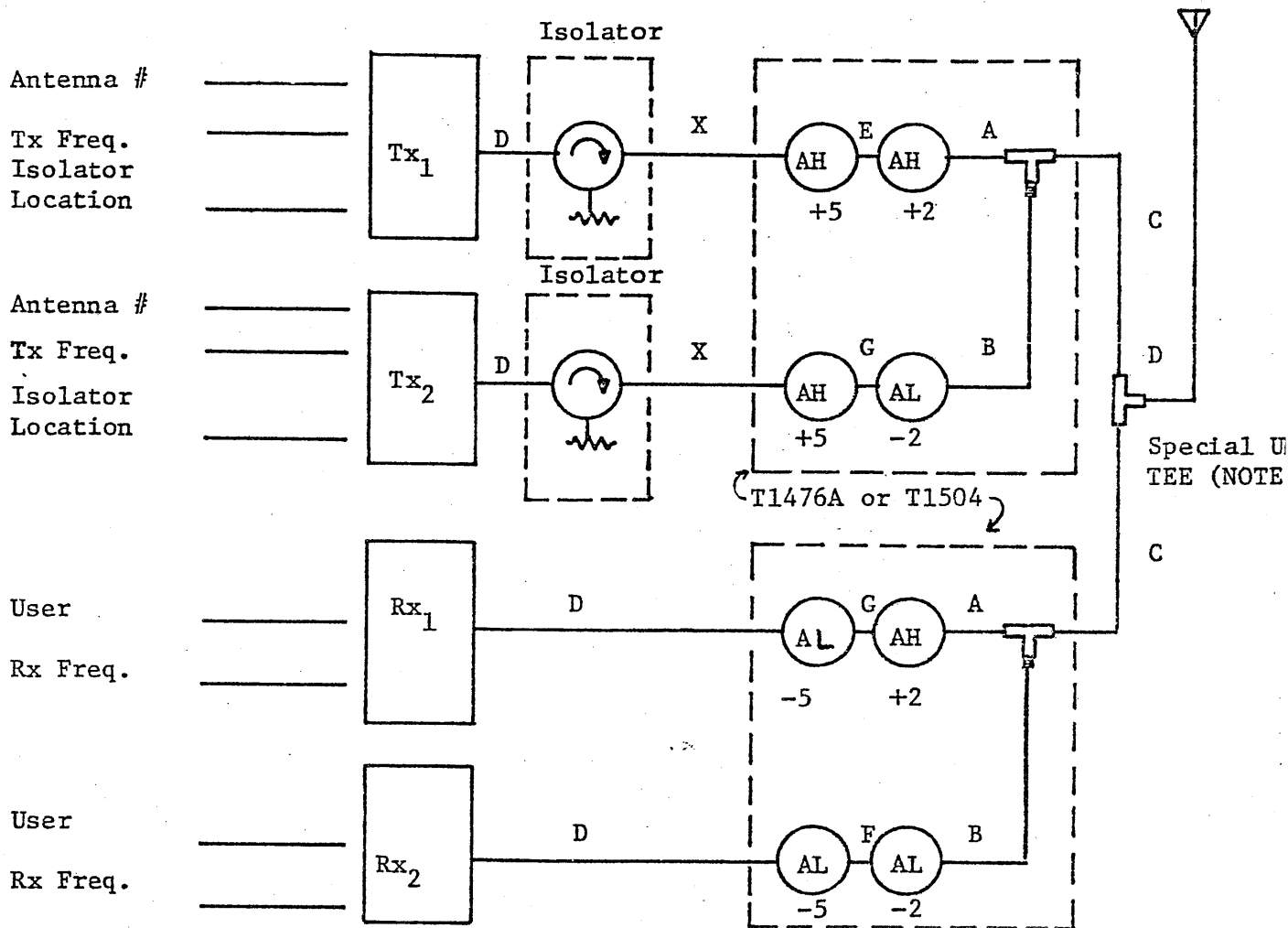
Diagram #3

* ONLY 5MHZ (Tx-Rx) spacing is shown on this diagram.

NOTES

1. When UHF female connector is used on antenna Heliac, two of four "bosses" on the male portion of the UHF TEE must be removed to insure proper shielding of the transmission line. Special tees have been color coded GREEN.
2. Frequency Separation between base station pairs should not exceed a minimum of 500KHz.
3. Cavity tuning is shown on the diagram as + or - numbers (in MHz) below each cavity. Also, please note that $Tx_1 < Tx_2$ and $Rx_1 < Rx_2$ in frequency.

INSTALLATION OF TWO BASES ON TO A SINGLE ANTENNA
 (NOTE 2)
 430-470MHZ ONLY
 (NOTE 3)



CABLE LENGTHS

<u>KEY</u>	430 - 470 MHz
G	13 3/8" - Blk - 1-84459A23
A	8-3/4" - Grn - 1-84459A06
B	5-3/4" - Red/Yel - 1-84459A12
C	7 3/8" Vio. - 1-84459A10
D	Non-Critical Lengths
E	8-1/2" Blu - 1-84459A07
F	9-3/4" - Org - 1-84459A04
X	30" - RG9U - 1-84127F07

CAVITY TUNING

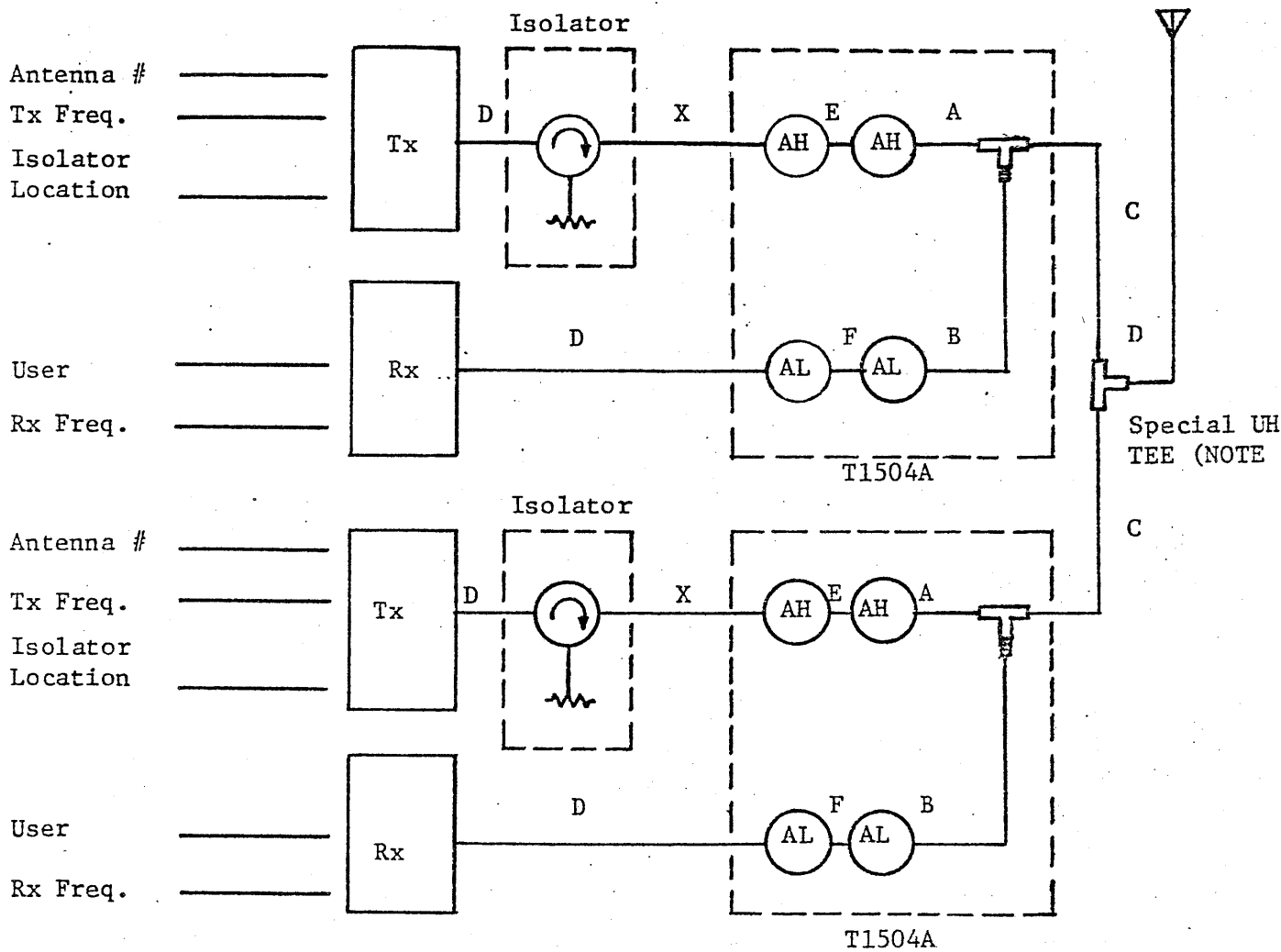
Receiver Pass: Receiver Freq.
 Receiver Notches: -5 MHz, (+ or -2 as shown)
 Transmitter Pass: Transmitter Freq.
 Transmitter Notches: +5 MHz, (+ or -2 as shown)

* Only 5 MHz or greater (TX-RX) spacing in the 406-430 MHz band is shown on this diagram. For any other arrangement, consult your Area Systems Engineer.

Notes

- 1) When UHF female connector is used on Antenna Heliac, two of four "bosses" on the male portion of the UHF Tee must be removed to insure proper shielding of the transmission line. Special tees have been color coded GREEN.
- 2) The T1475A duplexer covers the frequency range of 406-470 MHz. The T1503A duplexer covers the frequency range of 406-512 MHz.
- 3) Frequency Separation between base station pairs should not exceed a maximum of 500KHz.
- 4) When adding a second station to form a two station duplex arrangement, the cavity pass frequency adjustment for both duplexers should be peaked for optimum performance.

INSTALLATION OF TWO BASES ON TO A SINGLE ANTENNA
 (NOTE 2)
 430-470MHZ ONLY



Cable Lengths

<u>KEY</u>	<u>430 - 470 MHz</u>
A	8-3/4" - Grn - 1-84459A06
B	5-3/4" - Red/Yel - 1-84459A12
C	7 3/8" Vio. - 1-84459A10
D	Non-Critical Lengths
E	8-1/2" Blu - 1-84459A07
F	9-3/4" - Org - 1-84459A04
X	30" - RG9U - 1-84127F07

Cavity Tuning

T1504A

Receiver Pass: Receiver Freq.
 Receiver Notches: -5 MHz
 Transmitter Pass: Transmitter Freq.
 Transmitter Notches: +5 MHz

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* ONLY 5MHZ (Tx-Rx) spacing is shown on this diagram.

NOTES

1. When UHF female connector is used on antenna Heliac, two of four "bosses" on the male portion of the UHF TEE must be removed to insure proper shielding of the transmission line. Special tees have been color coded GREEN.
2. Frequency Separation between base station pairs should not exceed a maximum of 500KHz.

CONFIDENTIAL

inter-office correspondence

From: Allen Rasmussen

Date: April 4, 1974

To: Hil Teske

cc: Ray Schranz
Bob Bingham
Dick Gilman

Ron Davis ✓
Cliff Brown
Phil Jorgensen

SUBJECT: DUPLEXER CABLES

The following is a revised copy of my memo of March 28, 1974, regarding duplexer cable lengths. Please disregard the preceding memo.

Recently we have been having difficulties receiving the correct cables which were ordered per the Filters & Duplexers Manual 68P81102E96 Issue A-(6/23/72UP). In several cases, the type of cable is different than that which is stated in the manual. Also, on nine occasions the length is different.

In one case, a discrepancy in length amounts to 10½ inches, which appears to be much greater than that due to the velocity factor in cable type change, i.e., (1-84459A22).

I would hope that a speedy resolution of these differences can be accomplished as new installations at our antenna sites are being delayed due to the confusion regarding ordering these cables.

The attached table illustrates the differences, per information furnished by Wayne Asplen of NPD.

Regards,



AR

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<u>PART NO.</u>	<u>CABLE TYPE</u>	<u>LENGTH INCHES</u>	<u>CABLE TYPE</u>	<u>LENGTH INCHES</u>
I-84459A01	RG142 B/U	12 3/4	RG8	12 3/4 **
A04	"	9 3/4	RG 142 B/U	9 3/4
A05	"	5 1/2	"	5 1/2
A06	"	8 3/4	"	8 3/4
A07	"	8 1/2	"	8 1/2
A10	"	7 3/8	"	7 3/8
A11	"	15 3/4	"	15 3/4
A12	"	5 3/4	"	5 3/4
A13	"	14 1/2	"	15 *
A14	"	10 1/2	"	11 *
A15	"	9 3/8	"	10 *
A16	"	8	"	8
A17	"	17 3/4	"	18 *
A18	"	6 3/8	"	7 *
A19	"	11 3/4	"	12 *
A20	"	7 7/8	"	8 *
A21	"	6 7/8	"	7 *
A22	"	4 3/4	"	15 *
A23	-	-	"	13 3/8.*

A23 should now be ordered in place of A01.

** Discrepancy in Cable Type.

* Discrepancy in Cable Length.